SE 75

High Performance Prepreg System

SE 75 is an extremely versatile hot melt epoxy prepreg system. It builds on the established good handling and performance of SE 84LV but has more versatile cure possibilities from 12 hours at 70ºC (158ºF) to 45 minutes at 120ºC (248ºF), whilst maintaining an 8 week shelf life at 18-20°C.

This flexibility combined with its exceptional mechanical and thermal performance makes it suitable for a wide range of marine and industrial applications.

SE 75 can be used for any high-performance structure. Its long shelf life at 18-20°C (64-68°F) means it is particularly suited to large components that need to remain in mould for long durations prior to curing.

- New generation, hot melt, epoxy prepreg
- Builds on the established heritage and performance of SE84LV, with more versatile cure possibilities

  12 hours at 70ºC (158ºF)
  6 hours at 80ºC (176ºF)
  35 minutes at 120ºC (248ºF)
- Exceptional mechanical and thermal performance
- Eight weeks shelf life at 18-20°C (64-68°F)
- Optimised for vacuum bag processing
- Suitable for a wide range of Marine and Industrial applications
- Lloyds Register & DNV certified in certain formats

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 mould surface should be release coated and must have been tested for vacuum integrity prior to lay-up.

LAMINATION

The recommend temperature for prepreg lay-up is between 18-21°C. At this temperature the correct level of resin tack is obtained to minimize air entrapment and allow the prepreg to be repositioned with minimal distortion. A lower level of prepreg tack will reduce the air entrapment during lamination and result in a lower finished laminate void content.

Different supporting backer configuration are offered, with the common formats being 2DPE and POPA. The 2DPE format is two embossed polyethene plastic backers, one either side of the prepreg and POPA format is one embossed polyethene plastic backer with silicon paper on the other side. The 2DPE format gives the prepreg a lower level of tack, aids air removal and enables easier positioning of the product when laminating long lengths of prepreg.

When applying prepreg it can be beneficial to spike the prepreg with a perforation roller, this action allows the air to escape as the prepreg is applied and reduces the amount of inter ply air bubbles / bumps which can form. Spiking is typically done on unidirectional prepreg where it is impossible for the air to escape through the prepreg thickness.

Laminate debulking by vacuum pressure is required to ensure the laminate is sufficiently compacted prior to cure. The user needs to define at what intervals these debulks are needed during the lamination process. Typically it is done every 3 layers, but this can vary depending on the application and in some cases it is every layer. Debulking is needed to ensure the prepreg fully conforms to the mould shape and helps to reduce bumps / wrinkles appearing in the laminate.

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, low bleed release film should be used and if required a prepreg peel ply should be used to avoid further resin bleed.

CORE BONDING

When using Nomex™, aluminium honeycombs or foam core materials the SA75-90 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 SE 75 prepreg.

PRODUCT INFORMATION

AVAILABILITY

SE 75 is available in unidirectional carbon formats ranging in weight from 120 to 600g/m2, also woven or multiaxial reinforcements in carbon or glass from 100-1200g/m2. Please contact Gurit for 3rd Party Certification or see Lloyds Register / DNV websites.

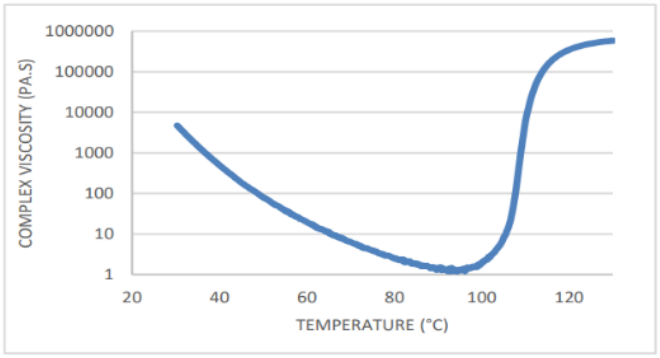
COMPATIBLE ADHESIVE FILMS

SA75-90 adhesive film has been developed specifically for this prepreg system. This can be supplied with or without a supporting medium in 150g to 400g film weights.

PREPREG PROPERTIES

RHEOLOGY DATA

SE75 resin viscosity profile conducted at 1°C (1.8°F) /minute.



