

# SE135T-1

## 190° T<sub>g</sub> EPOXY PREPREG SYSTEM

**SE 135T-1 is a high temperature resistance toughened epoxy system which is typically used in composite components for the defence, automotive and motorsport industries.**

SE 135T-1 is a high strength toughened epoxy system. It has a flexible cure envelope ranging from 125°C to 175°C. This makes SE 135T-1 suitable for the economic production of parts that have a high temperature requirement. If cured at higher temperatures of 175°C, a T<sub>g</sub> of 190°C is achievable.



- High temperature prepreg
- Thermal performance of 190°C (374°F)
- Minimum cure temperature 125°C (257°F)
- Vacuum bag or autoclave curing
- Toughened resin for improved mechanical properties

## INSTRUCTIONS FOR USE

SE135T-1 is a low tack prepreg and yet still offers high drape characteristics for precision laminating. It is possible to reposition when initially applied together but once pushed into place it will become difficult to separate. It will also self-adhere to a mould surface at 20°C (69°F), additional heat can be used to increase tack, but the product will be difficult to use in workshop temperatures above 24°C (75°F).

Once cured SE135-T1 is pale yellow in colour and like all cured epoxy resin prepregs over time the resin will gradually yellow with exposure to UV light, so a protective clear coat lacquer or paint is recommended for the final finished surface.

### AUTOCLAVE, PRESSURE BLADDER & VACUUM BAG PROCESSING

The mould should be treated with a high temperature release agent or film prior to lay-up. Place the layers of material into the mold in the same manner as a traditional prepreg. Overlaps are needed to ensure a continuous fiber distribution, the overlap distance should be in the region of 10-20mm.

Vacuum debulks may be needed to aid the placement of the layers, typically a 15-30 min debulking at 20°C (69°F) is used. A perforated release film and a breather mesh should be used in this operation to gain even vacuum over the part. Vacuum debulks will also reduce the amount of surface pin holes and voiding in the cured laminate when using a vacuum only cure.

For vacuum only -1bar cures, a perforated release film should be used and for autoclave where the pressure is greater than +1bar a non-perforated release film is typically required.

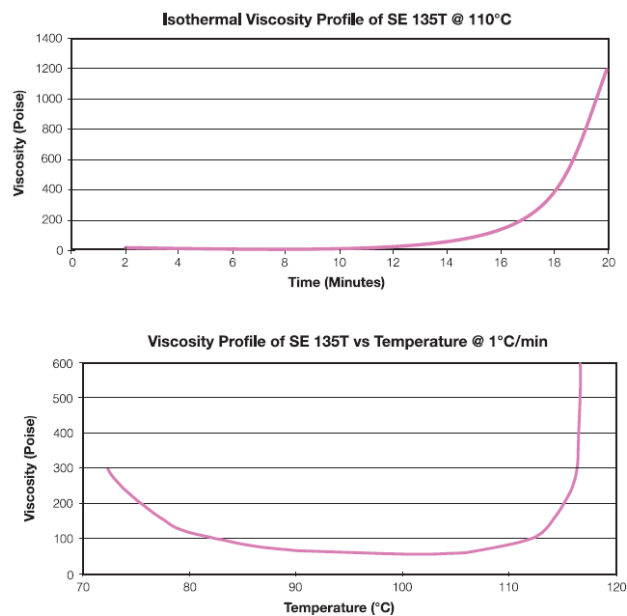
## PRODUCT INFORMATION

### AVAILABILITY

SE135T-1 is available in unidirectional carbon with fiber weights of 150 & 300 g/m<sup>2</sup> and woven reinforcements in carbon or glass from 100-660g/m<sup>2</sup>.

## PREPREG PROPERTIES

### RHEOLOGY DATA



PROPERTY	UNITS	VALUE
Minimum viscosity (1°C/minute ramp)	Pa.s (P)	7.5 (75)
Temperature at minimum viscosity (1°C/minute ramp)	°C (°F)	107 (225)

## CURE TIME AND TEMPERATURES

SE135T-1 offers flexible curing options and can be cured via autoclave, pressure bladder and vacuum processing methods.

