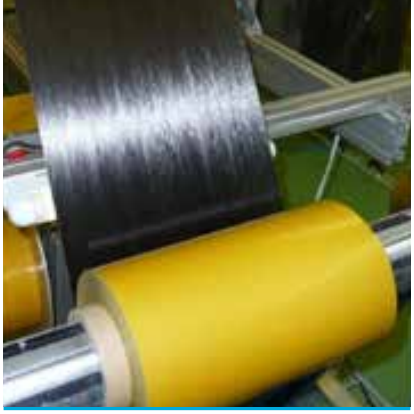


NTPT THINPREG™ 736LT
DATA SHEET

INTRODUCTION

ThinPreg™ 736LT 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 molding of components at 120°C (248°F). This is achieved with a good out-life of up to 60 days at 18-22°C (64-72°C). It is a toughened system, and offers excellent mechanical properties on a wide variety of fibers:

FEATURES

- Versatile, high-strength prepreg system
- Curable at temperatures as low as 80°C (176°F)
- Can be processed with vacuum-only processing
- Suitable tack for most hand layup and automated tape placement processes
- Low viscosity – Ideal for prepreg from 30 to 300gsm
- Lloyd's Register Certified

PURPOSE

ThinPreg™ 736LT is commonly used in vacuum bagging, autoclave processes and could be applied to other pressure molding processes.

ThinPreg™ 736LT is a controlled viscosity system especially suitable for low-flow processing conditions (vacuum bag pressure and minimum cure temperature). ThinPreg™ 736LT has a very high compressive and interlaminar shear strength. It's suitable for both light weight panels and heavily loaded components for example in high end marine applications.

ThinPreg™ 736LT can be used for sandwich structures with honeycomb, foam and balsa cores, in conjunction with NTPT's GF736 Adhesive Film or for monolithic parts.

NTPT prepreg products are often used with automated tape laying machines (ATL). Our products are formatted both for ATL and for manual layup.

PRODUCT FORMAT

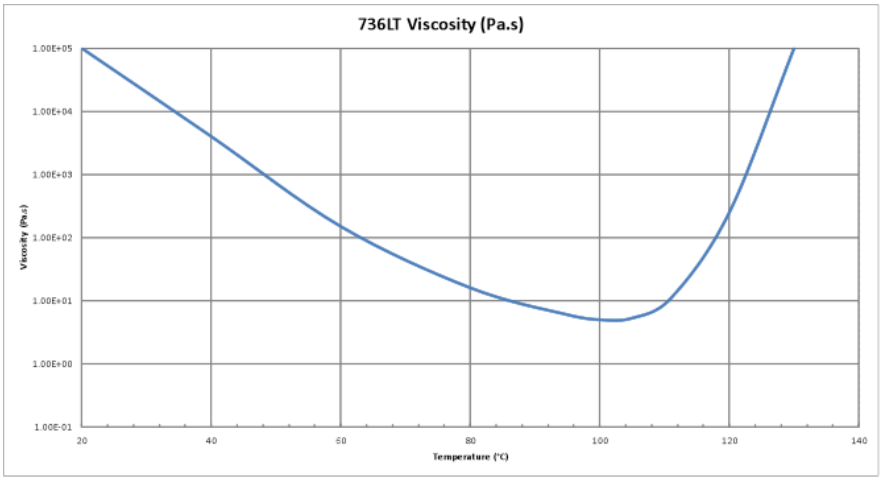
ThinPreg™ 736LT Product Format		
	Hand layup	**ATL**
Paper	YES	YES
Polythene film	YES	NO
Width (mm)	400	300
Available FAW (gsm)	Custom	
	50	
	75	
	100	
	150	
	200	
	250	
	300	

Please contact Customer Support to discuss specific requirements and availability. The product formats listed above also benefit from 3rd Party Certification.

TYPICAL CHARACTERISTICS

Rheology

ThinPreg™ 736LT resin viscosity profile conducted at 1°C/minute (1.8°F/minute).



Minimum viscosity: 5Pa.s at 100°C (212°F).

MECHANICAL PERFORMANCE

Cured resin mechanical properties

Property	Symbol	ThinPreg™ 736LT resin		Test standard
		Mpa	ksi	
Tensile strength	σT	-	-	ISO 527-2
Tensile modulus	ET	-	-	ISO 527-2
Flexural strength	σF	151.58	21984.86	ISO 178
Flexural modulus	EF	3670	532289.46	ISO 178
Compressive strength	σC	-	-	ISO 604

Unidirectional laminate properties

Cured using standard vacuum bag processing techniques and a minimum cure time of 12hrs at 80°C (176°F).

