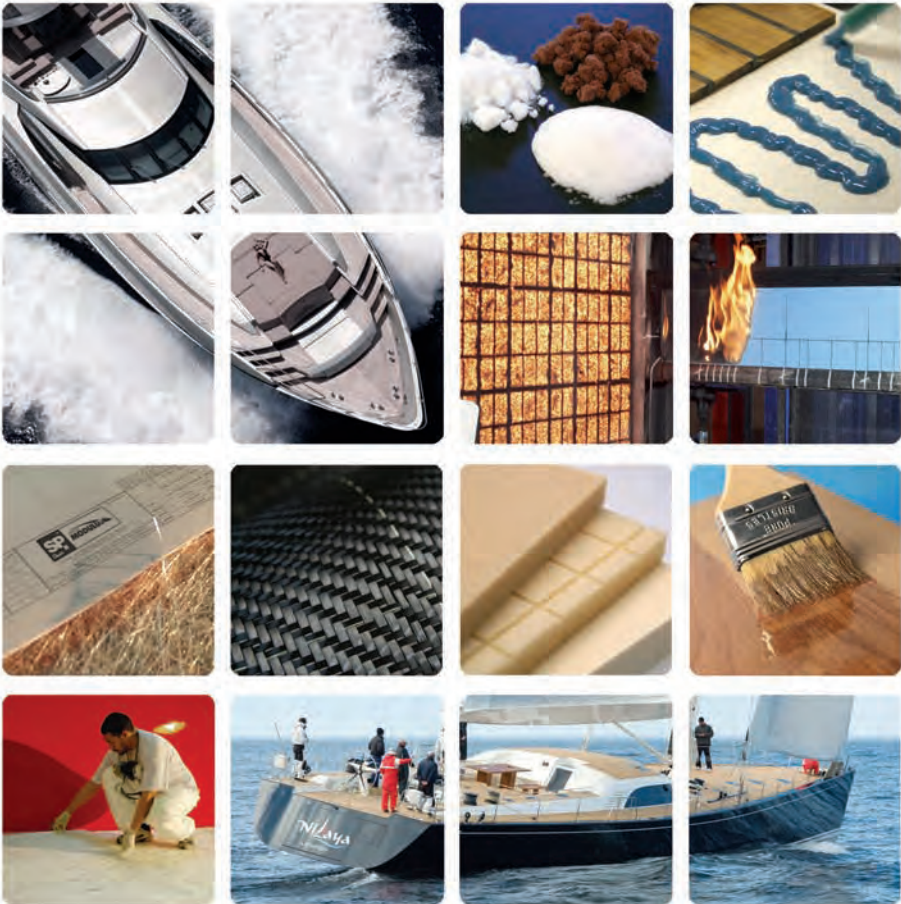




Marine Product Catalogue 2011



Introduction to SP-High Modulus, the marine business of Gurit

SP-High Modulus, the marine business of Gurit, is renowned as one of the leading manufacturers and suppliers of composite materials to the global boatbuilding market. With more than 20 years experience working alongside the world's leading designers, SP-High Modulus' unique approach integrates structural design, materials science and process engineering to offer a complete turnkey solution for the build of best-performance boats.

SP-High Modulus offers a unique solution to make boats stronger, lighter and faster: the combination of innovative, durable, industry-leading composite products with an unrivalled in-house technical expertise, ensuring best-in-class operation wherever it is applied. The versatility and durability of SP-High Modulus' product and in-depth engineering knowledge means every project delivers a performance that is finely tuned to individual specifications and needs.

SP-High Modulus' long history of development and innovation has increased part quality and durability while continual streamlining processes have improved productivity and reduced costs. Achievements include being:

- Instrumental in implementing advanced composites into marine structures
- First to provide a monocoque hull shell solution for race boats
- First to develop practical yet high performance prepregs for the boatyard environment

SP-High Modulus offers an impressive portfolio of standardised and customised products suitable for a full range of requirements, including a comprehensive range of tooling, reinforcement and prepreg materials. SP-High Modulus' patent-approved, award-winning SPRINT® technology offers lightweight, cost-effective solutions for series production boats, potentially reducing production time and cost by 60%, and weight by 40%; **Corecell™** is a leading structural foam core material, which has become widely accepted for the construction of large, high performance structures. Suitable for a wide range of demanding structural applications and different composite manufacturing processes, the **Corecell™** product range provides increased levels of performance, strength, structural integrity and handling, unmatched by any other core material.

How to use this Product Catalogue

This Product Catalogue has been produced to provide information on our main standard products. SP-High Modulus is also well served by a network of representatives, who hold stocks of SP-High Modulus products locally, and who can also act as a local point of contact for technical and sales information. A list of these representatives is given at the end of this publication.

Brief descriptions of each product and product group are given throughout this publication to facilitate product selection. Full information on any product should be obtained from the relevant Technical data-sheet. These can be obtained from the SP-High Modulus website, www.gurit.com/marine or by contacting Customer Support. Contact details for Customer Support are given at the end of this publication.

The Product Catalogue structure is given in the Contents Page opposite. For placing orders, contact details can be found at the end of this Product Catalogue. Written orders may be provided by fax, letter or email. Please use the order codes provided when placing your order to ensure that you obtain the correct products.

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Formulated Products



SP-High Modulus, the marine business of Gurit is a leading supplier of high performance epoxy products formulated to meet market and customer needs.

SP-High Modulus' innovative approach and expertise in epoxy formulations continues to deliver market leading products for a wide range of market segments including race boats, production boats and superyachts. SP-High Modulus provides a complete range of formulated products from in-mould gelcoats to multi-purpose systems.

- > Tooling Products
- > In-mould Gelcoat
- > Ampreg Laminating Systems
- > PRIME™ Infusion Products
- > Spabond Adhesives
 - > Spabond 300 Series - Designed for the bonding of epoxy boats and race boats
 - > Spabond 500 Series - Formulated for the bonding of production boats and superyachts
 - > Spabond 700 Series - Rapid curing systems designed for finishing, fitout and repair of composite structures
- > Coatings
- > Multi-purpose Systems

Tooling Products

Pattern Materials

Epoxy Tooling Paste

T-Paste 70-2 has been designed for Marine customers looking for a fast and reliable way to manufacture patterns and direct moulds.

T-Paste 70-2 combined with CNC technology allows more design freedom and improves pattern/direct mould accuracy whilst reducing production processes.

T-Paste 70-2 (mix ratio 100:92 by weight / 100:100 by volume)

<u>Resin Size</u>	<u>Order Code</u>	<u>Hardener Size</u>	<u>Order Code</u>
T-Paste 70-2 190 litres Resin	F940-122	T-Paste 70-2 190 litres Hardener	F940-123

Please note: A mixing machine is required to mix and dispense the T-Paste 70-2 product.

Machine Supplier	Machine Description	Website
Dekumed	Unidos 300TX/MP 200	www.dekumed.de
2KM	Poly Tool 8120 or Poly Tool 8220	www.2km.co.uk
Tartler	Nodopox 50 or Nodopox 200	www.tartler.com

For more information on suitable mixing machines, please contact SP-High Modulus.

Tooling Products

Mould Materials

Laminating

T-Lam 130-1 (mix ratio 100:40 by weight)

Resin Size	Order Code
T-Lam 130-1 20 kg Resin	F140-202

Hardener Size	Order Code
T-Lam 130-1 8kg Hardener	F140-204

Infusion

T-PRIME 130-1 (mix ratio 100:27 by weight)

Resin/Hardener Packs	Order Code
4.57 kg Pack (3.6 kg Resin / 0.97 kg Hardener)	F163-107

Resin Size	Order Code
T-PRIME 130-1 12.5 kg Resin	F163-102
T-PRIME 130-1 185 kg Resin	F163-100*

Hardener Size	Order Code
T-PRIME 130-1 3.4 kg Hardener	F163-103
T-PRIME 130-1 16.7kg Hardener	F163-106*

3 x 16.75 kg of T-PRIME 130 Hardener required to match 185kg of resin

* Made to Order

Gelcoats

CR 3400

In-Mould Epoxy Gelcoat / Surfacing System (mix ratio 100:30 by weight)

CR 3400 is an in-mould epoxy surfacing system for epoxy laminates and is designed to be used as the base for the subsequent application of a paint scheme. CR 3400 is therefore formulated to be easy to sand so that once released, the CR 3400 surface can be readily keyed prior to the application of the paint system. The product has a considerably longer overcoating window than other gelcoats - up to one day with Standard hardener at 20°C.

Resin Size	Order Code
19 kg Resin	F346-013

Hardener Size	Order Code
5.7 kg Standard	F346-015

Laminating Systems

Ampreg 21

Epoxy Wet Laminating System (resin to hardener mix ratio 100:33 by weight)

Ampreg 21 is the latest generation of laminating systems offered by SP-High Modulus. The low initial mixed viscosity makes this product ideal for wetting out heavyweight fibres/fabrics. It has been designed to give excellent mechanical and thermal properties from both ambient temperature cures and moderate temperature postcures (50°C). Ampreg 21 is available with a range of hardener speeds from Fast to Extra Slow and has been formulated to give significant improvements to Health and Safety when compared to competitive systems. Ampreg 21 is Germanischer Lloyds approved for certified applications.

Resin/Hardener Packs	Order Code
3.6 kg Pack (2.7 kg Resin / 0.9 kg Fast Hardener)	F121-011
3.6 kg Pack (2.7 kg Resin / 0.9 kg Standard Hardener)	F121-012
3.6 kg Pack (2.7 kg Resin / 0.9 kg Slow Hardener)	F121-013
3.6 kg Pack (2.7 kg Resin / 0.9 kg Extra Slow Hardener)	F121-014

Product Availability in Drums

Resin Size	Order Code	Hardener Size	Order Code
10 kg Resin	F121-034	3.33 kg Fast	F121-035
		3.33 kg Standard	F121-036
		3.33 kg Slow	F121-037
20 kg Resin	F121-002	6.66 kg Fast	F121-004
		6.66 kg Standard	F121-006
		6.66 kg Slow	F121-008
		6.66 kg Extra Slow	F121-010
		5.8 kg High Tg	F124-004
216 kg Resin	F121-015	18 kg Fast	F121-017
4 x 18kg Ampreg 21 Hardener required for 216kg drum of resin		18 kg Standard	F121-018
		18 kg Slow	F121-019
		18 kg Extra Slow	F121-020
1000 kg Resin	F121-016	165 kg Fast	F121-021
2 x 165kg Ampreg 21 Hardener required for 1000kg IBC of resin		165 kg Standard	F121-022
		165 kg Slow	F121-023
		165 kg Extra Slow	F121-024

Laminating Systems

Ampreg F230-1 Three-part Foaming Epoxy System (resin to hardener mix ratio 100:23 by weight)

Three-part foaming epoxy system which uses Ampreg 21 hardeners. Foam expands approximately 4x by volume to create a foam of 220-250kg/m².

Exact foaming density depends on moulding restraints and temperature.

Product Availability

Resin Size	Order Code
14.5 kg Resin	F113-007

Hardener Pack	Order Code
3.33 kg Slow	F121-037
3.33 kg Extra Slow	F121-038

(Hardener pack consists of 3.33 kg Hardener with 0.2 kg Foaming Agent and 10cc Syringe)

Laminating Systems

Ampreg 22

Epoxy Laminating System (resin to hardener mix ratio 100:28 by weight)

Ampreg 22 is an established and widely used laminating system. It is intended for both wet lay-up and vacuum bagging processes. The long working time and low exotherm of Ampreg 22 make it ideal for manufacturing large, high performance composite structures.

Ampreg 22 is both Germanischer Lloyds and Lloyds approved for certified applications.

Resin/Hardener Packs	Order Code
4.23 kg Pack (3.3 kg Resin / 0.93 kg Fast Hardener)	F118-020
4.23 kg Pack (3.3 kg Resin / 0.93 kg Standard Hardener)	F118-048
4.23 kg Pack (3.3 kg Resin / 0.93 kg Slow Hardener)	F118-037

Product Availability in Drums

Resin Size	Order Code	Hardener Size	Order Code
20 kg Resin	F118-061	5.6 kg Fast	F118-073
		5.6 kg Standard	F118-074
		5.6 kg Slow	F118-075
		5.6 kg Extra Slow	F118-076
		*5.8 kg High Tg	F124-004
		*please note alternative mix ratio for High Tg hardener - see datasheet	
193 kg Resin	F118-063	18 kg Fast	F118-062
3 x 18 kg Ampreg 22 hardener required for 193 kg drum of resin		18 kg Standard	F118-066
		18 kg Slow	F118-065
		18 kg Extra Slow	F118-064
		18 kg High Tg	F124-002
1000 kg Resin	F118-009	180.0 kg Fast	F118-018
280 kg Ampreg 22 hardener required for 1000 kg IBC of resin		180.0 kg Standard	F118-042
		180.0 kg Slow	F118-036
		180.0 kg Extra Slow	F118-019
		180.0 kg 14 Hour**	F118-047
		180 kg High Tg	F124-001
		*900kg Extra Slow	F118-031
		*900kg Slow	F118-051

*900kg hardeners in IBC's are made to order.

**Made to order

Laminating Systems

Ampreg 26

Epoxy Laminating System (resin to hardener mix ratio 100:33 by weight)

Ampreg 26 is SP-High Modulus' premium epoxy laminating system, and is particularly suitable for the manufacture of large, high performance composite structures. The product's high laminate mechanical properties and high Tg's, achievable from modest postcures, make it well suited for heavily loaded applications.

