

SE135T-1

190° Tg 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 Tg 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 Auto-clave 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 SE135T-1 is pale yellow in colour and like all cured epoxy resin prepreps 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 mould in the same manner as a traditional prepreg. Overlaps are needed to ensure a continuous fibre distribution, the overlap distance should be in 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.

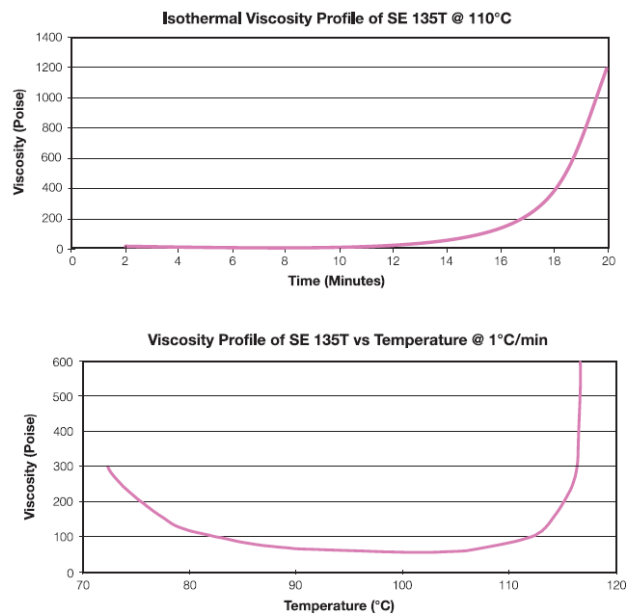
PRODUCT INFORMATION

AVAILABILITY

SE135T-1 is available in unidirectional carbon with fibre weights of 150 & 300 g/m² and woven reinforcements in carbon or glass from 100-660g/m².

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
Fibre Style	-	0/90° Woven 2x2 Twill	0° Unidirectional Carbon	0° Unidirectional Carbon	7781 Style Woven Glass Fabric	-
Fibre Areal Weight	-	200	300	300	300	ASTM D3171
Fibre 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*	σ_{T11}	MPa	(ksi)	808	(117.19)	ISO527-4
0° Tensile Modulus*	E_{t11}	GPa	(Msi)	66.5	(9.64)	ISO527-4
0° Compression Strength*	σ_{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	σ_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*	σ_{T11}	MPa	(ksi)	2415	(350.26)	ISO527-4
0° Tensile Modulus*	E_{t11}	GPa	(Msi)	134	(19.4)	ISO527-4
0° Compression Strength*	σ_{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	σ_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	σ_{T11}	MPa	(ksi)	1916	(277.89)	ISO527-4
0° Tensile Modulus	E_{t11}	GPa	(Msi)	137	(19.8)	ISO527-4
0° Compression Strength	σ_{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	σ_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	σ_{T11}	MPa	(ksi)	470	(68.2)	ISO527-4
0° Tensile Modulus	E_{t11}	GPa	(Msi)	28.2	(4.1)	ISO527-4
0° Compression Strength	σ_{C11}	MPa	(ksi)	648	(94)	SACMA SRM1-94
0° Compression Modulus	E_{c11}	GPa	(Msi)	27.7	(4)	SACMA SRM1-94
0° Flexural Strength	σ_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 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

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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.

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CONTACT INFORMATION

Please see local contact information at www.gurit.com

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