

Carbon & Glass SparPreg™

UD PREPREG SPAR SOLUTION

- ▮ UD Prepreg ideal for use in thick sections
- ▮ Excellent handling & processing properties during lamination
- ▮ Fully compatible with current Gurit SPRINT™/prepreg products
- ▮ Excellent mechanical properties
- ▮ Recommended cure between 85°C (185°F) and 120°C (248°F)
- ▮ Out-of-autoclave curing
- ▮ DNV-GL Certified Formats Available

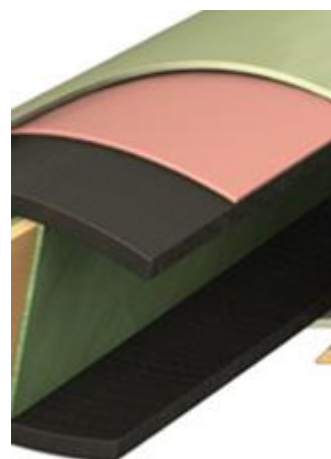
INTRODUCTION

SparPreg™ is an advanced UD prepreg, developed to enable the economic manufacture of unidirectional spar caps for more demanding blade designs, ideal for use in conjunction with other Gurit products.

SparPreg™ was developed to benefit the lay-up of thick UD sections, such as wind turbine blade spars. The material can produce thick laminates of exceptional quality with low void content, without the need for an intermediary de-bulking process or additional dry fabric reinforcement to aid air removal. The net result enables blade manufacturers to eliminate production steps and redundant materials and increase capacity.

SparPreg™ has been specially formulated to achieve the outstanding through-cure and mechanical performance of the WE91 prepreg and WT93 SPRINT™ resin systems.

SparPreg™ can be cured at temperatures as low as 85°C (185°F), but can also be used for the rapid manufacture of components at 120°C (248°F).



PRODUCT INFORMATION

A range of fibre types can be utilised with SparPreg™ to suit the application. SparPreg™ can be used with both SPRINT™ and prepreg products. Supplied with 2 poly backers SparPreg™ can be applied to the substrate with either side against the tool. The product formats listed to the right also benefit from 3rd Party Certification

PRODUCT DESCRIPTION	STATUS	CERTIFICATION
Sparpreg UD Carbon Prepreg 600g/m ² 31-37% resin content	Approved	DNV-GL TAK00001BD
Sparpreg UD Carbon Prepreg 600g/m ² 31-37% resin content	Approved	Lloyds Register LR2000027ALP
Sparpreg UD E-Glass Prepreg 1600g/m ² 29-35% resin content	Approved	DNV-GL TAK00001GR

PROPERTY	UNIT	UD CARBON	UD GLASS	TEST STANDARD
Tack	rating	*Low	*Low	-
Nominal Resin Content (by weight)	%	34	32	ASTM D 3171 Method II
Nominal Fibre Weight	g/m ²	600	1600	ASTM D 3171 Method II
Nominal Areal Weight	g/m ²	909	2353	ASTM D 3171 Method II
Nominal Roll Width	Mm	120-1500	120-1500	-
Backer	-	2 x embossed	2 x embossed	-

*allows repositioning of plies at recommended handling temperature

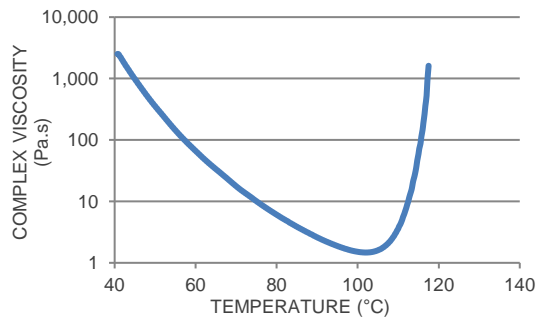
SparPreg™ allows the customer to lay-up thick UD sections and achieves excellent laminate quality with low void content, without the need for de-bulking or dry fabric reinforcement to remove air from between the plies. For optimum results a lay-up temperature less than +18°C (64°F) is recommended

PREPREG PROPERTIES

RHEOLOGY DATA

SparPreg™ resin viscosity profile conducted at 1°C (1.8°F) per minute.