Product Availability in Drums

Resin Size	Order Code
20 kg Resin	F116-035

216 kg Resin	F116-036
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4 x 18 kg of either Ampreg Ultraslow or Ampreg 26 hardener required for 216 kg resin

1000 kg Resin	F116-010
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333 kg of either Ampreg 26 or Ampreg Ultra Slow hardener required for 1000 kg resin

Hardener Size	Order Code
6.66 kg Fast	F116-039
6.66 kg Slow	F116-040

18 kg Fast	F116-037
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18 kg Slow	F116-038
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18 kg Ultra Slow	F117-205
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180.0 kg Slow	F116-030
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Ampreg Thixotropic Pregel Resin Additive

Ampreg Thixotropic Pregel is a resin additive with a grease-like consistency, which can be used with a variety of hardeners from the SP-High Modulus laminating resin range. It is used primarily as a thixotrope - to be added to low viscosity laminating resins for applications where resin drainage is a concern. It is therefore typically used in vertical and overhead laminating situations, particularly where heavy, open weave fabrics are being used, since these are the most prone to resin drainage.

Resin Size	Order Code
20 kg Resin	F120-008
193 kg Resin	F120-009

Hardener Size

Please refer to Ampreg Thixotropic Pregel Data-sheet for mix ratio information, when used with Ampreg 21, Ampreg 22 and Ampreg 26.

Laminating Systems

Ampreg Adhesion Promoter Modified Epoxy Resin System

Ampreg Adhesion Promoter (AP) is a unique resin system formulated to promote the adhesion between epoxy and vinyl ester resin. This allows production boatbuilders to use existing polyester gelcoats with higher performance epoxy resins supplied by SP-High Modulus.

Product Availability in Drums

<u>Resin Size</u>	<u>Order Code</u>
20 kg Ampreg Adhesion Promoter	F119-002
220 kg Ampreg Adhesion Promoter	F119-001

Hardener Size

Please refer to Ampreg Adhesion Promoter Datasheet for mix ratio information, when used with Ampreg 21 and Ampreg 22.

SP 115

Clear Epoxy Laminating System (resin to hardener mix ratio 100:33 by weight)

SP 115 is a low viscosity, ultra-clear epoxy laminating system. It has been designed for the manufacture of laminates which are to remain unpainted, and where a very clear finish is required. The material also contains blue UV filters which give the product its characteristic transparent pale violet/blue colour.

<u>Resin/Hardener Pack</u>	<u>Order Code</u>
SP 115 Box of 5 x 0.75 kg Resin each in a blister pack with 0.25 kg Hardener	F110-017
SP 115 5.0 kg Pack (3.75 kg Resin / 1.25 kg Hardener)	F110-020

Infusion Systems

PRIME™ 20LV

Epoxy Infusion System (resin to hardener mix ratio 100:26 by weight)

PRIME™ 20LV is the next generation of PRIME™ 20 SP-High Modulus epoxy infusion resin, specifically designed for use in a variety of resin infusion processes including RTM, SCRIMP™ and RIFT. It has a very low mixed viscosity and long working time, allowing large parts with complex reinforcements to be infused successfully in one operation. It has an exceptionally low exotherm characteristic, which allows thick sections to be manufactured without risk of premature gelation due to exothermic temperature rises. PRIME™ 20LV is both Germanischer Lloyd's and Lloyd's* approved for certified applications.

*Pending - Test results submitted for approval. Please check with a Customer Support Representative for up to date information.

Product Availability in Drums

PRIME™ 20LV Resin Size	Order Code
20 kg Resin	F160-049

†1 x 8.8 kg hardener required to match 2 x 20 kg resin.

220 kg Resin	F160-034
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3 x 19 kg hardener required to match 220 kg resin.

†3 x 17.6 kg hardener required to match 220 kg resin.

1000 kg Resin	F160-037
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260 kg hardener required to match 1000 kg resin.

PRIME™ Hardener Size	Order Code
5.2 kg Fast	F160-053
5.2 kg Slow	F160-054
5.2 kg Extra Slow	F160-055

†8.8 kg High Tg	F160-087
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19 kg Fast	F160-068
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19 kg Slow	F160-069
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19 kg Extra Slow	F160-070
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†17.6 kg High Tg	F160-088
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180 kg Fast	F160-018
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180 kg Slow	F160-032
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180 kg Extra Slow	F160-028
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*900kg Extra Slow	F160-033
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*900kg hardeners in IBC's are made to order.

PRIME™ 20 ULV

Ultra Low Viscosity Epoxy Infusion System (resin to hardener mix ratio 100:19 by weight)

PRIME™ 20 ULV is an ultra low viscosity epoxy infusion system, which utilises PRIME™ 20LV resin with a slow (ULV) hardener. The low viscosity of PRIME™ 20 ULV results in fast infusion times, less resin feed lines (reduced resin waste & infusion setup times) and easier wet-out of dry reinforcements leading to higher quality, lower cost parts.

Product Availability in Drums

PRIME™ 20LV Resin Size	Order Code
20 kg Resin	F160-049

220 kg Resin	F160-034
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3 x 13.95 kg hardener required to match 220 kg resin.

1000 kg Resin	F160-037
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PRIME™ ULV Hardener Size	Order Code
3.8 kg Slow	F160-075

13.95 kg Slow	F160-074
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170 kg Slow	F160-073
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Adhesives

Spabond 340LV

Epoxy Adhesive System (mix ratio 2:1 by weight and volume)

Spabond 340LV is a lower viscosity variant of Spabond 340. It has been designed for mixing/dispensing from cartridges and to provide higher dispense rates from mixing machines. This product is ideal for bond-line thicknesses up to 20mm. Spabond 340LV is Germanischer Lloyds approved for certified applications.

Dual Cartridge

900ml Dual Cartridge	Resin / Hardener	Order Code
Box of 10 x 900ml dual cartridge	600ml Resin / 300ml Fast Hardener	F645-042
Box of 10 x 900ml dual cartridge	600ml Resin / 300ml Slow Hardener	F645-041

400ml Dual Cartridge	Resin / Hardener	Order Code
Box of 20 x 400ml dual cartridge	266ml Resin / 134ml Fast Hardener	F645-033
Box of 20 x 400ml dual cartridge	266ml Resin / 134ml Slow Hardener	F645-034

Dispense Guns

900ml Dispense Guns

PC Cox Gun, PPA 600A pneumatic, 900ml 2:1	K215-039
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400ml Dispense Guns

Metix Gun, manual, 400ml 1:1/2:1	K215-021
Metix Gun, pneumatic, 400ml 1:1/2:1	K215-022

Mix Heads

900ml Mix Heads

Box of 20 x 16mm, 20 Element round mix head with screw connection	A640-021
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Designed for bonding large areas - high dispense rate

Box of 20 x 13mm, 18 Element round mix head with bell inlet	A640-009
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Designed for bonding small areas - lower dispense rate

400ml Mix Heads

Box of 20 x 10.7mm, 19 Element square mix head with screw connection	A640-019
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Product Availability in Drums

Resin Size	Order Code	Hardener Size	Order Code
20 kg Resin	F645-053	10 kg Fast	F645-051
		10 kg Std	F645-064
		10 kg Slow	F645-052
		10 kg Extra Slow	F645-057
200 kg Resin	F645-049	200 kg Fast	F645-050
		200 kg Std	F645-065
		200 kg Slow	F645-025
		200 kg Extra Slow	F645-029

Adhesives

Spabond 345

Epoxy Adhesive System (mix ratio 2:1 by volume)

Spabond 345 is a toughened high performance, adhesive system ideal for bonding large structures where substrate surfaces have uneven geometry. The product has a thick, paste-like consistency, and can be applied without sag in thicknesses of over 30mm at 15°C, making it ideal where large, uneven vertical gluelines are required. Spabond 345 has both higher thermal and higher mechanical properties than the other systems in the Spabond 300 range. Spabond 345/Fast Black has been formulated for carbon structures requiring an aesthetic finish.

400ml Dual Cartridge	Resin / Hardener Size	Order Code
Box of 20 x 400ml dual cartridges	266ml Resin / 134ml Fast Hardener	F646-016
Box of 20 x 400ml dual cartridges	266ml Resin / 134ml Fast Black Hardener	F646-024
Box of 20 x 400ml dual cartridges	266ml Resin / 134ml Slow Hardener	F646-014

Dispense Guns

400ml Dispense Guns

Metix Gun, manual, 400ml	K215-021
Metix Gun, pneumatic, 400ml	K215-022

Mix Heads

400ml Mix Heads

Box of 20 x 10.7mm, 19 Element square mix head with screw connection	A640-019
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Product Availability in Drums

Resin Size	Order Code	Hardener Size	Order Code
20 kg Resin	F646-038	9.6 kg Fast	F646-041
		9.6 kg Fast Black	F646-042
		9.6 kg Slow	F646-043
		9.6 kg Extra Slow	F646-044

Spabond 368

Corebond Epoxy Adhesive (mix ratio 2:1 by volume)

Spabond 368 is a DNV Approved Corebond Epoxy Adhesive. It is a low density adhesive, with a simple 2:1 by volume mix ratio which is designed for bonding a wide range of core materials. The product has very good application characteristics and can be applied in thicknesses of up to 15mm at 20°C on vertical surfaces without the risk of drainage.

Product Availability in Drums

Resin Size	Order Code	Hardener Size	Order Code
10 kg Resin	F654-021	4.4 kg Extra Slow Hardener	F654-022
17.5 kg Resin	F654-023	7.7 kg Extra Slow Hardener	F654-024

Adhesives

Spabond 540

Modified Epoxy Adhesive System (mix ratio 1:1 by volume)

Spabond 540 is a modified ambient curing epoxy adhesive designed for bonding polyester or epoxy laminates. The Adhesive system is available with two resins; Spabond 540 resin is designed for larger gaps up to 30mm and Spabond 540LV is a lower viscosity resin designed for thinner bondlines, <20mm. The high toughness and excellent gap filling properties make this adhesive ideal for stringers/bulkheads, frames and hull-to-deck joints on medium to large production boats.

Spabond 540 is RINA approved for certified applications.

Spabond 540LV Dual Cartridge

600ml Dual Cartridge	Resin / Hardener	Order Code
Box of 12 x 600ml dual cartridge	300ml Resin / 300ml Fast Hardener	F648-044
Box of 12 x 600ml dual cartridge	300ml Resin / 300ml Std Hardener	F648-045

Product Availability in Drums

Resin Size	Order Code	Hardener Size	Order Code
1 kg Spabond 540 Resin	F648-039	0.92 kg Fast	F648-012
1 kg Spabond 540LV Resin	F648-021	0.92 kg Std	F648-011
		0.92 kg Slow	F648-026
		0.92 kg Extra Slow	F648-046
10 kg Spabond 540 Resin	F648-040	9.2 kg Fast	F648-032
10 kg Spabond 540LV Resin	F648-031	9.2 kg Std	F648-037
		9.2 kg Slow	F648-034
		9.2 kg Extra Slow	F648-047
20 kg Spabond 540 Resin	F648-041	18.4 kg Fast	F648-010
20 kg Spabond 540LV Resin	F648-013	18.4 kg Std	F648-022
		18.4 kg Slow	F648-030
		18.4 kg Extra Slow	F648-048
200 kg Spabond 540 Resin	F648-042	184 kg Fast	F648-036
200 kg Spabond 540LV Resin	F648-035	184 kg Std	F648-033
		184 kg Slow	F648-038
		184 kg Extra Slow	F648-049

Dispense Guns

600ml Dispense Guns

PC Cox Gun, PPA 300A pneumatic, 600ml 1:1	K215-050
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Mix Heads

600ml Mix Heads

Box of 20 x 10.7mm, 19 Element square mix head with screw connection	A640-019
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Adhesives

Spabond 5 Minute Adhesive Rapid Cure Epoxy Adhesive (mix ratio 1:1 by weight and volume)

Spabond 5 minute adhesive uses SP-High Modulus' fast-setting technology. It combines rapid bonding speed (bonds in 5 minutes, full handling strength in 15-20 minutes) with a simple 1:1 by weight and by volume mix ratio. Spabond 5 minute is an ideal 'spot-weld' adhesive but it is not suitable for applications where a structural adhesive is required.

Description	Order Code
Box of 20 x 310ml Resin cartridge (un-pigmented)	F652-025
Box of 20 x 310ml Hardener cartridge (un-pigmented)	F652-027
Box of 20 x 400ml 2 component dual cartridge (pigmented) 200ml Resin / 200ml Hardener	F652-021

For 400ml dual cartridge; resin (yellow), hardener (blue).

Dispense Guns

310ml Single Component Cartridge Dispense Guns

PC Cox Gun CBM 310/XC BI-MIXER	K215-033
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400ml Dual Cartridge Dispense Guns

Metix Gun, manual, 400ml	K215-021
Metix Gun, pneumatic, 400ml	K215-022

Mix Heads

Mix heads are not available for the 310ml single component cartridges

Box of 20 x 10.7mm, 19 Element square mix head with screw connection	A640-019
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Adhesives

Spabond 730 Rapid Structural Adhesive

Spabond 730 is a rapid setting structural epoxy adhesive. It gels in 10 minutes and has full handling strength after 2 hours. Optimum properties for this adhesive are achieved after an overnight cure at ambient.

Description	Order Code
Box of 20 x 400ml 2 component dual cartridge (pigmented) 200ml Resin / 200ml Hardener	F650-007

For 400ml dual cartridge; resin (yellow), hardener (blue).

Dispense Guns

400ml Dispense Guns

Metix Gun DM400-01 Manual, 400ml	K215-021
Metix Gun DM400-85-01 Pneumatic, 400ml	K215-022

Mix Heads

400ml Mix Heads

Box of 20 x 10.7mm, 19 Element square mix head with screw connection	A640-019
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Filling and Fairing

S-Fair 600

Epoxy Fairing System (mix ratio 100:64 by weight)

S-Fair 600 is a simple 1:1 by volume, two component filler designed for filling and fairing large composite and metal structures such as hulls and decks. It can be applied up to a thickness of 35mm on a vertical surface. It is easy to sand and is compatible with a wide range of primers and top coats typically used in the marine market for the finishing of yachts. It is available with 2 hardeners; Fast and Standard, which enables the customer to tailor the working/cure time to the ambient workshop temperature.

