Gurit PREPREG

PRODUCT DATASHEET

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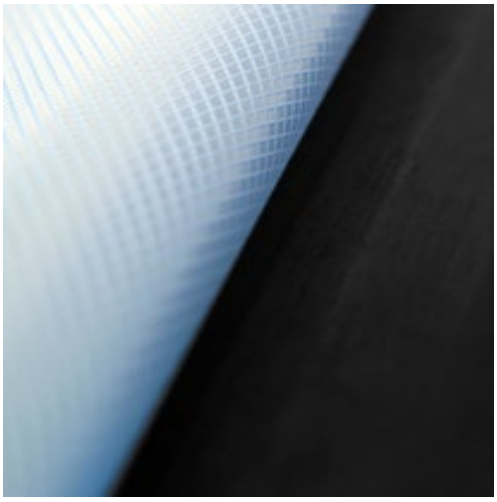


SE84LV

HIGH PERFORMANCE PREPREG SYSTEM

SE 84LV is an exceptionally versatile hot-melt, epoxy prepreg. It can be cured at temperature as low as 80°C (176°F), or can be used for faster moulding of components at 120°C (248°F). This is achieved with an extremely good outlife of up to 8 weeks at 18-22°C (64-72°F). It is a toughened system, and offers excellent mechanical properties on a wide variety of reinforcing fabrics and fibers.

SE 84LV is commonly used in vacuum bagging, press-molding, autoclave and other pressure molding processes.

SE 84LV is a low viscosity system used with heavy fiber weights where low-flow processing conditions (vacuum bag pressure and minimum cure temperature), are likely to be used. With its high compressive strength it is widely used in large heavily loaded components, such as yacht hulls, and spars. It has been selected for use by various America's Cup syndicates and boats racing in the IMOCA class.

SE 84LV is widely used in sandwich structures with honeycomb, foam and balsa cores, primarily with the toughened SA 80 Adhesive Film.

- Versatile, high strength prepreg system
- Curable at temperatures as low as 80°C (176°F)
- Can be processed with vacuum only processing
- Eight weeks shelf life @ 18-20°C (64-68°F)
- Excellent tack
- Suitable for a wide range of Marine and Industrial applications
- Lloyds Register certified in certain formats

Lloyd's Register

INSTRUCTIONS FOR USE

PREPARATION

When preparing the lay-up the prepreg should be removed from the freezer and allowed to thaw to room temperature in a sealed bag. This may take 6 to 24 hours depending on roll size. This prevents atmospheric moisture from condensing on the prepreg which may cause voiding on cure. The mold surface should be release coated and must have been tested for vacuum integrity prior to lay-up.

LAYING UP

The following procedure is recommended for preparing out of autoclave vacuum cured laminates

1. Place the lay-up on a tool which has been treated with a high temperature release agent or film.
2. Insert a thermocouple into the lay-up near the centre ply of the thickest edge section, outside the net trim line.
3. Install a vacuum bag. Position part in the oven or autoclave and draw vacuum to check for bag or system leaks.
4. It is not recommended to cure SE84LV under vacuum pressures of less than 85%.
5. Cure as described in the following section.
6. Upon completion of cure, turn off heat and cool until part temperature has fallen below 50°C (122°F). When fully cooled, the part may be debagged, trimmed and machined as necessary. A post-cure is generally not required.

CORE BONDING

This product can be used in conjunction with typical core materials. Representative test panels should be made to ensure that the laminate construction, curing method and other variables allow full filling of any cuts or slits in the foam. The cure cycles given in this datasheet are for typical monolithic flat panels and may not be appropriate for sandwich panels.
When using Nomex™ or aluminium honeycombs, the separate SA80 adhesive film is recommended and full details of use are provided on the product data sheet. This adhesive film can be supplied with or without lightweight glass carrier, or in some cases it can be supplied directly coated onto one face of the SE84LV prepreg.

THIN LAMINATES

When using very thin laminates (e.g. with a total laminate fibre weight of less than 300-400gm^2), care needs to be taken to avoid extracting excessive amounts of resin during the cure process. To avoid this, a very low bleed or microporous release film can be used, and for particularly critical components, a prepreg peel ply should be used.

PRODUCT INFORMATION

AVAILABILITY

SE84LV is available in unidirectional carbon formats ranging in weight from 120 to 600g/m^2, also woven or multiaxial reinforcements in carbon or glass from 100-1200g/m^2. Gurit uses a number of qualified fabric and fiber suppliers to enable flexibility within the supply chain and maintain product availability for our customers, which may be adjusted at Gurit's discretion. Our approved fibers are shown in the Table below.