PROPERTY	UNITS	VALUE
Minimum Viscosity	Pa.s (P)	1.2 (12)
Temperature at minimum viscosity	°C (°F)	94 (101)

TRANSPORT AND STORAGE

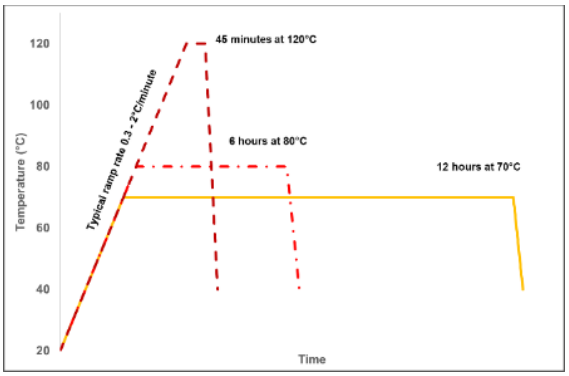
STORAGE TEMPERATURE	UNITS	VALUE
-18°C (0°F)	months	24
+18-20°C (64-68°F)	weeks	8
25°C (77°F)	weeks	4
30°C (86°F)	weeks	3

To maximise the de-frosted shelf life of the material it is beneficial to maintain a cool working environment. When not in use SE75 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. 70°C (158°F) should be treated as the minimum cure temperature; 65-70°C (149-158°F) will not generate adequate mechanical properties. It is not recommended to cure SE 75 under vacuum pressures of less than 85%.

PROPERTY	70°C CURE (158°C)	80°C CURE (176°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	6hrs	45 minutes	
Cure Pressure	-1 Bar / +6 Bar	-1 Bar / +6 Bar	-1 Bar / +6 Bar	
Tg (DMA)	85°C (185°F)	98°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 70°C (158°F)		6 HOURS 80°C (176°F)		45 MINS. 120°C (248°F)		TEST METHOD
Cured resin density	ρ_{cured}	g/cm³		1.19		1.19		1.19		Archimedean principle
Tensile Strength	σ_T	MPa	(ksi)	68	(9.86)	82	(11.9)	83	(12.0)	ISO 527-2
Tensile Modulus	E_T	GPa	(Msi)	3.8	(0.55)	3.4	(0.49)	3.0	(0.43)	ISO 527-2
Flexural Strength	σ_F	MPa	(ksi)	117	(16.9)	123	(17.8)	117	(19.9)	ISO 178
Flexural Modulus	E_F	GPa	(Msi)	3.8	(0.55)	3.5	(0.50)	2.9	(0.42)	ISO 178
Compressive Yield Strength	σ_C	MPa	(ksi)	147	(21.3)	140	(20.3)	117	(16.9)	ISO 604

UNIDIRECTIONAL LAMINATE PROPERTIES

Mean values derived from data from a single batch, cured 6 hours at 80°C (176°F). Customers with specific requirements must c arry out tests to prove conformity.

PROPERTY	SYMBOL	UNITS		HEC 150g/m²		HEC 300g/m²		HEC 600g/m²		TEST METHOD
Typical fibre density	ρ_{fibre}	g/cm²		1.8		1.8		1.8		
Fibre Modulus	E_{fibre}	GPa		227-257		227-257		227-257		
Resin Content		%		32-37		32-37		32-37		ASTM D3171 Method II
Fibre Volume Fraction	V_f	%		55		56		55		ASTM D3171 Method II
0° Tensile Strength*	X_T	MPa	(ksi)	2775	(402)	2494	(361)	2188	(317)	ISO527-5
0° Tensile Modulus*	E_T	GPa	(Msi)	138	(20)	141	(20.4)	144	(20.9)	ISO527-5
0° Compressive Strength*	X_C	MPa	(ksi)	1356	(197)	1390	(201)	1410	(205)	SACMA SRM1-94
0° Compressive Modulus*	E_{C11}	GPa	(Msi)	120	(17.4)	126	(18.3)	130	(18.8)	SACMA SRM1-94
90° Tensile Strength	Y_T	MPa	(ksi)	49	(7.1)	38	(5.5)	21	(3.0)	ISO527-5
90° Tensile Modulus	E_{T22}	GPa	(Msi)	8.7	(1.26)	8.7	(1.26)	8.6	(1.24)	ISO527-5
0° Flexural Strength	X_F	MPa	(ksi)	1490	(216)	1538	(223)	1450	(210)	ISO14125
0° Flexural Modulus	E_{F11}	GPa	(Msi)	107	(15.5)	109	(15.8)	122	(17.7)	ISO14125
0° ILSS	X_{ILSS}	MPa	(ksi)	86	(12.5)	85	(12.3)	86	(12.5)	ISO14130