Resin/Hardener Packs

Order Code

5 Litre Pack (2.5 L Resin / 2.5 L Fast Hardener)

F920-113

5 Litre Pack (2.5 L Resin / 2.5 L Std Hardener)

F920-112

Individual components of these packs may be purchased separately as shown below.

Product Availability in Drums

Resin Size

Order Code

10L Resin

F920-003

190L Resin

F920-107

Hardener Size

Order Code

10L Fast

F920-110

10L Std

F920-004

190L Fast

F920-109

190L Std

F920-108

Coatings

SP 320

Solvent-Free Clear Epoxy Coating System (mix ratio 100:33 by weight)

SP 320 is a solvent-free, clear epoxy coating that provides a high clarity, tough finish to whatever it is applied to. When used for coating wood, just a few coats will provide a depth of clarity that can only otherwise be achieved with many more coats of a conventional varnish. The epoxy coating will protect most surfaces from moisture ingress, and will also add strength to softwood surfaces.

Resin/Hardener Packs	Order Code
4.0 kg Pack (3.0 kg Resin / 1.0 kg Fast Hardener)	F505-028
4.0 kg Pack (3.0 kg Resin / 1.0 kg Slow Hardener)	F505-029

Individual components of these packs may be purchased separately as shown below.

Product Availability in Drums

Resin Size	Order Code	Hardener Size	Order Code
20.0 kg Resin	F505-035	6.66 kg Fast	F505-038
		6.66 kg Slow	F505-039

SP Pump Sets

Quantity	Description	Order Code
1 pair	SP 320 Pump Set / 4.0 kg pack	K216-311
1 pair	SP 320 Pump Set / 13.33 & 26.66 kg size	K216-312

Eposeal 300

Universal Epoxy Primer (mix ratio 1:1 by volume)

Eposeal 300 is a solvent-based, low viscosity epoxy primer. It has been developed primarily for use on wood but can also be used on other materials such as GRP, stone, ferrocement, brick, etc. Eposeal 300 has an extremely low viscosity which ensures that the product achieves rapid and deep penetration of porous surfaces.

Resin/Hardener Packs	Order Code
5.0 litre Pack (2.5 litre Resin / 2.5 litre Hardener)	F705-012

Multi-Purpose Systems

SP 106

Multi-purpose Epoxy System (mix ratio 5:1 by volume)

SP 106 is a simple to use, all-purpose epoxy which can be used unmodified as a protective primer, coating or laminating system. When modified with SP-High Modulus filler powders (see Ancillary Products) it can be used as an adhesive or filler system. Its various hardeners provide a range of working times and the Extra Slow hardener can also be used in hot or tropical conditions. SP 106 has been established for over 20 years as the primary epoxy system for the manufacture and repair of wooden boats, and is now widely used in many other woodworking applications.

Resin/Hardener Packs	Order Code
10 x box of 5 x 1 kg pack (0.85 kg Resin with 0.15 kg Fast Hardener in a blister pack)	F510-039
10 x box of 5 x 1 kg pack (0.85 kg Resin with 0.15 kg Slow Hardener in a blister pack)	F510-040
Box of 5 x 1 kg pack (0.85 kg Resin with 0.15 kg Fast Hardener in a blister pack)	F510-037
Box of 5 x 1 kg (0.85 kg Resin with 0.15 kg Slow Hardener in a blister pack)	F510-038
3.02 kg Pack (2.56 kg Resin / 0.46 kg Fast Hardener)	F510-041
3.02 kg Pack (2.56 kg Resin / 0.46 kg Slow Hardener)	F510-042

Resin Size	Order Code	Hardener Size	Order Code
10 kg Resin	F510-004	1.8 kg Fast (0.9 kg x 2)	F510-019
		1.8 kg Slow (0.9 kg x 2)	F510-031
20 kg Resin	F510-051	3.6 kg Fast	F510-018
		3.6 kg Slow	F510-053
216 kg Resin	F510-008	19.5 kg Fast	F510-020
2 x 19.5 kg hardener required for 216 kg resin.		19.5 kg Slow	F510-032
1000 kg Resin†	F510-034	180 kg Fast†	F510-021
		180 kg Slow†	F510-033

SP Pump Sets

Quantity	Description	Order Code
1 pair	SP 106 Pump Set / 3.0 kg size	K216-309
1 pair	SP 106 Pump Set / 11.8 kg & 23.5 kg size	K216-310

† Due to manufacturing restrictions these products are made irregularly and infrequently and therefore lead times can vary from a few days to a few weeks. Stock may be available at the time of ordering. Please contact Customer Support for confirmation of availability.

Multi-Purpose Systems

Handipack

Multi-purpose Epoxy System (mix ratio 2:1 by volume)

Handipack is a multi-purpose epoxy, supplied in a small pack designed for quick repair work and other small tasks. It has a simple 2:1 mix ratio and dispensing is made easy because pumps are supplied in the pack. Used as a coating, it cures rapidly to form a tough, clear film, with good moisture resistance. By adding the appropriate SP-High Modulus filler powder, adhesives and fillers can also be made. The medium-to-low viscosity of the material enables it to be used for small laminating tasks, using light-weight glass fabrics, such as those from the SP-High Modulus reinforcements range.

Resin/Hardener Packs

Order Code

10 x box of 5 x 375 ml (250 ml Resin with 125 ml Hardener & Pumps in a blister pack)	F520-012
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SP Pump Sets

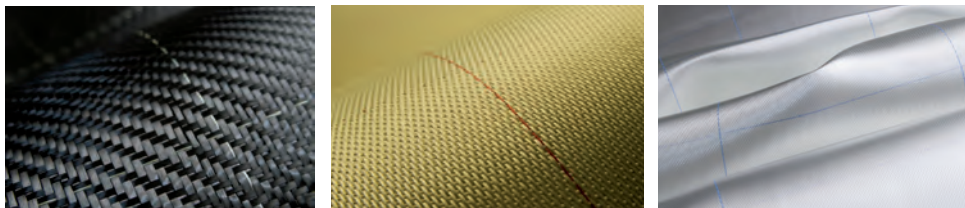
Quantity

Description

Order Code

1 pair	Handipack Pump Set	K216-308
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Reinforcement Materials



SP-High Modulus manufactures and supplies an extensive range of reinforcements suitable for composite component manufacture and repair. These materials are based on the most widely used fibre types and fibre orientations found in the industry, and incorporate a variety of construction techniques in their manufacture.

Our range of Reinforcements is presented by fibre type:

- i) Glass Products – E Glass
- ii) Aramid Products
- iii) Carbon Products
- iv) Hybrid combinations of the above fibres

And sub-divided into the following categories, based on the orientations of the primary structural fibres:

- i) Unidirectional Fabrics – A variety of construction styles with all structural fibres running at 0° where optimum mechanical properties or local reinforcement is required. The Style is generally Unitex ('UT') which offers a balance of handling properties.
- ii) Woven Fabrics – A wide range of woven fabrics, available in plain, twill and satin weave formations with fibres at $0^\circ/90^\circ$.
- iii) Multiaxial Fabrics – Stitched construction with fibres at $\pm 45^\circ$ or $0^\circ/90^\circ$ (Double Bias), $0^\circ/\pm 45^\circ/45^\circ$ (Triaxial) and $0^\circ/\pm 45^\circ/-45^\circ/90^\circ$ (Quadraxial). These products offer excellent mechanical properties, and have optimised fibre spread for high laminate quality.
- iv) Tapes – Narrow ($< 200\text{mm}$) fabric versions of the above:

There is also a section detailing the range of shears supplied to meet the specific requirements of cutting the different fibre types.

Reinforcement Materials

Availability

The supply of dry reinforcements is subject to a minimum single roll quantity per style for most items. Smaller quantities of fabric are available from SP-High Modulus' network of distributors, subject to cutting and handling charges.

This catalogue describes SP-High Modulus' standard range of reinforcement materials. If your preferred reinforcement is not listed in the following pages, please contact SP-High Modulus, as we can offer alternative weaves, weights, fibres and fibre combinations in any style. Non-standard items may be subject to limited availability. Width availability may change from time to time.

For further information, confirmation of stock levels and technical advice on SP-High Modulus' reinforcement materials - please contact SP-High Modulus' Customer Support Team.

SP Reinforcement Nomenclature

In order to make SP-High Modulus' Reinforcement designations easy to understand the following nomenclature is used throughout the range:

Reinforcement Designation System

- 1st letter: General Construction of Reinforcement Fabric
- WR = Woven rovings - (glass)
 - R = Woven fabric - yarn (glass/aramid) or tows (carbon)
 - X = Double bias ($\pm 45^\circ$) stitched fabric
 - Q = Quadraxial ($0^\circ/90^\circ/\pm 45^\circ$) stitched fabric
 - Y = Triaxial ($0^\circ/\pm 45^\circ$) stitched fabric
 - UT = Unitex woven low-crimp unidirectional fabric
 - UF = Unifibre non-woven unidirectional fabric
- 2nd letter: Fibre Type (or Major Component in Hybrid)
- E = E glass
 - S = S glass (or R glass)
 - A = Aramid
 - C = Carbon
- 3rd letter: 2nd Fibre Type - Minor Component in Hybrid (as above);
also:
- (when present) T = Tape version

Reinforcement Materials

Following the letters are 2, 3 or 4 digits which provide an indication of area weight in g/m². (Please note that the number shown in the fibre style is not the exact weight in grammes.)

Final digit: Identifier to distinguish otherwise similar fabrics.

Suffix letter: For woven fabrics, the following suffixes indicate the weave:

- P = Plain
- T = 2x2 twill
- S = 3x1 twill
- T4 = 4x4 twill
- Hx = Satin (where x = harness number)
- C = Crowsfoot
- B = Basket
- Q = Quadran

Examples: UT-C300/500
UD carbon in Unitex
Nominal weight 300g/m²
Width 500mm

RA320H5/1000
Woven aramid fabric, 5 Harness Satin
Nominal weight 320g/m²
Width 1000mm

QEA1204/1270
Quadraxial E-glass/aramid hybrid fabric
Nominal weight 1200g/m²
Width 1270mm

Reinforcement Materials

E-Glass Products

Uni-directional Reinforcement Fabrics

Please be advised that these materials may be subject to a minimum order quantity of greater than one roll. Please contact your Customer Support Representative for details.

Style	Width (mm)	Unit	Standard Roll (m ²)	Order Code
UT-E250	500	sqm	100	R161-015
UT-E500	500	sqm	50	R161-021

0/90° Woven Yarn

Style	Width (mm)	Unit	Standard Roll (m ²)	Order Code
RE86P	1050	sqm	109.2	R111-008
RE165T	1270	sqm	133.3	R111-203
RE210D	1300	sqm	141.7	R111-120
RE295H4	1240	sqm	136.4	R111-113
RE301H8	1270	sqm	130.8	R111-117
RE400T	1250	sqm	137.5	R111-197

0/90° Woven Roving Yarn

Style	Width (mm)	Unit	Standard Roll (m ²)	Order Code
WRE581T	1250	sqm	62.5	R111-116

+45° Double Bias Stitched Fabrics

Style	Width (mm)	Unit	Standard Roll (m ²)	Order Code
XE304	1270	sqm	127	R121-190
XE451	1270	sqm	114.3	R121-187
XE603	1255	sqm	62.75	R121-014
XE905	1270	sqm	50.8	R121-018

0/90/±45° Quadraxial Stitched Fabrics

Style	Width (mm)	Unit	Standard Roll (m ²)	Order Code
QE624	1270	sqm	76.2	R121-151
QE1174	1270	sqm	44.4	R121-153

In cases of high demand, products may not always be available from stock. Please contact your Customer Support Representative for confirmation of availability.

Additions and changes to our Reinforcements range may be made at any time. Please refer to our website (www.gurit.com/marine), or contact your Customer Support Representative for latest information.

Reinforcement Materials

E-Glass Products - cont'd

0/90° Woven Tapes

Typical uses for these tapes are in the reinforcement of the joint lines of thin, light panels bonded at their edges, and the wrapping of tubular structures.

Style	Width (mm)	Unit	Order Code
RET160	50	50 lm roll	R111-053
RET160	100	50 lm roll	R111-055

±45° E-Glass Tapes

Stitched type in E-glass. Typical uses for these tapes are in the reinforcement of the joint lines of thick, heavy panels bonded at their edges.

Style	Width (mm)	Unit	Order Code
XET300	125	50 lm roll	R121-056
XET601	140	50 lm roll	R121-060

NB. If you require any products which are not featured in the Product Catalogue, please contact your Customer Support or Sales Representative.

Please contact your Customer Support Representative for confirmation of availability.

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Reinforcement Materials

Carbon Products

These products may be produced with either HSC or HEC carbon fibres.

Unidirectional Reinforcement Fabrics

Please be advised that these materials may be subject to a minimum order quantity of greater than one roll. Please contact your Customer Support Representative for details.

Style	Width (mm)	Unit	Standard Roll (m ²)	Order Code
UT-C200	500	sqm	75	R163-039
UT-C300	500	sqm	62.5	R163-040

0/90° Woven Reinforcements

SP-High Modulus reserve the right to interchange 1000mm and 1270mm alternatives without prior notice.