### TYPICAL CURE PROFILES

Note: The successful use of these cure schedule will depend on part size and laminate construction. Heat up rate and dwell periods need to be tailored to take consideration of oven capacity, thermal mass of tool, laminate construction etc.

PROPERTY	130°C CURE (266°)	140°C CURE (284°)	175°C CURE (347°)	TEST METHOD
Processing method	Vacuum bag / Autoclave	Vacuum bag / Autoclave	Vacuum bag / Autoclave	
Ramp rate	1- 2°C/minute to 85°C	1 – 2°C/minute	1 – 2°C/minute	
	45 minutes @ 85°C	2 hours @ 140°C	2 hours @ 175°C	
	1-2°C/minute from 85°C to 130°C	Cool	Cool	
	2 hours @ 130°C			
	Cool			
Tg (DMA)	145-150°C (293 - 302 °F)	150-155°C (302 - 311°F)	185-190°C (365 - 374°F)	ASTM D7028

### CURE CYCLE VS. GLASS TRANSITION TEMPERATURE

INITIAL CURE	POST CURE	DRY Tg	TEST METHOD
2 hours at 130°C	-	150°C	ASTM D7028
2 hours at 130°C	1 hours at 175°C	166°C	ASTM D7028
2 hours at 130°C	2 hours at 175°C	175°C	ASTM D7028
2 hours at 130°C	4 hours at 175°C	182°C	ASTM D7028
2 hours at 175°C	–	191°C	ASTM D7028

## PREPREG PROPERTIES

The technical data are means values for information based on results achieved under specific and/or defined test conditions. Customers with specific requirements must carry out tests to prove conformity to their own requirements. The data given does not form a product specification.

PROPERTY	UNITS	RC200T	HEC300	IMC300	RE301	TEST METHOD
Fiber style	-	0/90° Woven 2x2 twill	0° Unidirectional carbon	0° Unidirectional carbon	7781 Style woven glass fabric	-
Fiber areal weight	-	200	300	300	300	ASTM D3171
Fiber type	-	3k carbon	12k carbon	12K carbon	E glass	-
Resin content	%	40 ±3%	35 ±3%	35 ±3%	35 ±3%	ASTM D3171 Method II
Nominal prepreg areal weight	g/m²	333	462	462	462	ASTM D3171 Method II
Nominal cured ply thickness	mm	0.22	0.3	0.3	0.24	ASTM D792
Nominal cured density	Kg/m³	1500	1532	1522	1826	ASTM D3171 Method II

## CURED LAMINATE PROPERTIES

SE135-1 / RC200T Woven Carbon, -1bar vacuum bag cure

PROPERTY	SYMBOL	UNITS		SE135T-1/RC200T (3k)		TEST METHOD
0° Tensile strength*	$\sigma_{T11}$	MPa	(ksi)	808	(117.19)	ISO527-4
0° Tensile modulus*	$E_{t11}$	GPa	(Msi)	66.5	(9.64)	ISO527-4
0° Compression strength*	$\sigma_{C11}$	MPa	(ksi)	790	(114.58)	SACMA SRM1-94
0° Compression modulus	$E_{c11}$	GPa	(Msi)	66.0	(9.7)	SACMA SRM1-94
0° Flexural strength	$\sigma_F$	MPa	(ksi)	892	(129)	ISO 14125
0° Flexural modulus	EF11	GPa	(Msi)	52.3	(7.59)	ISO 14125
0° ILSS	$T_{ILSS}$	MPa	(ksi)	74	(10.7)	ISO 14130