* Normalised to 60% V_f

PROPERTY	SYMBOL	UNITS	IMC 150g/m²	IMC 300g/m²	IMC 450g/m²	TEST METHOD
Typical fibre density	ρ_{fibre}	g/cm²	1.79	1.79	1.79	
Fibre Modulus	E_{fibre}	GPa	275-310	275-310	275-310	
Resin Content		%	32-37	32-37	32-37	ASTM D3171 - II
Fibre Volume Fraction	V_f	%	58	59	58	ASTM D3171 - II
0° Tensile Strength*	X_T	MPa (ksi)	2765 (401)	2722 (395)	2511 (364)	ISO527-5
0° Tensile Modulus*	E_T	GPa (Msi)	172 (24.9)	177 (25.7)	172 (24.9)	ISO527-5
0° Compressive Strength*	X_C	MPa (ksi)	1450 (210)	1422 (206)	1458 (211)	SACMA SRM1-94
0° Compressive Modulus*	E_{C11}	GPa (Msi)	157 (22.8)	143 (20.7)	152 (22.0)	SACMA SRM1-94
90° Tensile Strength	Y_T	MPa (ksi)	33 (4.78)	39 (5.65)	36 (5.22)	ISO527-5
90° Tensile Modulus	E_{T22}	GPa (Msi)	8.3 (1.20)	7.9 (1.15)	8.3 (1.20)	ISO527-5
0° Flexural Strength	X_F	MPa (ksi)	1387 (201)	1474 (213)	1359 (197)	ISO14125
0° Flexural Modulus	E_{F11}	GPa (Msi)	134 (19.4)	134 (19.4)	137 (19.9)	ISO14125
0° ILSS	X_{ILSS}	MPa (ksi)	86 (12.5)	88 (12.7)	81 (11.7)	ISO14130

- Normalised to 60% V_f

PROPERTY	SYMBOL	UNITS	HMCFIBRE 150g/m²	HMCFIBRE 300g/m²	HMCFIBRE 600g/m²	TEST METHOD
Typical fibre density	ρ_{fibre}	g/cm²	1.8	1.8	1.8	
Fibre Modulus	E_{fibre}	GPa	365-405	365-405	365-405	
Resin Content		%	32-37	32-37	32-37	ASTM D3171 - II
Fibre Volume Fraction	V_f	%	58	57	61	ASTM D3171 - II
0° Tensile Strength*	X_T	MPa (ksi)	2515 (365)	2318 (336)	2226 (323)	ISO527-5
0° Tensile Modulus*	E_T	GPa (Msi)	223 (32.3)	208 (30.1)	221 (30.6)	ISO527-5
0° Compressive Strength*	X_C	MPa (ksi)	1322 (192)	1122 (163)	1115 (162)	SACMA SRM1-94
0° Compressive Modulus*	E_{C11}	GPa (Msi)	194 (28.1)	187 (27.1)	186 (27.0)	SACMA SRM1-94
90° Tensile Strength	Y_T	MPa (ksi)	37 (5.36)	26 (3.77)	21.8 (3.16)	ISO527-5
90° Tensile Modulus	E_{T22}	GPa (Msi)	7.2 (1.04)	7 (1.02)	7.2 (1.04)	ISO527-5
0° Flexural Strength	X_F	MPa (ksi)	1319 (191)	1397 (203)	1349 (196)	ISO14125
0° Flexural Modulus	E_{F11}	GPa (Msi)	178 (25.8)	200 (29.0)	163 (23.6)	ISO14125
0° ILSS	X_{ILSS}	MPa (ksi)	81 (11.74)	86 (12.5)	82 (11.9)	ISO14130

* Normalised to 60% V_f

CARBON WOVEN LAMINATE PROPERTIES

Mean values derived from data from a single batch, cured 6 hours at 80°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).