Style	Width (mm)	Unit	Standard Roll (m ²)	Order Code
RC200T	1270	sqm	127	R113-134
RC303T	1270	sqm	133.3	R113-128
RC416T	1270	sqm	63.5	R113-083
RC660T	1270	sqm	63.5	R113-127

+45° Double Bias Stitched Fabrics

Style	Width	Unit (mm)	Standard Roll (sqm)	Order Code
XC302	1270	sqm	127	R123-060
XC411	1270	sqm	127	R123-006
XC611	1270	sqm	63.5	R123-068

Please contact your Customer Support Representative for confirmation of availability.

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Reinforcement Materials

Carbon Products - cont'd

Uni-directional Reinforcement Tapes

Non-crimp plain weave type (Unix) in carbon. Typical uses for these tapes are in the local reinforcement of predominantly glass composite structures, where the load paths are known.

Style	Width (mm)	Unit	Order Code
RUCT500P	100	50 lm roll	R163-057

±45° Double Bias Stitched Tapes

Stitched type in carbon. Typical uses for this tape is in the reinforcement of the joint lines of thick, heavy panels bonded at their edges. Woven from HEC fibres.

Style	Width (mm)	Unit	Order Code
XCT411	120	50 lm roll	R123-017

NB. If you require any products which are not featured in the Product Catalogue, please contact your Customer Support or Sales Representative.

Please contact your Customer Support Representative for confirmation of availability.

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Reinforcement Materials

Aramid Products

0/90° Woven Reinforcements

Style	Width (mm)	Unit	Standard Roll (m ²)	Order Code
RA175H4	1000	sqm	100	R112-004
RA320H5	1000	sqm	100	R112-007

+45° Double Bias Stitched Fabrics

Style	Width (mm)	Unit	Standard Roll (m ²)	Order Code
XA450	1270	sqm	133.3	R122-002

NB. If you require any products which are not featured in the Product Catalogue, please contact your Customer Support or Sales Representative.

Please contact your Customer Support Representative for confirmation of availability.

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Reinforcement Materials

Shears

Composite Material Shears

Aramid Shears

Aramid is a tough material requiring special cutting edges. SP-High Modulus aramid shears have serrated blades to prevent fibre slip while cutting and toughened steel edges for more effective cutting. The premium grade are a higher specification which last longer in use. The Teflon coating of the shears allows easy clean up when cutting resin-impregnated fabric.

Style	Unit of Sale	Order Code
Teflon coated aramid shears 10" round point	1 pair	A648-009

Carbon and Glass Shears

Carbon and glass fibres, although strong, are relatively brittle. SP-High Modulus carbon/glass shears have heavy duty chromed blades and black handles. Left-handed pairs are also available.

Style	Unit of Sale	Order Code
Carbon glass shears 10" LOA/13cm cut	1 pair	A648-004
Carbon glass shears 12" LOA/16cm cut	1 pair	A648-005

Prepreg Materials



Pre-impregnated materials (prepregs) are reinforcement fibres or fabrics into which a pre-catalysed resin system has been impregnated by a machine. The resin systems in these materials react only very slowly at room temperature, giving rise to working times of many days to several months. The prepreg resins can only be fully cured by heating them to the prescribed cure temperature. The accuracy of the machinery used to combine the fabric or fibre with the resin system ensures that laminates produced from prepregs have more consistent and higher fibre contents than can be achieved by wet lay-up techniques. Furthermore, this technology allows the use of very tough and strong resin systems that would be too high in viscosity to be impregnated by hand.

SP-High Modulus' prepregs all use the latest solvent-free, hot-melt technology. This combines the prepreg resin system with the reinforcement using heat to reduce resin viscosity and pressure to assist resin impregnation. Besides producing a volatile-free product, the solvent-free nature of this process is far more environmentally acceptable than the more traditional 'solvent tower' process. Every prepreg product produced by SP-High Modulus is monitored on-line with sophisticated measuring equipment. This gives the products their highly accurate and consistent resin contents.

Although it is theoretically possible to produce an almost infinite number of resin and reinforcement permutations, wherever possible SP-High Modulus produces prepregs from a defined selection to ensure that each product provides the best combination of performance and cost. These standard items are listed in this product catalogue, and enquiries for other combinations should be made to an SP-High Modulus Sales Engineer.

Photos: Tim Wright/www.photoaction.com

Prepreg Materials

Fibre Definitions of HSC, HEC, IMC and HMC

Fibre	Strength	Modulus
HSC	>3.8GPa	242 ± 15GPa
HEC	>4.8GPa	242 ± 15GPa
IMC	>4.4GPa	295 ± 15GPa
HMC	>4.3GPa	385 ± 10GPa

Special bespoke products are available for custom applications, where specific variants of width, resin content, fibre weight, tack levels and backers etc can be requested. For specific enquiries on custom products, please contact SP-High Modulus Product Management.

Product descriptions shown in the following pages are all structured according to the following systems:

Unidirectional prepregs: Resin systems and variant / fibre type (generic or mfrs. code) / fibre weight (g/sqm) / prepreg width (mm) / resin content (%) by weight (normally ±3%) / backer colour (normally embossed poly)

eg. PC53-4163 (SE84LV / HEC / 300g / 400mm / 35% / 1 blue poly, 1 paper)

Woven and Multiaxial prepregs: Resin system and variant / SP-High Modulus reinforcement designation / prepreg width (mm) / resin content (%) by weight (normally ±3%) / backer colour (normally embossed poly)

eg. PC22-1849 (SE84LV / XA450 / 1270mm / 46% / 1 blue)

Adhesive films: Resin systems and variant / carrier (S = scrim) / total weight (g/sqm) / film width (mm) / backer colour (normally paper)

eg. PC11-579 (SA80 / S / 250g / 1270mm / 1 paper)

A full description of the SP-High Modulus reinforcement designation system is given in the Reinforcement section of this Product catalogue.

Prepreg Materials

popa = 1 paper backer + 1 poly backer

SE 70

SE 70 is a family of hot melt, low temperature (70°C) cure, epoxy prepreg systems. They have been developed for use in the construction of large components using low energy cure cycles, and have an outlife of 30 days at 23°C. Excellent properties can be achieved at this cure temperature, particularly compressive and interlaminar shear strengths.

Woven Carbon

Description	Typical Roll Length (m ²)	Order Code
SE 70/RC203P/1270/42+/-3%/popa	63.5	PP13-4315
SE 70/RC303T/1270/42+/-3%/popa	44.45	PP13-2823
SE 70/RC660T/1270/40+/-3%	25.4†	PP13-4746
SE 70/RC200T/1270/40+/-3%	76.2	PP13-3792

Unidirectional High Strength Carbon (HSC) (Modulus 236 GPa±7GPa, Strength >3.8GPa)

Description	Typical Roll Length (m ²)	Order Code
SE 70/HSC/300/400mm/35+/-3%/popa	60†	PP53-4197

Unidirectional High Elongation Carbon (HEC) (Modulus 240 GPa±8GPa, Strength >4.8GPa)

Description	Typical Roll Length (m ²)	Order Code
SE 70/HEC/150/400mm/37+/-3%	80†	PP53-3204
SE 70/HEC/200/400mm/35+/-3%/popa	80†	PP53-4164
SE 70/HEC/300/400mm/35+/-3%/popa	60†	PP53-4165

Unidirectional Intermediate Modulus Carbon (IMC) (Modulus 299 GPa±9GPa, Strength >4.4GPa)

Description	Typical Roll Length (m ²)	Order Code
SE70/IMC/300/400mm/37+/-3%/popa	60†	PP53-4463

Biaxial ±45 Carbon

Description	Typical Roll Length (m ²)	Order Code
SE70/XC411/1270/40+/-3%	38.1†	PP23-3410

Peel Ply

Description	Typical Roll Length (m ²)	Order Code
SE70LV/NPP80/1000mm/50+/-5%/1pa	100	PP15-5724

Other Carbon, Glass, Aramid & Hybrid Prepregs

SE 70 is available in similar formats as SE84LV. Please consult the appropriate sections of this product catalogue. Call Customer Support or Sales for further information.

Please check availability with your Customer Support representative

† This item may have a minimum order quantity of more than 1 roll. Please contact your Customer Support representative for details.

Prepreg Materials

SE 84LV

SE 84LV is an exceptionally versatile hot-melt, epoxy prepreg, it can be cured at temperatures as low as 80°C, or it can be used for faster moulding of components at 120°C. This is achieved with an extremely good outlife of up to 56 days at 21°C. SE 84 is a toughened system, and offers excellent mechanical properties on a wide variety of reinforcing fabrics and fibres. With its high compressive strength it is widely used in large heavily loaded components, such as yacht hulls, and spars.

The SE 84LV resin system is Lloyds approved. SP-High Modulus has Lloyds and GL approval for SE 84LV with some multi-axial carbon, woven carbon and carbon UD products. Please contact your customer support representative for more information.

Unidirectional High Strength Carbon (HSC) (Modulus 236 GPa±7GPa, Strength >3.8GPa)

Description	Typical Roll Length (m ²)	Order Code
SE 84LV/HSC/150/400mm/35%/popa	80†	PC53-2308
SE 84LV/HSC/200/400mm/37%+/-3%/popa	80†	PC53-4184
SE 84LV/HSC/300/400mm/35+/-3%/popa	60†	PC53-944
SE 84LV/HSC/450/400mm/35+/-3%/popa	40†	PC53-2307

Unidirectional High Elongation Carbon (HEC) (Modulus 240 GPa±8GPa, Strength >4.8GPa)

Description	Typical Roll Length (m ²)	Order Code
SE 84LV/HEC/150/400mm/37+/-3%/popa	80†	PC53-4161
SE 84LV/HEC/200/400mm/37+/-3%/popa	80†	PC53-4160
SE 84LV/HEC/300/400mm/35+/-3%/popa	60†	PC53-4163
SE 84LV/HEC/450/400mm/35+/-3%/popa	40†	PC53-4159

Unidirectional Intermediate Modulus Carbon (IMC) (Modulus 299 GPa±9GPa, Strength >4.4GPa)

Description	Typical Roll Length (m ²)	Order Code
SE 84LV/IMC/300/400mm/35%/popa	60†	PC53-2306
SE 84LV/IMC/450/400mm/40+/-3%/popa	40†	PC53-4843

Please check availability with your Customer Support representative

† This item may have a minimum order quantity of more than 1 roll. Please contact your Customer Support representative for details.

Prepreg Materials

SE 84LV - cont'd.

Unidirectional High Modulus Carbon (HMC) (Modulus 380 GPa±10GPa, Strength >4.3GPa)

Description	Typical Roll Length (m ²)	Order Code
SE 84LV/HMC/150/400mm/35+/-3%/popa	80†	PC53-1807
SE 84LV/HMC/300/400mm/35+/-3%/popa	60†	PC53-1808
SE 84LV/HMC/450/400mm/35%/popa	40†	PC53-2305

Woven High Strength Carbon (Modulus 230 GPa±10GPa, Strength >3.3GPa)

Description	Typical Roll Length (m ²)	Order Code
SE 84LV/RC200T/1270mm/42+/-3%	63.5	PC13-2646
SE 84LV/RC203P/1270mm/42+/-3%/popa	63.5	PC13-4314
SE 84LV/RC303T/1270mm/42+/-3%	44.45	PC13-2710
SE 84LV/RC416T/1270mm/40+/-3%	31.75†	PC13-2682
SE 84LV/RC660T/1270mm/43.5+/-3%	25.4†	PC13-3625

Biaxial ±45 Carbon

Description	Typical Roll Length (m ²)	Order Code
SE84LV/XC305/1270mm/41+/-3%	63.5	PC23-4362
SE 84LV/XC411/1270mm/40+/-3%	38.1	PC23-1738
SE 84LV/XC611/1270mm/40+/-3%	31.75†	PC23-3803

Hybrid Fibre - Unidirectional, Woven and Multiaxial

Description	Typical Roll Length (m ²)	Order Code
SE 84LV/REA390S/1200mm/39+/-3%	60†	PC11-1741

Please check availability with your Customer Support representative

† This item may have a minimum order quantity of more than 1 roll. Please contact your Customer Support representative for details.

Prepreg Materials

SE 84LV - cont'd.

Peel Ply

Description	Typical Roll Length (m ²)	Order Code
SE 84LV/NPP80/1000mm/50+/-5%/1 paper	100	PC15-1744

Woven Glass

Description	Typical Roll Length (m ²)	Order Code
SE 84LV/RE165T/1000mm/41+/-3%	50	PC11-1745
SE 84LV/RE200P/1270mm/39+/-3%	63.5	PC11-2884
SE 84LV/RE295/1240mm/39+/-3%	62	PC11-4005

Multiaxial Glass

Description	Typical Roll Length (m ²)	Order Code
SE 84LV/XE603/1250mm/36+/-3%	31.25†	PC21-1747
SE 84LV/XE905/1270mm/35+/-3%	19.05†	PC21-1748

Woven and Multiaxial Aramid

Description	Typical Roll Length (m ²)	Order Code
SE 84LV/RA175H4/1000mm/50+/-3%	50	PC12-1750
SE 84LV/RA320H5/1270mm/46+/-3%	63.5	PC12-1752
SE 84LV/XA450/1270mm/46+/-3%	63.5	PC22-1849

Please check availability with your Customer Support representative

† This item may have a minimum order quantity of more than 1 roll. Please contact your Customer Support representative for details.

Prepreg Materials

Intensifying Pastes

SP-High Modulus' mono-component pastes are pre-catalysed adhesive/filler systems that can be used in conjunction with SP-High Modulus prepregs and SPRINT®. They are used as in-situ fillers to bridge corners or tight radii and can also be used as core splicing adhesives. The system range covers black and white variants in high and low densities. Being pre-catalysed system, they require freezer storage for long-term stock holding. Outlife at 20°C is about 20 days.