FIBER TYPE	DESCRIPTION	APPROVED FIBER TYPES	STRENGTH (MPa)	MODULUS (GPa)
HEC	High Elongation Carbon	T700, 34-700, H2250, TR50S, TC35, TC36, STS40, HTS40, HTS45	> 4000	227 to 257
IMC	Intermediate Modulus Carbon	T800, IM2C, IM7	> 4400	275 to 310
HMC	High Modulus Carbon	HR40, M40J	> 4300	365 to 405
UHMC	Ultra-High Modulus Carbon	M46J	> 4000	420 to 455

The table above provides indicative values and does not constitute a specification

T700, 34-700, H2250, TR50S, TC35, TC36, STS40, HTS40, HTS45

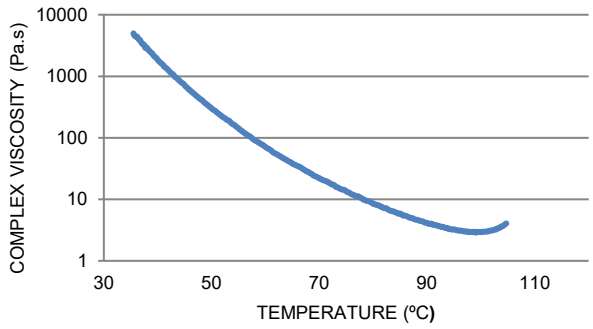
The product formats listed below also benefit from 3rd Party Certification.

PRODUCT DESCRIPTION	REINFORCEMENT WEIGHT RANGE	STATUS	CERTIFICATION BODY	CERTIFICATE NUMBER
SE84LV HEC UD Prepreg	150 - 600g/m²	Expires 02/2026	Lloyds Register	LR2165022ALP
SE84LV XC Series Prepreg	XC150 – XC611	Expires 02/2026	Lloyds Register	LR2165015ALP
SE84LV RC Series Prepreg	RC200 – RC660	Expires 02/2026	Lloyds Register	LR2165018ALP

PREPREG PROPERTIES

RHEOLOGY DATA

SE84LV resin viscosity profile conducted at 1°C (1.8°F) /minute.



PROPERTY	UNITS	VALUE
Minimum viscosity	Pa.s (P)	2.9 (29)
Temperature at minimum viscosity	°C (°F)	99 (210)

TRANSPORT AND STORAGE

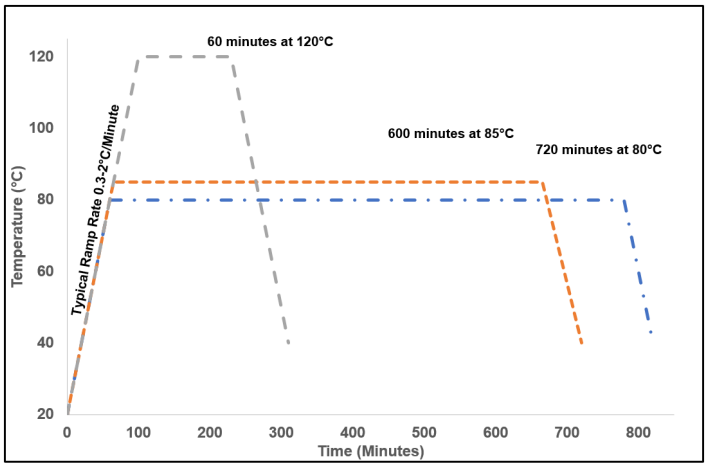
STORAGE TEMPERATURE	UNITS	VALUE
-18°C (0°F)	Months	24
+18-20°C (64-68°F)	Weeks	8

To maximise the de-frosted shelf life of the material it is beneficial to maintain a cool working environment. When not in use, SE84LV products should be maintained at -18°C (0°F).

TYPICAL CURE TIME AND TEMPERATURES

All temperatures measured by thermocouple installed on the laminate surface. Vacuum should be maintained as high as possible throughout the cure cycle. 80°C (176°F) should be treated as the minimum cure temperature; lower temperature cures may not generate adequate mechanical properties.