PROPERTY	SYMBOL	UNITS		RC200T		RC416T		RC660T		TEST METHOD
Uncured Resin Content		%		39-45		39-45		39-45		ASTM D3171- II
Cured Ply Thickness		mm		0.22		0.43		0.65		ASTM D792
Fibre Volume Fraction	V_f	%		49		48		58		ASTM D3171 - II
0° Tensile Strength*	X_T	MPa	(ksi)	751	(109)	909	(132)	963	(140)	ISO527-4
0° Tensile Modulus*	E_T	GPa	(Msi)	71	(10.3)	63	(9.14)	59	(8.56)	ISO527-4
0° Compressive Strength*	X_C	MPa	(ksi)	743	(108)	681	(98.6)	496	(71.9)	SACMA SRM1-94
0° Compressive Modulus*	E_{C11}	GPa	(Msi)	62	(8.99)	54	(7.83)	54	(7.83)	SACMA SRM1-94
90° Tensile Strength	Y_T	MPa	(ksi)	711	(103)	1055	(153)	854	(124)	ISO527-4
90° Tensile Modulus	E_{T22}	GPa	(Msi)	61	(8.85)	76	(11.0)	60	(8.70)	ISO527-4
90° Compressive Strength*	X_C	MPa	(ksi)	648	(89.6)	700	(101)	500	(72.5)	SACMA SRM1-94
90° Compressive Modulus*	E_{C11}	GPa	(Msi)	53.5	(7.76)	59	(8.56)	54	(7.83)	SACMA SRM1-94
0° Flexural Strength	X_F	MPa	(ksi)	853	(124)	832	(124)	521	(75.6)	ISO14125
0° Flexural Modulus	E_{F11}	GPa	(Msi)	53	(7.69)	51	(7.39)	57	(8.27)	ISO14125
0° ILSS	X_{ILSS}	MPa	(ksi)	63	(9.57)	53	(7.69)	50	(7.25)	ISO14130

*Normalised to 55% fibre volume fraction

BIAXIAL (+/-45°) CARBON LAMINATE PROPERTIES

Mean values derived from data from a single batch, cured 6 hours at 80°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) fibres stitched together at +/-45° to each other. HEC fibres are characterised by having a tensile modulus between 227-257GPa

PROPERTY	SYMBOL	UNITS		XC150		XC411		XC611		TEST METHOD
Uncured Resin Content		%		42		42		42		ASTM D3171 Method II
Cured Ply Thickness		mm		0.16		0.43		0.61		ASTM D792
Fibre Volume Fraction	V_f	%		53		52		56		ASTM D3171 Method II
+45° Tensile Strength*	X_T	MPa	(ksi)	1128	(163)	992	(144)	726	(105)	ISO527-4
+45° Tensile Modulus*	E_T	GPa	(Msi)	62	(8.99)	67	(9.72)	66	(9.57)	ISO527-4
-45° Tensile Strength*	X_T	MPa	(ksi)	1193	(173)	857	(124)	723	(105)	ISO527-4
-45° Tensile Modulus*	E_T	GPa	(Msi)	59	(8.56)	67	(9.72)	66	(9.57)	ISO527-4
+45° Compressive Strength*	X_C	MPa	(ksi)	694	(101)	739	(107)	432	(63.0)	SACMA SRM1-94
+45° Compressive Modulus*	E_{C11}	GPa	(Msi)	56	(8.12)	58	(8.41)	59	(8.56)	SACMA SRM1-94
-45° Compressive Strength*	X_C	MPa	(ksi)	690	(100)	702	(102)	553	(80.0)	SACMA SRM1-94
-45° Compressive Modulus*	E_{C11}	GPa	(Msi)	56	(8.12)	60	(8.70)	61	(8.85)	SACMA SRM1-94
+45° Flexural Strength	X_F	MPa	(ksi)	930	(135)	1013	(147)	738	(107)	ISO14125
+45° Flexural Modulus	E_{F11}	GPa	(Msi)	54	(7.83)	56	(8.12)	50	(7.25)	ISO14125
-45° Flexural Strength	X_F	MPa	(ksi)	987	(143)	903	(131)	850	(123)	ISO14125
-45° Flexural Modulus	E_{F11}	GPa	(Msi)	56	(8.12)	58	(8.41)	52	(7.54)	ISO14125
0° ILSS	X_{ILSS}	MPa	(Ksi)	65	(9.43)	56	(8.12)	34	(4.93)	ISO14130