For use with SE 84 (or SPRINT® at 80 degrees)

Description	Order Code
SP 4202 Black - high density - mono-component intensifying paste 316g cartridge	FX4202-22
SP 4832 Black - low density - mono-component intensifying paste 300ml (216g) cartridge	FX4832-31
SP 4832 15kg (22lt) pail for use with dispensing machines	FX4832-32
SP 9435 White - high density - mono-component intensifying paste 300ml	FX9435-28

For use with SE 70

SPX11100 White mono-component intensifying paste 300ml	FY1100-31
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Please check availability with your Customer Support representative

SP Adhesive films

SA 70 is an adhesive film that is designed for secondary bonding, core-bonding and for co-curing with the range of SP-High Modulus prepregs. It can be cured at temperatures as low as 70°C, or can be more quickly cured at temperatures above 120°C. The product has an outlife of 56 days.

SA 80 is an adhesive film that is designed for secondary bonding, core-bonding and for co-curing with the range of SP-High Modulus prepregs. It can be cured at temperatures as low as 80°C, or can be more quickly cured at temperatures above 120°C. SA80 FR is a fire retardant version.

SA 70

Description	Carrier Type	Typical Roll Length (m ²)	Order Code
SA 70/S/250g/1270mm	glass	101.6	PP11-2279
SA 70/S/400g/1270mm	glass	63.5	PP11-2278
SA 70/00/150g/1270mm	none	63.5	PP00-2967
SA 70/00/150g/1270mm	none	102.9	PP00-5549

SA 80

Description	Carrier Type	Typical Roll Length (m ²)	Order Code
SA 80/00/100g/1270mm	none	127	PC00-735
SA 80/00/200g/1270mm	none	127	PC00-1778
SA 80/S/150g/1270mm	glass	127	PC11-666
SA 80/S/250g/1270mm	glass	101.6	PC11-579
SA 80/S/400g/1270mm	glass	63.5	PC11-580

Please check availability with your Customer Support representative

SPRINT® Materials



SPRINT® - SP Resin Infusion Technology – is a unique patented material and processing technology that allows high quality composite components, with high mechanical properties and very low void content, to be produced rapidly and economically.

SPRINT® materials consist of a layer of fibre reinforcement either side of a pre-cast, precatalysed resin film with a very lightweight tack film on one face. The material therefore has the appearance of dry reinforcement, which has resin concealed at its center. SPRINT® materials are produced by a process that differs from conventional prepreg so that the fibres in the reinforcements remain dry and unimpregnated by the resin.

SPRINT® materials are laid up in a mould and vacuum bagged as for conventional prepreg. However, when the vacuum is applied, the air transport properties of the dry reinforcement enable air trapped in the fibre bundles and between layers to be easily removed. When the temperature is then raised for the cure, the resin film softens and flows into the air-free reinforcement. The void content of the resultant laminate is extremely low (typically 0-0.5%).

SPRINT® is available in a number of resin and reinforcement combinations using woven and stitched carbon, glass, aramid and hybrids in a multitude of styles. These can be in the form of random mat, woven fabrics, stitched fabrics, or simple rovings.

Unlike conventional prepreg the fibres are not held rigidly by the resin, so the SPRINT® prepreg is much more drapable. The technology has been successfully applied to a range of applications from large structures (with thick laminates) to small complex mouldings.

SPRINT® is also Germanischer Lloyds approved for some products within the range. Please see the following pages for more information, or contact your customer support representative for more details.

SPRINT® Materials

Product Descriptions

Surfacing Film	Resin System / Carrier (if any) / Resin Weight / Surfacing Medium (if any) / Width
Structural SPRINT®	Resin System / Fabric / Resin Content / Fabric / Width
Single SPRINT®	Fabric / Resin Film

Description / Explanations

RC2 = RC200T	195gsm 3k Carbon, Twill Weave
RC3 = RC300T	300gsm 6k Carbon, Twill Weave
RC303T	300gsm 12k Carbon, Twill Weave
RC6 = RC660T	660gsm 12k Carbon, Twill Weave
W5 = WRE581	580gsm Glass Woven Roving

SPRINT® Materials

ST 95 - Structural SPRINT®

ST 95 is a toughened SPRINT® system that offers an extremely good balance of mechanical properties. With a minimum cure temperature of 80°C (with a suitable post-cure), it is ideal for structural components where improved performance and resistance to micro-cracking is desired. ST 95 resin matrix has good flow resistant characteristics that make it stable at room temperature (21°C). The product has a light tack on one side which aids placement in a mould tool. For details of cure schedules, please refer to data sheet.

ST 95 is Germanischer Lloyds approved for some glass and carbon products. Please contact your customer support representative for more information.

Carbon

Description	Typical Roll Length (m ²)	Order Code
ST95/RC200T/42%/RC200T/1270/T/popa	31.75†	SL13-2810
ST95/RC303T/42%/RC303T/1270/T/popa	25.4†	SL13-2826
ST95/RC303T/51%/RC303T/1270/T/popa*	19.05	SL13-2878

*Additional resin included for core-bonding.

Glass

Description	Typical Roll Length (m ²)	Order Code
ST95/+45E3/42%/-45E3/1270/T/popa	22	SL41-3199
ST95/RE301H8/46%/RE301H8/1270/T/popa*	19.05	SL11-2891
ST95/WRE581T/35%/WRE581T/1250/T/popa	15	SL11-2732
ST95/WRE581T/41%/WRE581T/1250/T/popa	12.5	SL11-2560

*Additional resin included for core-bonding.

Please check availability with your Customer Support representative

† This item may have a minimum order quantity of more than 1 roll. Please contact your Customer Support representative for details.

SPRINT® Materials

ST 70 - Structural SPRINT®

This is a low temperature (70°C) cure, SPRINT® system. They have been developed for use in the construction of large components using low energy cure cycles, and have an outlife of 30 days at 23°C. Excellent properties can be achieved at this cure temperature, particularly compressive and interlaminar shear strengths.

Description	Typical Roll Length (m²)	Order Code
ST70/RC303T/42%/RC303T/1270/T /popa	19.05†	SA13-4555
ST70/RC303T/51%/RC303T/1270/T /popa	19.05	SA13-4475
ST70/WRE581T/41%/WRE581T/1250/T	18.75†	SA11-4399

Please check availability with your Customer Support representative

† This item may have a minimum order quantity of more than 1 roll. Please contact your Customer Support representative for details.

SPRINT® Materials

SPRINT® Surfacing Materials

SP-High Modulus have a range of surfacing materials specific to a number of applications. With the exception of SF 95 (supplied in flat sheets of 510mm x 1260mm) these products are supplied on a roll.

SF 80 is a pale green lightweight, sandable film. It provides a pin-hole free surface to all marine mouldings with minimal print-through, onto which a paint finish can be applied.

SF 95 surfacing material is a 300g grey filled epoxy film designed to enhance the surface finish of moulded composite components. Cured at 85°C with a vacuum only process, it provides a 'Class A' surface finish with no print through from the underlying laminate. SF 95 forms a stable sandable surface onto which a paint finish can be applied once lightly keyed. It is supplied in 515 x 1260mm sheets.

SF 95VH is a silicon carbide surfacing system developed initially for the automotive sector to protect vulnerable underbody components of both GT racing and sports cars which minimises fibre damage from foreign object impacts. For details of cure schedules, please refer to data sheet.

SF 95PF is a grey filled epoxy film designed to enhance the surface finish of composite components. Curable at 85°C with a vacuum only process it provides an easy sanding pinhole free surface finish with minimal print through from the underlying laminate. SP 95PF provides a stable surface onto which a paint finish can be applied once lightly keyed.

Description	Typical Roll Length (m²)	Order Code
SF70/S2/150g/1260	63	SC11-4405
SF80/S2/150g/1260	63	SC11-2829
SF95VH/S2/300g/1270	63.5	SA11-1654
SF95PF/S2/300g/1260/Black	63	SA11-2351

Please check availability with your Customer Support representative

† This item may have a minimum order quantity of more than 1 roll. Please contact your Customer Support representative for details.

SPRINT® Materials

Single SPRINT®

ST 94 is a toughened system offering a good balance of mechanical properties. It comprises of a single layer of reinforcement fabric plied against a resin filmed paper. The resin film has a medium tack that makes it ideal for vertical surface applications. Although moderately tacky, ST 94 can be repositioned once in place without disturbing the underlying single SPRINT® layers.

ST 94 is Germanischer Lloyds approved for some glass and carbon products. Please contact your customer support representative for more information.

Carbon

Description	Typical Roll Length (m ²)	Order Code
ST94/RC200T/1270/42+/-3%/S/S	63.5	SR13-5180
ST94/RC416T/1270/42+/-3%/S/S	120.65	SR13-3550
ST94/RC660T/1270/42+/-3%/S/S	22.86	SR13-3109
ST94/XC305/1270/42+/-3%/S/S	44.45	SR23-4393
ST94/XC411/1270/42+/-3%/S/S	31.75†	SR23-3134
ST94/XC611/1270/40+/-3%/S/S	25.4	SR23-5358

Glass

Description	Typical Roll Length (m ²)	Order Code
ST94/WRE581/1250/33%+/-3%/S/S	31.25	SR11-3219
ST94/QE624/1270/33+/-3%/S/S	63.5	SR21-4765L
ST94/QE1203/1270/35+/-3%/S/S	15.24	SR21-2850
ST95/XE905/1270/43%/S/S	16.51	SL21-3634

Aramid

Description	Typical Roll Length (m ²)	Order Code
ST94/RA320H5/1270/45%/S/S	30.48	SR12-5042

Please check availability with your Customer Support representative

† This item may have a minimum order quantity of more than 1 roll. Please contact your Customer Support representative for details.

SPRINT® Materials

Single SPRINT®

ST 70 is a specially tailored SPRINT® resin system that offers some unique characteristics. Chief among these is that it can be co-cured with polyester gelcoat / vinylester skincoat for use in production components. This allows the use of SPRINT in production boats with confidence. It has a versatile cure envelope from overnight at 70°C to cycles as short as 25minutes at 120°C and is sufficiently toughened that it can be used for both the structural laminate and as a core-bond with Corecell™ foam simply by increasing the resin content of the SPRINT®, removing the need for additional adhesive films. The low cure temperature allows use of low cost tooling materials such as vinylester / glass tooling. In line with all SPRINT® resin matrices, ST 70 has good flow characteristics, tailored to give low flow at room temperature to avoid wetting out of the reinforcement on the roll, but high flow at the cure temperature to ensure full wet out and low void content.

Carbon

Description	Typical Roll Length (m ²)	Order Code
ST70/RC203P/1270/40%+/-3%/S/S	63.5	SA13-4612
ST70/RC416T/1270/42%/S/S	127	SA13-4493

Glass

Description	Typical Roll Length (m ²)	Order Code
ST70/QE624/1270/35+/-3%/S/S	25.4	ST21-5469
ST70/WRE850T/1250/35%/S/S	62.5	ST11-5315
ST70/XE905/1270/32+/-3%/S/S	127	SA21-4599

S-Core

S-Core is a multi-layered moulding material consisting of a layer of polyester non-woven honeycomb material against a precatylised resin film. It must be accompanied by a SPRINT® laminate on both faces.

S-Core has a cured thickness of 4mm, making it ideal for bulking out laminates.

Description	Typical Roll Length (m ²)	Order Code
ST70/S-Core/4.0mm/1270	12.7†	SA11-4522
ST94/S-Core/4.0mm/1270	10.16	SR11-3444

Please check availability with your Customer Support representative

† This item may have a minimum order quantity of more than 1 roll. Please contact your Customer Support representative for details.

Fire Retardant Materials



SP-High Modulus' range of Fire Retardant (FR) products are designed to deliver high performance laminates whilst meeting demanding fire requirements.

The ease of use and processing properties of these systems allow large parts to be manufactured in one operation using vacuum only consolidation.

The Fire Retardant range is available in a wide variety of formats from ambient curing liquid systems to elevated temperature curing SPRINT® products.

Typical applications include cladding of buildings, interior and exterior train parts, commercial/military craft and fire protection on passenger ferries/superyachts.

- > Ambient Curing FR Products
 - > Ampreg 21FR
 - > Adhesives & Surfacing Materials

- > Elevated Temperature Curing
 - > ST 70FR
 - > SE 90FR
 - > ST 90FR

Fire Retardant Materials - Ambient Curing

Fire Retardant Surfacing Materials & Adhesives

Please contact a member of the SP-High Modulus customer support team for information on Fire Retardant Surfacing Materials.

Ampreg 21FR

Fire Retardant Epoxy Wet Laminating System (resin to hardener mix ratio 100:21 by weight)

Ampreg 21FR has been optimised for the manufacture of large composite structures using hand layup, and vacuum bagging techniques. Ampreg 21FR has been designed to give excellent mechanical and thermal properties from both ambient temperature cures, and moderate temperature postcures (50°C). This system is available with a range of hardener speeds, from Fast to Ultra Slow.

Product Availability in Drums

Ampreg 21FR Resin Size	Order Code
15.85 kg Resin	F122-004

Ampreg 21 Hardener Size	Order Code
3.33 kg Standard	F121-036
3.33 kg Slow	F121-037

257 kg Resin	F122-005
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3 x 18 kg hardener required to match 257 kg resin.

3 x 15.4 kg hardener required to match 257 kg resin.

18 kg Standard	F121-018
18 kg Slow	F121-019
18 kg Extra Slow	F121-020
†15.4 kg Ultra Slow	F122-006
* †900 kg Ultra Slow (MTO)	F122-007

*900kg hardeners in IBC's are made to order.

† mix ratio 100 : 18 by weight

Fire Retardant Materials - Elevated Curing

ST 70FR

Fire Retardant Glass Structural SPRINT®

ST 70FR is a low temperature curing Fire Retardant Epoxy SPRINT® product. The SPRINT® format makes this product ideal for the manufacture of thick sections requiring a high level of 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. ST 70FR provides high quality laminates from vacuum only processing.