PROPERTY	80°C CURE (176°C)	85°C CURE (185°C)	120°C CURE (248°C)	TEST METHOD
Processing method	Vacuum Bag/Autoclave	Vacuum Bag/Autoclave	Vacuum Bag/Autoclave	
Typical ramp rate	0.3 – 2°C/minute	0.3 – 2°C/minute	0.3 – 2°C/minute	
Cure time	12 hrs	10hrs	1 hour	
Cure pressure	-1 Bar / +6 Bar	-1 Bar / +6 Bar	-1 Bar / +6 Bar	
Tg (DMA)	95°C (185°F)	105°C (208°F)	125°C (257°F)	ASTM D7028



MECHANICAL PROPERTIES

CURED RESIN PROPERTIES

Resin cast oven cured, mean values.

PROPERTY	SYMBOL	UNITS		12 HOURS 80°C (176°F)		TEST METHOD
Cured resin density	ρ_{cured}	g/cm²		1.22		Archimedean principle
Tensile strength	σ_T	MPa	(ksi)	82	11.9	ISO 527-2
Tensile modulus	E_T	GPa	(ksi)	3.9	566	ISO 527-2
Flexural strength	σ_F	MPa	(ksi)	123	17.8	ISO 178
Flexural modulus	E_F	GPa	(ksi)	3.5	508	ISO 178
Compressive yield strength	σC	MPa	(ksi)	163	23.6	ISO 604

UNIDIRECTIONAL LAMINATE PROPERTIES

Mean values derived from data from a single batch, cured 10 hours at 85°C (176°F) and does not comprise a specification. Customers with specific requirements must carry out tests to prove suitability.

PROPERTY		UNITS		HEC FIBER		IMC FIBER		HMC FIBER		UHMC FIBER		TEST METHOD
Typical fibre density	ρ_{fiber}	g/cm²		1.8		1.79		1.82		1.84		
Fibre modulus	E_{fiber}	GPa		227-257		275-310		365-405		420-405		
Resin content		%		32-37		32-37		32-37		35		ASTM D3171 Method II
Fiber volume fraction	V_f	%		55		55.5		54.5		54.3		ASTM D3171 Method II
0° tensile strength*	X_T	MPa	(ksi)	2458	(356)	2894	(420)	2658	(384)	1980	(287)	ISO527-5
0° tensile modulus*	E_T	GPa	(Msi)	134	(19.4)	170	(24.6)	222	(32.2)	250	(36.6)	ISO527-5
0° compressive strength*	X_C	MPa	(ksi)	1354	(196)	1417	(206)	1166	(169)	1070	(155)	SACMA SRM1-94
0° compressive modulus*	E_{C11}	GPa	(Msi)	121	(17.5)	153	(22.1)	192	(27.8)	227	(32.9)	SACMA SRM1-94
90° tensile strength	Y_T	MPa	(ksi)	39.2	(5.6)	33.2	(4.8)	30.1	(4.35)	26	(3.77)	ISO527-5
90° tensile modulus	E_{T22}	GPa	(Msi)	8.3	(1.2)	8.4	(1.22)	7.1	(1.03)	6.6	(0.96)	ISO527-5
0° flexural strength	X_F	MPa	(ksi)	1448	(210)	1406	(212)	1393	(202)			ISO14125
0° flexural modulus	E_{F11}	GPa	(Msi)	106	(15.4)	129	(18.7)	175	(25.3)			ISO14125
0° ILSS	X_{ILSS}	MPa	(ksi)	87	(12.6)	89	(12.9)	82	(11.9)	79	(11.3)	ISO14130

* Normalised to 60% V_f

CARBON WOVEN LAMINATE PROPERTIES

Mean values derived from data from a single batch, cured 10 hours at 85°C (176°F). Customers with specific requirements must carry out tests to prove conformity. Where test directions are given, they are with respect to the warp direction of the roll. Fabrics contained in these prepregs are 2X2 twill woven with High Elongation Carbon (HEC). HEC fibers are characterised by having a tensile modulus between 227-257GPa.