PROPERTY	VALUE	
Minimum Viscosity	1.5 Pa.s	15 P
Temperature at Minimum Viscosity	102 °C	216°F



TRANSPORT & STORAGE

When stored sealed & out of direct sunlight.

STORAGE TEMP		UNIT	VALUE
-18°C	0°F	months	24
+5°C	+41°F	months	6
+21°C	+70°F	days	60
+30°C	+86°F	days	20

All prepreg materials should be stored in a freezer when not in use to maximise their useable life, since the low temperature reduces the reaction of resin and catalyst to virtually zero. However, even at -18°C (0°F), the temperature of most freezers, some reaction will still occur. In most cases after some years, the material will become unworkable.

HEALTH AND SAFETY

Please refer to product SDS for up to date information specific to this product

MINIMUM CURE TIME & TEMPERATURE

Recommended minimum cure is 10 hours at 85°C (185°F)

PROPERTY	OVEN / VAC BAG						TEST STANDARD
Typical Laminate	4 plies of 600g/m ² Unidirectional Carbon SparPreg™						-
Typical Ramp Rate	1 – 2°C (2 – 4°F) per minute						-
Cure Temperature*	85°C (185°F)	90°C (194°F)	95°C (203°F)	100°C (212°F)	110°C (230°F)	120°C (248°F)	-
Cure Dwell Time	600 (min)	360 (min)	270 (min)	180 (min)	90 (min)	45 (min)	-
Cure Pressure	-1bar (14.5Psi)						-
De-mould Temperature	< 60°C (140°F)						-
Dry Tg ₁ (DMA)	110-125°C / 230 – 257°F						ASTM D7028

*thick section laminates will require a low temperature dwell for exotherm control.

MECHANICAL PROPERTIES

All data presented in this datasheet is based on the mechanical testing of a single batch of material.

CURED RESIN PROPERTIES

Oven cured using standard processing techniques and a minimum cure time of 10 hours at 85°C (185°F).

PROPERTY	SYMBOL	SPARPREG™ RESIN CAST		TEST STANDARD
Tensile Strength	σ_T	57 - 62 MPa	ksi	ISO 527-2
Tensile Modulus	E_T	3.0 GPa	Msi	ISO 527-2
Compressive Strength	σ_C	125 - 132 MPa	Ksi	ISO 178
Compressive Modulus	E_C	4.0 GPa	Msi	ISO 178

UNIDIRECTIONAL CARBON LAMINATE

Cured using recommended minimum cure of 45 minutes at 120°C (248°F).

PROPERTY	SYMBOL	600g/m ² HEC		TEST STANDARD
Cure Method	-	Vacuum bag cured at -1 bar		-
Cure Schedule	-	45 minutes at 120°C (248°F)		-
Cured Ply Density	ρ_{ply}	1.55 g/cm ³	0.056 lb/in ³	
Glass Transition Temperature	T_{g1}	110-120 °C	230-248 °F	ISO 6721 (DMA)
Cured Ply Thickness	t_{ply}	0.60 mm	0.024 in	ASTM D 3171 Method II
0° Tensile Strength (Normalised to 56%)	X_T	2234 MPa	324 Ksi	ISO 527-5 Type A
0° Tensile Modulus (Normalised to 56%)	E_{T11}	140 GPa	20.3 Msi	ISO 527-5 Type A
0° Compressive Strength (Normalised to 56%)	X_C	1183 MPa	171 Ksi	SACMA SRM1-94
0° Compressive Modulus (Normalised to 56%)	E_{C11}	123 GPa	17.8 Msi	SACMA SRM1-94
90° Tensile Strength	Y_T	45 MPa	6.5 Ksi	ISO 527-5 Type B
90° Tensile Modulus	E_{T22}	7.9 GPa	1.15 Msi	ISO 527-5 Type B
90° Compressive Strength	Y_C	146 MPa	21 Ksi	SACMA SRM1-94
90° Compressive Modulus	E_{C22}	7.2 GPa	1.0 Msi	SACMA SRM1-94
0° Flexural Strength	X_F	1368 MPa	198 Ksi	ISO 14125
0° Flexural Modulus	E_{F11}	114 GPa	16.5 Msi	ISO 14125
±45° In-Plane Shear Strength	τ_{12}	51 MPa	7.4 Ksi	ISO 14129
±45° In-Plane Shear Modulus	G_{12}	4.9 GPa	0.7 Msi	ISO 14129
±45° In-Plane Shear Poisson's Ratio	ν_{12}	0.79		ISO 14129
0° ILSS	X_{ILSS}	81 MPa	11.7 Ksi	ISO 14130