SE 90FR / ST 90FR

Fire Retardant Prepreg & SPRINT® Systems

SE 90FR is a high performance fire-retardant, hot-melt, epoxy prepreg system. This product is ideal for customers requiring a fire retardant UD carbon prepreg product. It can be co-cured with ST 90FR to give high quality FR laminates with vacuum only processing. ST 90FR can be cured at 90°C, yet retains an outlife of up to 56 days at 23°C. These products are ideal for structural components where self-extinguishing fire performance and high load bearing capability are desired.

Format	Fire Retardant Matrix Resin	Availability (fibre/fabric areal weight/m ²)					
		Carbon			Glass		
		UD	Woven	Biaxial	Woven	Stitched Quadraxials	Biaxial
SPRINT	ST70FR	not typically supplied on carbon reinforcements			290g - 850g	600g - 800g	600g - 900g
	ST90FR	n/a	200g - 670g	300g - 600g			
Prepreg	SE90FR	150g - 600g	200g - 670g	300g - 600g	not typically supplied on glass reinforcements		

Core Materials



Introduction

Cores in a sandwich construction are specified by designers and architects to increase stiffness and reduce the weight of a composite structure. SP-High Modulus has a range of core materials to fit almost any specification or manufacturing process.

Corecell™ is a structural foam core material using a SAN polymer base featuring high toughness and impact resistant characteristics. **Corecell™** has become widely accepted for the construction of large, high performance structures. It is the latest in foam core technology and although originally developed for the marine industry, it is now used in other applications such as wind turbines and sub sea vessels.

Corecell™ grades have various type approvals including the American Bureau of Shipping (ABS), Det Norske Veritas (DNV), Germanischer Lloyd (GL), Registro Italiano Navale (RINA) and Bureau Veritas (BV). Please check for additional product approvals.

PVCell is a closed cell, cross-linked PVC foam. It provides high strength to weight ratio for all composite applications. Other key features of PVCell include outstanding chemical resistance, low water absorption and excellent thermal insulation capabilities. It is compatible with most common resin systems including epoxy, polyester and vinylester. PVCell has various approvals including Germanischer Lloyd (GL) (G100), Det Norske Veritas (DNV), American Bureau of Shipping (ABS), and Registro Italiano Navale (RINA).

G-PET is a highly adaptable, recyclable, thermoplastic foam with a good balance of mechanical properties, temperature resistance, density and cost for a wide range of applications and production processes. G-PET is approved by Germanischer Lloyd (GL)

Balsaflex® is the classic end-grain balsa wood core, featuring very high strength to weight ratio. Balsaflex® is available in range of densities, thickness and format/finish. Balsaflex® is approved by Germanischer Lloyd (GL)

Photo courtesy of Fountain Powerboats

Core Materials

Forms of Supply

Core is supplied in a wide range of product forms, optimized for different applications and composite production processes. Our standard product forms are described below. SP-High Modulus can also tailor sheets to your own specification - please call us to discuss your requirements.

PL - Plain Sheet – Optimum material properties. Limited bending in-mould.

PH - Plain with Bleeder Holes – Assists air release in vacuum bag processes.

Cuts for conformability (Foam)

SC – Single Cut – Provides flexibility in a single direction on one or both sides of a sheet. If done on both sides, the cuts intersect so no bleeder holes are necessary for vacuum bagging. Maximum sheet size is half of a full-size sheet.

DC - Double Cut – Provides flexibility in two directions on one or both sides of the sheet. If Double Cut on both sides, the intersecting cuts make DC a highly effective resin infusion medium. The cuts are not visible when the sheets lie flat and these narrow knife-cuts minimize unnecessary resin accumulations compared to sawn core materials.

CS – Contour Scrim – provides optimum flexibility in two directions. Sheets are knife cut in squares and bonded to a glass scrim. Available on sheets up to 25mm (0.98") thick. Maximum standard sheet size is half the full sheet.

Surface grooves for infusion – Available on all foam types

VIC - Vacuum Infusion Core – Tailor made vacuum infusion materials are used by leading boatbuilders worldwide. There are several VIC options and we can customize grooving patterns and bleeder holes as required. For curved laminate sections, double-sided DC is very effective system for resin infusion with low weight gain. Heat forming VIC surface cut also useful for obtaining curved panels with minimal resin uptake.

Product Formats (Balsa)

Balsaflex® is available plain or with typical formats including perforations, microgrooves, with or without scrim, contour scrim and with optional coating.

Other Product Formats

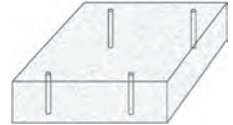
Bead and Cove - Bead and cove strip planking aids the building of large, curved structures, in a mouldless build method.

Fillet strips – Triangular edge strips to create tapered panel edge drop-offs, or stringer base fillets.

Kits – SP-High Modulus has an extensive kitting capability to provide all the formats described here in customized, numbered, ready to use, CNC machined kits.



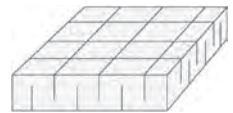
PL - Plain



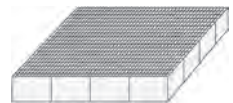
PH - Plain/Bleeder Holes



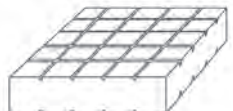
SC - Single Cut



DC - Double Cut



CS - Contour/Scrim



VIC - Typical VIC

Core Materials

Corecell™

Corecell™ M-Foam

Corecell™ M-Foam is the next generation of Corecell™. Combining high static properties, high toughness and compatibility with infusion and prepreg processes, Corecell™ M-Foam is the Marine Foam.

Type	M60	M80	M100	M130	M200
Average Density (kg/m ³)	65	85	107.5	140	200
Edge Marking	Green	Blue	Black	Pale Brown	Brown
Nominal Sheet Size (mm)	1285x2605	1220x2440	1130x2275	1015x2045	915x1830
Thickness Range (mm)	5-42	5-45	5-40	5-32	5-30

Corecell™ A-Foam

Corecell™ A-Foam is the original Corecell™ material. The styrene acrylonitrile (SAN) base chemistry has inherent toughness and elongation far beyond that of core materials based on chemistries such as PVC or vinyl ester. Corecell™ A-Foam was also developed to address the inhibition issues associated with marine foams using more traditional base chemistry. Corecell™ A-Foam is suitable for processing up to 60°C.

Type	A400	A500	A550	A600	A800	A1200
Average Density (kg/m ³)	69	92	103	116.5	150	210
Edge Marking	Green	Blue	Yellow	Black	Pale Brown	Brown
Nominal Sheet Size (mm)	1220x2440	1220x2440	1180x2400	1130x2275	1015x2045	915x1830
Thickness Range (mm)	3-38	3-40	3-35	3-35	3-32	3-28

Corecell™ P-Foam

A development of the original Corecell™ A-Foam, Corecell™ P-Foam foam is ideal for prepreg applications. Corecell™ P-Foam possesses similar physical properties as Corecell™ A-Foam, but can be processed up to 85°C.

Type	P500	P600	P800	P1200
Average Density (kg/m ³)	100	122	155	220
Edge Marking	Pink / Blue	Pink / Black	Pink / Pale Brown	Pink / Brown
Nominal Sheet Size (mm)	1065x2185	1015x2045	915x1880	785x1600
Thickness Range (mm)	12-35	12-34	12-30	12-28

Corecell™ S-Foam

Corecell™ S-Foam has been developed primarily to resist hydrostatic pressures in sub-sea applications. It is manufactured in three densities, and buoyancy modules can therefore be designed to specific depths, ranging from approximately 300 to 1100 metres (averages).

Type	S1200	S1800
Average Density (kg/m ³)	210	315
Edge Marking	Red / Brown	Red / Mauve
Nominal Sheet Size (mm)	890x1830	785x1600
Thickness Range (mm)	25	21

Core Materials

PVCell G-Foam

PVCell is a closed cell, cross-linked PVC foam. It provides high strength to weight ratio for all composite applications.

Type	G60	G80	G100	G130	G200
Average Density (kg/m ³)	60	80	100	130	200
Edge Marking	Red/Green/Red	Red/Black/Red	Red/White/Red	Red/Yellow/Red	Red/Gray/Red
Nominal Sheet Size (mm)	1220x2440	1220x2440	2200x1100	1900x950	1620x810
Thickness Range (mm)	5-75	5-70	5-60	5-50	5-45

G-PET

G-PET is a highly adaptable, recyclable, thermoplastic foam with a good balance of mechanical properties, temperature resistance, density and cost for a wide range of applications and production processes.

Type	80	90	110	135
Average Density (kg/m ³)	80	94	114	135
Nominal Sheet Size (mm)	1220x2440	1220x2440	1220x2440	1220x2440
Thickness Range (mm)	5-150	5-150	5-150	5-150

BALSAFLEX®

Balsaflex® is the classic end-grain balsa wood core.

Type	110	150	220
Average Density (kg/m ³)	110	150	220
Nominal Sheet Size (mm)	1220x610	1220x610	1220x610
Thickness Range (mm)	5-45	5-45	5-45

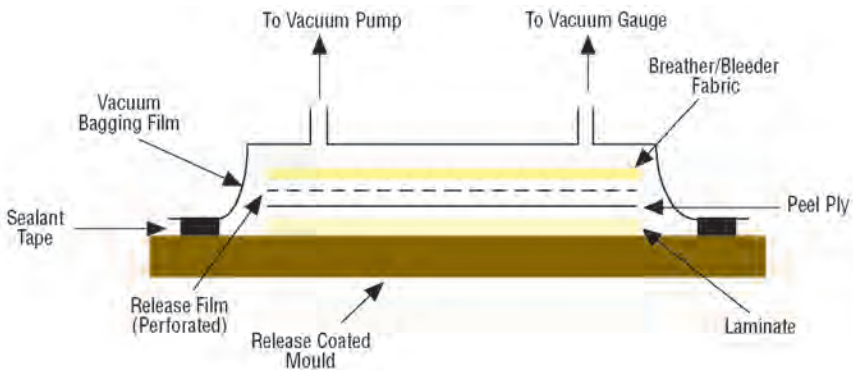
Vacuum Consumables



The range of vacuum consumables has been designed for use in a wide range of vacuum bag processes. Such processes include autoclave/prepreg curing, wet lay-up, low temperature oven/prepreg processes and infusion processes.

SP-High Modulus has selected a specific range of products which are particularly suitable for working with SP-High Modulus' epoxy prepreg and laminating systems where they are regularly used for the curing of large composite structures at temperatures up to 150°C.

The diagram below shows a simple vacuum stack indicating the products that are typically used for vacuum bag curing of composite components in low temperature ovens and high temperature autoclaves.



Vacuum Consumables

Peel Plies

Peel plies are fine weave fabrics which are applied to the laminate stack to provide a clean, contaminant-free textured surface, suitable for secondary bonding, filling or painting.

Product Description	Notes	Standard Width (mm)	Unit of Sale	Order Code
Stitch Ply A	80gsm pin-striped nylon	250	100 lm roll	V620-001
Stitch Ply A	80gsm pin-striped nylon	750	100 lm roll	V620-003
Stitch Ply A	80gsm pin-striped nylon	1000	100 lm roll	V620-004
Stitch Ply A	80gsm pin-striped nylon	1630	100 lm roll	V620-006

Release Films

Release films are used to separate and release the laminate from the vacuum stack following the cure of the component. These films are perforated to allow a certain bleed of resin from the laminate into a breather material such as Econoweave 44W.

Product Description	Notes	Standard Width (mm)	Unit of Sale	Order Code
WL 3600 MP22	clear, heavily-perf. pp	1200	500 lm roll	V600-002
WL 3600 P3	clear, medium-perf. pp	1200	500 lm roll	V600-003
WL 3600 P98	clear, low-perf. pp	1200	500 lm roll	V600-024
WL 3600 RP2	low perf. pp	1520	1000 lm roll	V600-015

Vacuum Bagging Films

Vacuum bagging films are used to effectively seal the whole of the area of the composite laminate to be cured.

Product Description	Notes	Standard Width (mm)	Unit of Sale	Order Code
WL 7400	green, 50u thick, heat-stab PA6	2794	305 lm roll	V680-001
WL 7400	green, 50u thick, heat-stab PA6	4064	229 lm roll	V680-002
Securlon L100	blue, 75u 12mm	8000	83lm	V680-007*

* Due to storage limitations, this product is made to order.

Sealant Tapes

Sealant tape is used to seal the tool to the vacuum bag in order to provide an airtight seal. The tapes are tacky to ensure a positive seal is achieved against a variety of tool surfaces.

Product Description	Notes	Standard Width (mm)	Unit of Sale	Order Code
AT90	black, high tack	12 x 3 x 15,000	30 roll box	V700-001
AT140	white, medium tack	12 x 3 x 15,000	30 roll box	V700-002

Vacuum Consumables

Flash / Release / Shrink Tapes

Flash tapes are used to locate vacuum consumable materials or to mask off areas to be painted, sanded or to prevent damage. Some of these tapes have release qualities so they can be used as tool repair tapes if necessary. Shrinktapes are used to consolidate specific components.

Product Description	Notes	Standard Width (mm)	Unit of Sale	Order Code
Flashbreaker 1	adhesive backed flash tape	25	66 lm roll	V720-001
Flashbreaker 1	adhesive backed flash tape	50	66 lm roll	V720-002
A575RC	release coated shrink tape	32	91 lm roll	V740-001
A575RC	release coated shrink tape	64	91 lm roll	V740-002

Self Adhesive Mould Release Materials

Self-adhesive mould release materials are used to cover moulds as an effective alternative to the use of release wax or liquids.