PROPERTY	SYMBOL	UNITS		RC200T		RC416T		TEST METHOD
Uncured resin content		%		42		40		ASTM D3171- II
Cured ply thickness		mm		0.23		0.43		ASTM D792
Fibre volume fraction	V_f	%		47-53		50-59		ASTM D3171 - II
0° tensile strength*	X_T	MPa	(ksi)	719	(104)	1006	(146)	ISO527-5
0° tensile modulus*	E_T	GPa	(Msi)	60.6	(8.79)	59.1	(8.57)	ISO527-5
0° compressive strength*	X_C	MPa	(ksi)	759	(110)	649	(94.1)	SACMA SRM1-94
0° compressive modulus*	E_{C11}	GPa	(Msi)	58.3	(8.46)	55.6	(8.19)	SACMA SRM1-94
90° tensile strength	Y_T	MPa	(ksi)	662	(96.0)	858	(124.4)	ISO527-5
90° tensile modulus	E_{T22}	GPa	(Msi)	61.6	(8.96)	58.9	(8.54)	ISO527-5
90° compressive strength*	X_C	MPa	(ksi)	731	(106)	659	(95.6)	SACMA SRM1-94
90° compressive modulus*	E_{C11}	GPa	(Msi)	59.0	(8.56)	55.2	(8.00)	SACMA SRM1-94
0° flexural strength	X_F	MPa	(ksi)	847	(123)	892	(129)	ISO14125
0° flexural modulus	E_{F11}	GPa	(Msi)	51.2	(7.43)	50.6	(7.34)	ISO14125
0° ILSS	X_{ILSS}	MPa	(ksi)	74.8	(10.8)	55.8	(8.09)	ISO14130

*Normalised to 55% fiber volume fraction

BIAXIAL (+/-45°) CARBON LAMINATE PROPERTIES

Mean values derived from data from a single batch, cured 10 hours at 85°C (176°F). Where test directions are given, they are with respect to the warp direction of the roll. Fabrics contained in these products are 2 layers of unidirectional High Elongation Carbon (HEC) fibers stitched together at +/-45° to each other. HEC fibers are characterised by having a tensile modulus between 227-257GPa.

PROPERTY	SYMBOL	UNITS		XC411		TEST METHOD
Uncured resin content		%		40		ASTM D3171 Method II
Cured ply thickness		mm		0.43		ASTM D792
Fibre volume fraction	V_f	%		47-59		ASTM D3171 Method II
+45° tensile strength*	X_T	MPa	(ksi)	1124	(144)	ISO527-5
+45° tensile modulus*	E_T	GPa	(Msi)	63.8	(9.72)	ISO527-5
-45° tensile strength*	X_T	MPa	(ksi)	1237	(124)	ISO527-5
-45° tensile modulus*	E_T	GPa	(Msi)	64.5	(9.72)	ISO527-5
+45° compressive strength*	X_C	MPa	(ksi)	595	(107)	SACMA SRM1-94
+45° compressive modulus*	E_{C11}	GPa	(Msi)	62.0	(8.41)	SACMA SRM1-94
-45° compressive strength*	X_C	MPa	(ksi)	645	(102)	SACMA SRM1-94
-45° compressive modulus*	E_{C11}	GPa	(Msi)	60.2	(8.70)	SACMA SRM1-94
+45° flexural strength	X_F	MPa	(ksi)	815	(147)	ISO14125
+45° flexural modulus	E_{F11}	GPa	(Msi)	41.5	(8.12)	ISO14125
-45° flexural strength	X_F	MPa	(ksi)	1004	(131)	ISO14125
-45° flexural modulus	E_{F11}	GPa	(Msi)	57.0	(8.41)	ISO14125
0° ILSS	X_{ILSS}	MPa	(Ksi)	49.7	(8.12)	ISO14130

*Normalised to 55% fiber volume fraction

HEALTH AND SAFETY

The following points must be considered:

1. Skin contact must be avoided by wearing protective gloves. Gurit recommends the use of disposable nitrile gloves for most applications. The use of barrier creams is not recommended, but to preserve skin condition a moisturizing cream should be used after washing.
2. Protective clothing should be worn when mixing, laminating or sanding. Contaminated work clothes should be thoroughly cleaned before re-use.
3. Eye protection should be worn if there is a risk of resin, hardener, solvent or dust entering the eyes. If this occurs flush the eye with water for 15 minutes, holding the eyelid open, and seek medical attention.
4. Ensure adequate ventilation in work areas. Respiratory protection should be worn if there is insufficient ventilation. Solvent vapors should not be inhaled as they can cause dizziness, headaches, loss of consciousness and can have long term health effects.
5. If the skin becomes contaminated, then the area must be immediately cleansed. The use of resin-removing cleansers is recommended. To finish, wash with soap and warm water. The use of solvents on the skin to remove resins etc must be avoided.

   Washing should be part of routine practice:
   - before eating or drinking
   - before smoking & vaping
   - before using the lavatory
   - after finishing work

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

Gurit produces a separate full Safety Data Sheet for all hazardous products. Please ensure that you have the correct SDS to hand for the materials you are using before commencing work.

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.

CONTACT INFORMATION

Please see local contact information at www.gurit.com

24-HOUR CHEMICAL EMERGENCY NUMBER

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