* original laminate fibre volume fraction

UNIDIRECTIONAL GLASS LAMINATE

Cured using recommended minimum cure of 45 minutes at 120°C (248°F).

PROPERTY	SYMBOL	1200 g/m ² E-GLASS		1600 g/m ² E-GLASS		TEST STANDARD
Resin Content	-	32%		32%		-
Cure Method	-	Vacuum bag cured at -1 bar		Vacuum bag cured at -1 bar		-
Cure Schedule	-	45 minutes at 120°C (248°F)				-
Cured Ply Thickness	t _{ply}	0.81 mm	0.032 in	1.25 mm	0.049 in	ASTM D 3171 Method II
0° Tensile Strength (Normalised to 56%)	X _T	935 MPa	136 ksi	1225 MPa	178 ksi	ISO 527-5 Type A
0° Tensile Modulus (Normalised to 56%)	E _{T11}	44 GPa	6.4 Msi	48 GPa	7.0 Msi	ISO 527-5 Type A
0° Compressive Strength (Normalised to 56%)	X _C	1001 MPa	145 ksi	950 MPa	138 ksi	SACMA SRM1-94
0° Compressive Modulus (Normalised to 56%)	E _{C11}	42 GPa	6.1 Msi	47 GPa	6.8 Msi	SACMA SRM1-94
90° Tensile Strength	Y _T	42 MPa	6.1 ksi	41 MPa	5.9 ksi	ISO 527-5 Type B
90° Tensile Modulus	E _{T22}	12 GPa	1.7 Msi	11 GPa	1.6 ksi	ISO 527-5 Type B
0° Flexural Strength	X _F	1347 MPa	195 ksi	-	-	ISO 14125
0° Flexural Modulus	E _{F11}	42 GPa	6.1 Msi	-	-	ISO 14125
±45° In-Plane Shear Strength	τ ₁₂	39 MPa	5.7 ksi	45 MPa	6.5 ksi	ISO 14129
±45° In-Plane Shear Poisson's Ratio	ν ₁₂	0.62		0.64		ISO 14129
0° ILSS	X _{ILSS}	71 MPa	10.3 ksi	51 MPa	7.4 ksi	ISO 14130

* original laminate fibre volume fraction

NOTICE

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

The Company strongly recommends that Customers make test panels in the final process conditions and conduct appropriate testing of any goods or materials supplied by the Company prior to final use to ensure that they are suitable for the Customer's planned application. Such testing should include testing under conditions as close as possible to those to which the final component may be subjected. The Company specifically excludes any warranty of fitness for purpose of the goods other than as set out in writing by the Company. Due to the varied nature of end-use applications, the Company does, in particular, not warrant that the test panels in the final process conditions and/or the final component pass any fire standards.

The Company reserves the right to change specifications and prices without notice and Customers should satisfy themselves that information relied on by the Customer is that which is currently published by the Company on its website. Any queries may be addressed to the Technical Services Department.

Gurit is continuously reviewing and updating literature. Please ensure that you have the current version by contacting your sales contact and quoting the revision number in the bottom left-hand corner of this page.

TECHNICAL CONTACT INFORMATION

For all other enquiries such as technical queries:

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24-HOUR CHEMICAL EMERGENCY NUMBER

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