Product Description	Notes	Standard Width (mm)	Unit of Sale	Order Code
Tooltec A007	adh. backed PTFE on glass carrier	1000	sqm	V750-001

Vacuum Fittings

Vacuum fittings are used to connect the bagged vacuum assembly to the vacuum pump.

Product Description	Notes	Unit of Sale	Order Code
VV401C	Through bag breach connector	each	V710-001
440 T/F	Non-return Vacuum Socket	each	V710-011
440 T/F	Non-return Vacuum Plug	each	V710-012
VG 20	Vacuum Gauge	each	V710-004
Econo flo	Vacuum Hose	3 lm hose	V710-005

Breather Fabrics / Meshes

Breather fabrics are used to absorb excess resin (bleed) from a laminate which is being cured under vacuum. The fabric also allows the air, or any volatiles, to be evacuated prior to, and during the cure cycle.

Product Description	Notes	Standard Width (mm)	Unit of Sale	Order Code
Econoweave 44W	153gsm polyester	1520	100 lm roll	V660-001
Econoweave 1010W	330gsm polyester	1520	50 lm roll	V660-002
Breatherflow 20	High Flow. (White)	950	152 lm roll	V660-003
Knitflow 40	Standard Flow. (Green)	2500	80 lm roll	V660-004

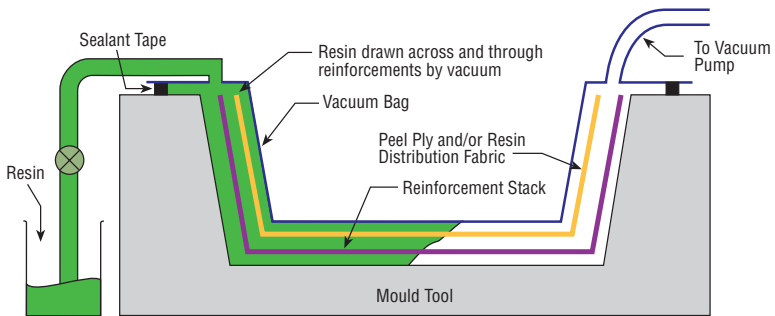
Vacuum Consumables

Infusion

SP-High Modulus have selected a range of infusion materials which can be used from the simplest test panel to the largest yachts or wind turbines.

Resin infusion is very similar to vacuum bagging in that differences in air pressure consolidate the laminate stack and control the resin content of the composite. The main difference is that the reinforcement fibre is introduced into the mould dry - not wetted out with resin. A Peel Ply and infusion mesh are then introduced, the mould is then sealed using a vacuum bag and tacky tape. The mould is then evacuated of air very like vacuum bagging. Once the vacuum bag has been sealed and the vacuum level maintained the resin system is introduced through inlet pipes. The resin then flows / is sucked into the mould over the infusion mesh and down into the laminate.

This generates very repeatable, in weight and strength, mouldings by a clean and controllable production method. For further details please see our website at www.gurit.com or contact our Technical Department.



Product Description	Notes	Unit of Sale	Order Code
Infusion 5/8" Poly Pipe	12.5mm Internal diameter poly pipe (100ft)	each	V820-501
Infusion 5/8" Connector	Through bag connector to fit 5/8" poly pipe	each	V830-501
Infusion 1/2" Ball Valve	12.5mm Control Valve	each	V810-101
Infusion 1/2" Tail Fitting for Ball Valve	12.5mm hose end fitting	each	V830-201
Infusion 1/2" Plas. 90° Elbow	12.5mm 90° hose to hose fitting	each	V830-203
Infusion 1/2" Plastic T-Piece	12.5mm hose to two hose fitting	each	V830-202
Infusion 1/2" Poly Pipe	10mm Internal diameter poly pipe (100ft)	each	V820-103
Infusion 1/2" Connector	Through bag connector to fit 1/2" poly pipe	each	V830-204
Infusion Dist. Channel	White Spiral Wrap	25lm	V830-401
Knitflow40 Roll	Knitflow 40 - Standard Flow. (Green) 2500mm	80lm	V660-004
Polyethylene Mesh			
Infusion Resin Trap	22lt internal volume with clear shatter proof perspex lid	each	V800-001
Spray Contact Adhesive	1 x 500ml can	each	V840-001

Ancillary Products



In order to assist in the use of the wide range of materials manufactured and supplied by SP-High Modulus, a range of Ancillary Products are also available. These have been refined over many years to enable users to handle products safely and to obtain the very best results from SP-High Modulus materials. The Ancillary Products are grouped together into three main categories:

- > Filler Powders – This section includes a range of filler powders which are designed to modify the properties of some of the SP-High Modulus liquid solvent-free resin systems, and so create resin mixes for use as fillers and adhesives.
- > Solvents – This section includes a range of solvents for cleaning tools and surfaces.
- > Sundries – This section includes:
 - Products for mixing and dispensing such as dispense pumps and drum taps
 - Products for resin application such as brushes and rollers
 - Products for skin protection such as Nitrile gloves and barrier cream
 - Products for pigmenting SP-High Modulus solvent-free resins.

Filler Powders



Introduction

SP-High Modulus filler powders are designed to modify the properties of some of the SP-High Modulus liquid solvent-free epoxy resins and so to create a variety of semi-liquid products such as filling and fairing compounds and adhesives. The fillers form three distinct categories: hollow spheres, short fibres, and flow modifiers.

Hollow Spheres

Hollow spheres serve to increase the volume and reduce the density of any resin system and are used to make adhesive mixes and filling & fairing mixes. They are regularly used for producing easily sanded filling & fairing compounds, and can also be used for making low density adhesives for low strain applications. Within this category SP-High Modulus supplies two different types of hollow spheres: microballoons and glass bubbles.

Short Fibres

For adding strength to a resin and hardener mix used as a structural adhesive, short reinforcing fibres are often added which act in a similar strengthening way to the long reinforcing fibres used in composite construction. The fibres also help to prevent resin starvation when bonding porous surfaces. Within this category SP-High Modulus supplies cellulose microfibrils.

Flow Modifiers

The most common material for modifying the flow properties of a resin mix is colloidal silica. This is a very fine powder which is added in conjunction with other fillers to 'thicken' mixes and reduce their flow on vertical surfaces (increase thixotropy). Resin systems such as Spabond 340LV have silica pre-added by specialised equipment. This machinery can provide a high level of dispersion so that less silica is required to achieve the same level of thixotropy than would be achieved by hand mixing.

Filler Powders

Microballoons

Brown microsphere filler powder used to make glues or paste fillers.

Size	Order Code
0.1 kg (approx. 1 litre) (minimum order 5 units)	A225-002
0.3 kg (approx. 3 litres)	A225-003
5.0 kg (approx. 50 litres)	A225-005
12.0 kg (approx. 120 litres)	A225-007

Glass Bubbles

White microsphere filler powder used to make glues or paste fillers.

Size	Order Code
0.12 kg (approx. 1-1.5 litre) (minimum order 5 units)	A230-005
0.3 kg (approx. 2-3 litres)	A230-001
5.0 kg (approx. 30-50 litres)	A230-003

Microfibres

Cellulose fibres used to make adhesive mixes.

Size	Order Code
0.1 kg (approx. 1 litre) (minimum order 5 units)	A215-004
0.5 kg (approx. 5 litres)	A215-003
5.0 kg (approx. 50 litres)	A215-005
20.0 kg (approx. 200 litres)	A215-007

Colloidal Silica

Fine, anti sag, filler powder. Use in combination with other filler powders.

Size	Order Code
0.05 kg (approx. 1 litre) (minimum order 5 units)	A220-002
0.25 kg (approx. 5 litres)	A220-003
2.5 kg (approx. 50 litres)	A220-005
10.0 kg (approx. 200 litres)	A220-006

Graphite Powder

Black powder to add colour to mixes and lubricant effect

Size	Order Code
0.75 kg Graphite powder	A235-001

Ancillary Kit

For use with SP-High Modulus Handipack and small packs of SP-High Modulus products for filling, gluing and laminating.

Quantity	Description	Order Code
10 x Box of 5	Each blister pack contains: 1 x pot Microballoons, Blister Packs 1 x pot Colloidal Silica, 1 x pot Microfibres, 4 x pairs Disposable Gloves, 2 x 1/2" Brushes, 5 x Mixing Sticks, 2 x Mixing Pots, 1 x 1 metre Woven Glass Tape, SP Filler Guide	A300-003

SP Solvents



Introduction

SP-High Modulus produces a range of formulated solvents for use with both solvent-free and solvent-based products.

Due to the very different chemistry of some of the SP-High Modulus products from each other, it is important that the correct solvents are selected for the intended application.

The solvents fall into two main groups:

Those which are used for a variety of cleaning applications with SP-High Modulus' solvent-free epoxies such as SP106, Ampreg 22. These solvent-free products should never have solvent added to them to 'thin them down'. If a lower viscosity, thinner epoxy product is required then this should be achieved by gentle warming of the product, or warming the surface to which the product is applied. Note that any extra heat applied will also accelerate the product's rate of cure. Alternatively, there may be a different SP epoxy product with a more suitable viscosity for the intended application.

For the correct solvent for a given application, please see the resin systems data sheet for details.

Solvents

Cleaning Solvents

Fast Epoxy Solvent (Solvent A) Surface Degreaser

Size	Order Code
1.0 litre	A105-002
5.0 litres	A105-003

Standard Solvent (Solvent B) Tool Cleaner

Size	Order Code
1.0 litre	A108-002
5.0 litres	A108-003

Cleaning Fluid (Solvent C) By-Product Remover

Size	Order Code
1.0 litre	A110-003
5.0 litres	A110-004

Application, Processing & Sundry Items



Introduction

The following application and sundry items are designed to assist the user in dispensing, mixing and applying SP-High Modulus formulated products, quickly, efficiently and safely. This section is therefore divided into three product groups. **Mixing and Dispensing** includes a range of products which enable measured amounts of epoxy resin and hardener to be transferred from the containers, and mixed together in the correct ratio, without spillage. The **Application and Processing** section includes products that allow efficient transfer of the mixed resin system to the job. This section is not exhaustive. Other items, not supplied by SP-High Modulus but regularly found in workshops, such as conventional brushes, are also suitable for the application of many SP-High Modulus formulated products. Finally, the **Skin Protection** section contains items to assist with the safe handling of SP-High Modulus products. Please note that full Material Safety Data Sheets (MSDS) are available for each SP-High Modulus formulated product - each MSDS contains full details of the types of safety equipment that should be employed during the product's use.

Application, Processing & Sundry Items

Mixing and Dispensing

50 cc & 10 cc Syringe*

Quantity	Description	Order Code
Each	10cc Syringe (1cc graduations)	A660-001
Each	50cc Syringe (10cc graduations)	A660-002

Syringe Kit*

Quantity	Description	Order Code
Each	Syringe Kit (50cc, 10cc, dip tube)	A660-003

Pump Sets

Quantity	Description	Order Code
1 pair	SP 106 Pump Set / 3.0 kg size (12ml dispense)	K216-309
1 pair	SP 106 Pump Set / 11.8 kg & 23.5 kg size (30ml dispense)	K216-310
1 pair	SP 320 SP Pump Set / 4.0 kg pack (14ml dispense)	K216-311
1 pair	SP 320 Pump Set / 13.33 & 26.66 kg size (35ml dispense)	K216-312
1 pair	Minipump	K216-019

Drum Taps

Quantity	Description	Order Code
Each	200 litre Drum Tap (large metal)	K342-003
Each	25 litre Drum Tap (small plastic)	K342-005
Each	200 litre Drum Tap (large plastic)	K342-010

* Syringes should be washed with warm water and a mild detergent, then flushed with clean water and allowed to air dry before use.

Application, Processing & Sundry Items

Application and Processing Equipment

Re-useable Mixing Pot

Quantity	Description	Order Code
Each	*Reusable Mixing Pots 0.5L (0.8L max)	A640-013
Each	*Clear lid for Mixing Pots	A640-014

*Minimum order 100 Reusable Mixing Pots 0.5 litre.

Shaped Mixing Sticks

Quantity	Description	Order Code
1 box	Mixing Sticks (box 100 sticks)	A640-004

Rollers

Quantity	Description	Order Code
Each	Disposable Foam Roller - 7" x 1.75" foam	A605-001

Roller Frame and Tray

Quantity	Description	Order Code
Each	Roller Frame - 7" x 1.75"	A615-001
Each	Roller Tray - flexible plastic	A620-001

Brushes

Quantity	Description	Order Code
1	Brush for coating / laminating - 2" (50mm)	A635-003

Spiked Roller

Quantity	Description	Order Code
1	Spiked roller for de-aeration of prepreg laminates - 5" with frame & handle	A610-001

Application, Processing & Sundry Items

Skin Protection

Hand Cleaner

Quantity	Description	Order Code
250 ml	Hand Cleaner - Tube	A710-010
5 litre	Hand Cleaner Paste - Tub	A710-009

After Work Cream

Quantity	Description	Order Code
250 ml	After Work Cream - Bottle	A707-003

Disposable Gloves

Quantity	Description	Order Code
100 pairs	Nitrile Disposable Gloves - extra large	A740-008
100 pairs	Nitrile Disposable Gloves - medium	A740-006

Pigments

Epoxy Pigment

Size	Description	Order Code
0.5 kg	SP Pigment - white	A445-002
0.5 kg	SP Pigment - grey	A445-003
0.5 kg	SP Pigment - black	A445-004
2.0 kg	SP Pigment - black	A445-007

Contacting SP-High Modulus

In an effort to answer incoming telephone calls more promptly and to improve the service to our customers, we operate an Automated Attendant Telephone System. The main benefit of the system is that multiple calls are answered simultaneously thus reducing customer waiting time, and individuals can be contacted directly, even outside of the switchboard open hours (Monday - Friday, 08.30 - 17.00).