\* Normalised to 60%  $V_f$

SE135T HEC 300, +6bar pressure cure

PROPERTY	SYMBOL	UNITS		SE135T-1 HEC/300		TEST METHOD
0° Tensile strength*	$\sigma_{T11}$	MPa	(ksi)	2415	(350.26)	ISO527-4
0° Tensile modulus*	$E_{t11}$	GPa	(Msi)	134	(19.4)	ISO527-4
0° Compression strength*	$\sigma_{C11}$	MPa	(ksi)	1400	(203.05)	SACMA SRM1-94
0° Compression modulus*	$E_{c11}$	GPa	(Msi)	125	(18.1)	SACMA SRM1-94
0° Flexural strength	$\sigma_F$	MPa	(ksi)	-	-	ISO 14125
0° Flexural modulus	EF11	GPa	(Msi)	-	-	ISO 14125
0° ILSS	$T_{ILSS}$	MPa	(ksi)	100	(14.5)	ISO 14130

\* Normalised to 60%  $V_f$

SE135T IMC 300, -1bar vacuum bag cure

PROPERTY	SYMBOL	UNITS		SE135T-1 IMC/300		TEST METHOD
0° Tensile strength	$\sigma_{T11}$	MPa	(ksi)	1916	(277.89)	ISO527-4
0° Tensile modulus	$E_{t11}$	GPa	(Msi)	137	(19.8)	ISO527-4
0° Compression strength	$\sigma_{C11}$	MPa	(ksi)	1224	(177.52)	SACMA SRM1-94
0° Compression modulus	$E_{c11}$	GPa	(Msi)	82	(11.8)	SACMA SRM1-94
0° Flexural strength	$\sigma_F$	MPa	(ksi)	-	-	ISO 14125
0° Flexural modulus	EF11	GPa	(Msi)	-	-	ISO 14125
0° ILSS	$T_{ILSS}$	MPa	(ksi)	77	(11.1)	ISO 14130

SE135T RE301 (7781 STYLE), -1bar vacuum bag cure

PROPERTY	SYMBOL	UNITS		SE135-1/RE301		TEST METHOD
0° Tensile strength	$\sigma_{T11}$	MPa	(ksi)	470	(68.2)	ISO527-4
0° Tensile modulus	$E_{t11}$	GPa	(Msi)	28.2	(4.1)	ISO527-4
0° Compression strength	$\sigma_{C11}$	MPa	(ksi)	648	(94)	SACMA SRM1-94
0° Compression modulus	$E_{c11}$	GPa	(Msi)	27.7	(4)	SACMA SRM1-94
0° Flexural strength	$\sigma_F$	MPa	(ksi)	677	(98.2)	ISO 14125
0° Flexural modulus	EF11	GPa	(Msi)	21	(3)	ISO 14125
0° ILSS	$T_{ILSS}$	MPa	(ksi)	63	(9.1)	ISO 14130

## HOT WET PERFORMANCE

PROPERTY	CURE	CONIDTIONING	UNITS	VALUE
Tg1 DMA	180 minutes at 175°C	14 days at 21°C	°C (°F)	185
Tg1 DMA	180 minutes at 175°C	14 days immersion in 70°C water	°C (°F)	115

## TRANSPORT AND STORAGE

STORAGE TEMPERATURE	PRODUCT	UNITS	VALUE
-18°C (0°F)		Months	24
+18-20°C (64-68°F)	SE135T carbon unidirectional products	Weeks	4
+18-20°C (64-68°F)	SE135 woven and stitched products	Weeks	6

To maximise the de-frosted shelf life of the material it is beneficial to maintain a cool working environment. When not in use SE135T-1 products should be maintained at -18°C (0°F).

## 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](http://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](http://www.gurit.com)

## 24-HOUR CHEMICAL EMERGENCY NUMBER

For advice on chemical emergencies, spillages, fires or exposures:

Europe	+44 1273 289451
Americas	+1 646 844 7309
APAC	+65 3158 1412

[customer.support@gurit.com](mailto:customer.support@gurit.com)

[www.gurit.com](http://www.gurit.com)

All trademarks used or mentioned in this document are protected by law.