*Normalised to 55% fibre volume fraction

GLASS UNIDIRECTIONAL LAMINATE PROPERTIES

Mean values derived from data from a single batch cured using standard processing techniques and standard cure of 12 hours at 70°C (176°F). Where test directions are given, they are with respect to the warp direction of the roll. Fabrics contained in these prepregs standard e-glass.

PROPERTY	SYMBOL	UNITS		EGL 300 g/m²		TEST METHOD
Uncured Resin Content				36		
Typical fibre density	ρ_{fibre}	g/cm²		2.6		
Fibre Modulus	E_{fibre}	GPa		69		
Cured Ply Thickness	-	mm		0.25		
Fibre Volume Fraction	V_f	%		47.3		ASTM D3171 Method II
0° Tensile Strength*	X_T	MPa	(ksi)	1499	(217)	ISO527-5
0° Tensile Modulus*	E_T	GPa	(Msi)	51	(7.4)	ISO527-5
0° Compressive Strength*	X_C	MPa	(ksi)	1207	(175)	SACMA SRM1-94
0° Compressive Modulus*	E_{C11}	GPa	(Msi)	43.8	(3.4)	SACMA SRM1-94
90° Tensile Strength	Y_T	MPa	(ksi)	45.6	(6.6)	ISO527-5
90° Tensile Modulus	E_{T22}	GPa	(Msi)	10.7	(1.55)	ISO527-5
0° Flexural Strength	X_F	MPa	(ksi)	1472	(213.5)	ISO14125
0° Flexural Modulus	E_{F11}	GPa	(Msi)	32.3	(4.68)	ISO14125
0° ILSS	X_{ILSS}	MPa	(ksi)	91.5	(13.3)	ISO14130

* normalised to 55% fibre volume fraction

GLASS WOVEN LAMINATE PROPERTIES

Mean values derived from data from a single batch cured using standard processing techniques and standard cure of 12 hours at 70°C (176°F). Where test directions are given, they are with respect to the warp direction of the roll. Fabrics contained in these prepregs standard e-glass.

PROPERTY	SYMBOL	UNITS		RE295 H4		RE301 H8		TEST METHOD
Uncured Resin Content		%		40		37		ASTM D3171- II
Cured Ply Thickness		mm		0.225		0.237		ASTM D792
Fibre Volume Fraction	V_f	%		51.2		48.1		ASTM D3171 - II
0° Tensile Strength*	X_T	MPa	(ksi)	550	(79.8)	639	(92.7)	ISO527-4
0° Tensile Modulus*	E_T	GPa	(Msi)	32	(4.64)	37	(5.37)	ISO527-4
0° Compressive Strength*	X_C	MPa	(ksi)	643	(93.3)	572	(83.0)	SACMA SRM1-94
0° Compressive Modulus*	E_{C11}	GPa	(Msi)	29	(4.20)	32	(4.64)	SACMA SRM1-94
90° Tensile Strength*	Y_T	MPa	(ksi)	526	(76.3)	549	(79.6)	ISO527-4
90° Tensile Modulus*	E_{T22}	GPa	(Msi)	32	(4.64)	33	(4.79)	ISO527-4
90° Compressive Strength*	X_C	MPa	(ksi)	558	(80.9)	519	(75.3)	SACMA SRM1-94
90° Compressive Modulus*	E_{C11}	GPa	(Msi)	29	(4.21)	31	(4.50)	SACMA SRM1-94
0° Flexural Strength	X_F	MPa	(ksi)	813	(118)	672	(97.5)	ISO14125
0° Flexural Modulus	E_{F11}	GPa	(Msi)	29	(4.21)	23	(3.34)	ISO14125
0° ILSS	X_{ILSS}	MPa	(ksi)	66	(9.57)	58	(8.41)	ISO14130

* normalised to 55% fibre 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 moisturising cream should be used after washing.
2. 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
3. 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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