Begin by dialling the Gurit (UK) Ltd main number (see below). Providing you have a touch-tone phone (your key pad should have a * or #), you are able to dial the extension number of the person you require as soon as the call is answered by the Automated Attendant. If the person at the extension you have dialled is not available you will be given the option of leaving a message in their voice mail. If you choose to leave a message then you can either hang up when done, or press zero to get to another extension. If you do not wish to leave a message at all but would instead like to speak to someone else, then press zero as soon as the message begins. This will put you through to the operator or, out of hours, the main Gurit (UK) Ltd answering service.

If you do not have a touch-tone phone, or you do not know to whom you wish to speak, then simply remain on the line during the welcoming message and during office hours (08.30 - 17.00) your call will be answered by the operator.

Outside office hours you will be invited to record a message.

We have listed below SP-High Modulus personnel who are likely to be contacted on a regular basis. Please note individual E-mail addresses remain as before (see overleaf).

	Main Switchboard	Fax No.	
Gurit (UK) Ltd Main No	+44 (0)1983 828000	+44 (0)1983 828100	
	Mobile No.	Extension No.	Fax No.
Technical Services - For all technical enquiries concerning the use of SP-High Modulus materials			
Martin Armstrong		103	
Head of Marine Sales - EMEA			
Peter Tyler	+44 (0)7967 682644	255	+44 (0)1983 828100
Customer Support Manager - Marine			
Laura Johnston		137	+44 (0)1983 828217
For quotations, placing orders, stock enquiries, order status & shipping enquiries			
- Marine Key Account Enquiries:			
Lucy Barry		176	+44 (0)1983 828217
- for Distributor Supplies:			
Tim Wright		250	+44 (0)1983 828217
Nikki Dorsett		148	+44 (0)1983 828217
- for Marine Export Orders:			
Lucy Barry		176	+44 (0)1983 828217
Laura Johnston		137	+44 (0)1983 828217
Sales, Marine - Rudy Jurg	+44 (0)7739 610760	413	+44 (0)1983 828100
Sales, Marine - Paul Riley	+44 (0)7971 680325	-	+44 (0)1983 828100
Sales, Marine - Yannick Le Morvan	+44 (0)7791 319793	412	+44 (0)1983 828100
Sales, Marine - Piet Heydorn	+49 (0)1622 434968	-	+44 (0)1983 828100
Sales, Marine - Ferdinando Ollino	+39 (0)3485 560265	-	+44 (0)1983 828100
- for Corecell™ Orders -			
Carole Dion	+001 819 847 1863	2241	

Contacting SP-High Modulus

	Mobile No.	Extension No.	Fax No.
Invoice Queries			
Credit Control - Nicola Robinson		421	+44 (0)1983 828100
Marketing Communications - Dan Jones		297	+44 (0)1983 828100
SP-High Modulus Engineering			
Alex Shimell	+44 (0)7909 940220		+44 (0)23 8045 7489
Global Technical Leader - Marine			
Nick Partington	+44 (0)7968 042360	157	+44 (0)1983 828100

Product Management

Prepreg, SPRINT [®] , Core, Formulated Products, Tooling & Adhesives			
Joe Summers	+44 (0)7967 726551	231	+44 (0)1983 828100

Global Offices	Tel	Fax	E-mail
SP-High Modulus (Australia)	+61 (0) 410 500 028		marine-au@gurit.com
Neil Loveland			
SP-High Modulus (New Zealand)	+64 (0) 9 415 6262	+64 (0) 9 415 7262	marine-nz@gurit.com
Sean Jeffery			
SP-High Modulus (Canada)	+1 819 847 2182	+1 819 847 2572	marine-na@gurit.com
Jean-Pierre Mouligne			

E-mail

All personnel listed can be contacted directly by E-mail. The format for each E-mail address is: first name.surname@gurit.com using the first names and surnames shown in the list. If you are not sure who to contact, you can E-mail gurit@gurit.com and your E-mail will be forwarded to the appropriate person.

Website

Information on products can be found at our website: www.gurit.com. This site contains the most up to date information on all of our products, in a PDF format that can be downloaded for local use. It is also possible to E-mail Gurit (UK) Ltd directly from this site.

Contacting SP-High Modulus Representatives Globally - Cont'd

Please refer to your local sales outlet - see list below.

SP Distributors	Tel	Fax	E-mail
Argentina - Boat Paint Center			
Nicolas Goldenberg	+54 11 4745 3866	+54 11 4744 5396	info@boatpaintcenter.com
Brazil - FM Fibras			
Luis Felix	+41 3344 2002	+41 3344 2002	luis@fmfibras.com.br
Denmark			
Call Customer Support department for Gurit UK +44 (0) 1983 828 000			
Finland - Kevra Oy			
Juha Kokko	+358 9612 6820	+358 9 6126 8220	juha.kokko@kevra.fi
France - Gazechim Composites			
Patrick Latry	+33 4 67 4955 00	+33 4 67 4955 49	composites@gazechim.fr
Germany - CTM GmbH			
Gerrit Steffens	+49 46 21 955 33	+49 46 21 955 35	gerrit.steffens@CTMat.de
Greece - A. Anagnostopoulos & Co.			
Eftyhis Fragozidis	+30 210 4112521	+30 210 4136717	info@marineshop.gr
Holland - Bouwmeester Advanced Composites Center			
Jaco Bouwmeester	+31 20 665 2452	+31 20 665 2548	sp-bac@planet.nl
Hungary - Epoxi Hungaria			
Tamas Simon	+36 1 464 7570	+36 1 464 7577	tsimon@farix.hu
Italy - Resintex Technology S.r.l.			
Laura Fabi	+39 0775 898 099	+39 0775 837 401	laura@resintex.it
Portugal - Quinimar			
Dr Orlando Barquinha	+351 219 666210	+351 219 666410	quinimar@mail.telepac.pt
Russia - IGC			
Elena Romanova	+7 495 926 6006	+7 495 730 5056	romanova@igco.ru
South Africa - AMT (Pty) Ltd			
John Soper	+27 21 511 2669	+27 21 510 8389	john.soper@amtcomposites.co.za
Spain - Fibras Reforzadas			
Jean Carol	+34 91 556 4648	+34 91 556 8882	jean.carol@fibrasreforzadas.com
Switzerland - VC Vertriebs AG			
Thomas Brunartt	+41 44 833 6386	+41 44 833 1487	info@schiffsfarben.ch
Sweden			
Call Customer Support department for Gurit UK +44 (0) 1983 828 000			
Turkey - Neva Marine Yat Malzemeleri Ltd			
Nurettin Caliskan	+90 216 447 0600	+90 216 447 0602	nurettin@nevamarine.com
United Arab Emirates - Al Masaood			
	+971 4 323 3344	+971 4 323 3355	compositemarine@masaood.com
United Kingdom			
Marineware Ltd	+44 (0)2380 330208	+44 (0)2380 339667	sales@marineware.com
Hempel UK Ltd	+44 (0)1633 874024	+44 (0)1633 489089	sales.uk@hempel.com
(Hempel UK Ltd previously known as Blakes Marine Paints Ltd)			

Imperial / Metric Conversion Tables For SP-High Modulus Products

The bold figures in the central columns can be read as either the U.S. or the S.I. measure.

Thus 1 inch = 25.4 millimetres: or 1 millimetre = 0.039 inches.

Mil (thou)	Microns (µm)	Inches	mm	Feet	Metres	Yards	Metres	Ounces	Grams	Pounds	Kilograms						
0.039	1	25.40	0.039	1	25.4	3.281	1	0.305	1.094	1	0.914	0.035	1	28.350	2.205	1	0.454
0.079	2	50.80	0.079	2	50.8	6.562	2	0.610	2.187	2	1.829	0.071	2	56.699	4.409	2	0.907
0.118	3	76.20	0.118	3	76.2	9.843	3	0.914	3.281	3	2.743	0.106	3	85.048	6.614	3	1.361
0.157	4	101.60	0.157	4	101.6	13.123	4	1.219	4.374	4	3.658	0.141	4	113.398	8.818	4	1.814
0.197	5	127.00	0.197	5	127.0	16.404	5	1.524	5.468	5	4.572	0.176	5	141.748	11.023	5	2.268
0.236	6	152.40	0.236	6	152.4	19.685	6	1.829	6.562	6	5.486	0.212	6	170.097	13.228	6	2.722
0.276	7	177.80	0.276	7	177.8	22.966	7	2.134	7.655	7	6.401	0.247	7	198.446	15.432	7	3.175
0.315	8	203.20	0.315	8	203.2	26.247	8	2.438	8.749	8	7.315	0.282	8	226.796	17.637	8	3.629
0.354	9	228.60	0.354	9	228.6	29.528	9	2.743	9.843	9	8.230	0.317	9	255.146	19.842	9	4.082

Fluid Oz.	Litres	Pints	Litres	US Quarts.	Litres	US Gal.	Litres	Imp.Gal.	Litres	US Gal.	Imp. Gal.						
35.21	1	0.028	1.760	1	0.568	1.057	1	0.946	0.264	1	3.785	0.220	1	4.546	1.200	1	0.833
70.42	2	0.057	3.520	2	1.137	2.114	2	1.892	0.528	2	7.570	0.440	2	9.092	2.401	2	1.666
105.63	3	0.085	5.279	3	1.705	3.171	3	2.838	0.792	3	11.355	0.660	3	13.638	3.601	3	2.499
140.84	4	0.114	7.039	4	2.273	4.228	4	3.784	1.056	4	15.140	0.880	4	18.184	4.802	4	3.332
176.06	5	0.142	8.799	5	2.841	5.285	5	4.73	1.32	5	18.925	1.100	5	22.730	6.002	5	4.165
211.27	6	0.170	10.559	6	3.410	6.342	6	5.676	1.584	6	22.710	1.320	6	27.277	7.203	6	4.998
246.48	7	0.199	12.318	7	3.978	7.400	7	6.622	1.848	7	26.495	1.540	7	31.823	8.403	7	5.831
281.69	8	0.227	14.078	8	4.546	8.457	8	7.568	2.112	8	30.280	1.760	8	36.369	9.604	8	6.664
316.90	9	0.256	15.838	9	5.114	9.514	9	8.514	2.376	9	34.065	1.980	9	40.915	10.804	9	7.497

Sq. yds	Sq. metres	oz/sq.yd	g/sq.m	ksi	N/sq.mm (MPa)	Msi	GPa	°C	°F	°C	°F				
1.196	1	0.836	0.029	1	33.9	0.145	1	6.895	0.145	1	6.895	-18	0	110	230
2.392	2	1.672	0.059	2	67.9	0.290	2	13.790	0.290	2	13.790	0	32	115	239
3.588	3	2.508	0.088	3	101.8	0.435	3	20.685	0.435	3	20.685	5	41	120	248
4.784	4	3.345	0.118	4	135.8	0.580	4	27.580	0.580	4	27.580	10	50	125	257
5.980	5	4.181	0.147	5	169.7	0.725	5	34.475	0.725	5	34.475	15	59	130	266
7.176	6	5.017	0.177	6	203.6	0.870	6	41.370	0.870	6	41.370	20	68	135	275
8.372	7	5.853	0.206	7	237.6	1.015	7	48.265	1.015	7	48.265	25	77	140	284
9.568	8	6.689	0.236	8	271.5	1.160	8	55.160	1.160	8	55.160	30	86	145	293
10.764	9	7.525	0.265	9	305.5	1.305	9	62.055	1.305	9	62.055	35	95	150	302
												40	104	155	311
												45	113	160	320
												50	122	165	329

Cu. Feet	Cu. Metres	lb/cu.in	g/cu.cm	lb/cu.ft	kg/cu.m	Miles	Kilomtrs.	°C	°F	°C	°F				
35.315	1	0.028	0.036	1	27.7	0.062	1	16.0	0.621	1	1.609	55	131	170	338
70.629	2	0.057	0.072	0.8	22.1	0.125	2	32.1	1.243	2	3.219	60	140	175	347
105.944	3	0.085	0.031	0.85	23.5	0.187	3	48.1	1.864	3	4.828	65	149	180	356
141.259	4	0.113	0.033	0.9	24.9	0.250	4	64.1	2.485	4	6.437	70	158	185	365
176.573	5	0.142	0.034	0.95	26.3	0.312	5	80.2	3.107	5	8.047	75	167	190	374
211.888	6	0.170	0.038	1.05	29.1	0.374	6	96.2	3.728	6	9.656	80	176	195	383
247.203	7	0.198	0.040	1.1	30.4	0.437	7	112.2	4.350	7	11.265	85	185	200	392
282.517	8	0.227	0.042	1.15	31.8	0.499	8	128.2	4.971	8	12.875	90	194	205	401
317.832	9	0.255	0.043	1.2	33.2	0.561	9	144.3	5.592	9	14.484	95	203	210	410
												100	212	215	419
												105	221	220	428



UK (EMEA)

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

Italy

Ferdinando Ollino

T +39 (0)3485 560265

Canada

175, Rue Péladeau

Magog QC

J1X 5G9 Canada

T +1 819 847 1863

F +1 819 847 2572

E marine-na@gurit.com

New Zealand

32 Canaveral Drive, Albany 0632

Private Box 302-191, North Harbour

Auckland, New Zealand

T +64 (0) 9 415 6262

F +64 (0) 9 415 7262

E marine-nz@gurit.com

Australia

Unit 1A, 81 Bassett Street

Mona Vale NSW 2103

Australia

T +61 (0) 2 9979 7248

F +61 (0) 2 9979 6378

E marine-au@gurit.com

USA

115 Broadcommon Road

Bristol

Rhode Island 02809, USA

T +1 401 396 5008

F +1 401 396 5246

E marine-na@gurit.com