Property	Symbol	HEC* Carbon Fiber 75gsm		HEC* Carbon Fiber 300gsm		Test Standard
		SI	Imperial	SI	Imperial	
Fiber density	ρ_{fiber}	1.8 g/cm³	0.065 lb/in³	1.8 g/cm³	0.065 lb/in³	-
Fiber modulus	E_{fiber}	230 Gpa	33.36 Msi	230 Gpa	33.36 Msi	-
Fiber strength	X_{fiber}	4900 Mpa	711 Ksi	4900 Mpa	711 Ksi	-
Resin content	%	37%		35%		ASTM D3171 Method II
Cured ply density	ρ_{ply}	1.576 g/cm³	00.057 lb/in³	1.612 g/cm³	0.058 lb/in³	ASTM D792
Glass transition temperature	T_{g1}	115.1 °C	204.65 °F	112.2 °C	200.3 °F	ISO 6721
Cured ply thickness	T_{ply}	0.076 mm	0.0030 in	0.286 mm	0.0113 in	ASTM D3171 Method II
0° Tensile cured fiber volume	V_f	55.2%		58.2%		ISO 527-4
0° Tensile strength (normalized to 60%)	X_T	2181 Mpa	316.27 Ksi	2180 Mpa	316.18 Ksi	ISO 527-4
0° Tensile poisson's ratio	E_t	-		-		ISO 527-4
0° Compressive strength fiber volume	ν_{11}	55.2%		58.2%		ASTM D3171 Method II
0° Compressive strength (normalized to 60%)	X_C	1254 Mpa	181.88 Ksi	1074 Mpa	155.77 Ksi	SACMA SRM1-94
0° Compressive modulus fiber volume	V_f	55.2%		58.2%		ASTM D3171 Method II
0° Compressive modulus (normalized to 60%)	E_{C11}	132 Gpa	19.14 Msi	130 Gpa	18.85 Msi	SACMA SRM1-94
90° Tensile cured fiber volume	V_f	55.2%		58.2%		ASTM D3171 Method II
90° Tensile strength	Y_T	- Mpa	- Ksi	32.92 Mpa	4.77 Ksi	ISO 527-4
90° Tensile modulus	E_{T22}	- Gpa	- Msi	8.63 Gpa	1.25 Msi	ISO 527-4
90° Compressive strength fiber volume	V_f	55.2%		58.2%		ASTM D3171 Method II
90° Compressive strength	Y_C	160 Mpa	- Ksi	157 Mpa	23 Ksi	SACMA SRM1-94
90° Compressive modulus fiber volume	V_f	55.2%		58.2%		ASTM D3171 Method II
90° Compressive modulus	E_{C22}	- Gpa	- Msi	10.54 Gpa	1.529 Msi	SACMA SRM1-94
0° Flexural fiber volume	V_f	55.2%		58.2%		ASTM D3171 Method II
0° Flexural strength	XF	1568 Mpa	227 Ksi	1530 Mpa	222 Ksi	ISO 14125
0° Flexural modulus	E_{F11}	87.52 Gpa	12.69 Msi	80.27 Gpa	11.64 Msi	ISO 14125
+-45° IPS fiber volume	V_f	55.2%		58.2%		ASTM D3171 Method II
+-45° In plane shear strength	τ_{12}	- Mpa	- Ksi	- Mpa	- Ksi	ISO 14129
+-45° In plane shear modulus	G_{12}	- Gpa	- Msi	- Gpa	- Msi	ISO 14129
+-45° In plane shear poisson's ratio	ν_{12}	-		-		ISO 14129
0° ILLSS fiber volume	V_f	55.2%		58.2%		ASTM D3171 Method II
0° ILSS	X_{ILSS}	83.14 Mpa	12.06 Ksi	88.69 Mpa	12.86 Ksi	ISO 14130

(*): NTPT has the following fiber description

NTPT Carbon Fiber Naming Convention				
	Modulus	Tensile Strength	Description	Commercial Names
HSC	≈230Gpa	≈3.5Gpa	High Strength Carbon	T300, AS42
HEC	≈230Gpa	≈4.8Gpa	High Elongation Carbon	T700, 34-700
IMC	[290Gpa,310Gpa]	≈5.4Gpa	Intermediate Modulus Carbon	T800
HMC	[370Gpa,410Gpa	≈4.4Gpa	High Modulus Carbon	M40J, HR40
UHMC	≈430Gpa	≈4.2Gpa	Ultra High Modulus Carbon	M46J
***	>430Gpa			

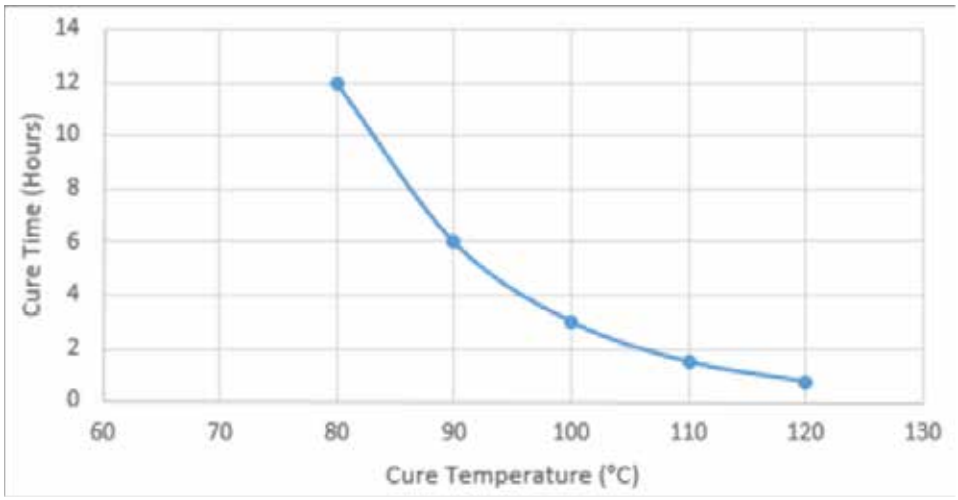
*** Designated by the fiber commercial name

INSTRUCTIONS FOR USE

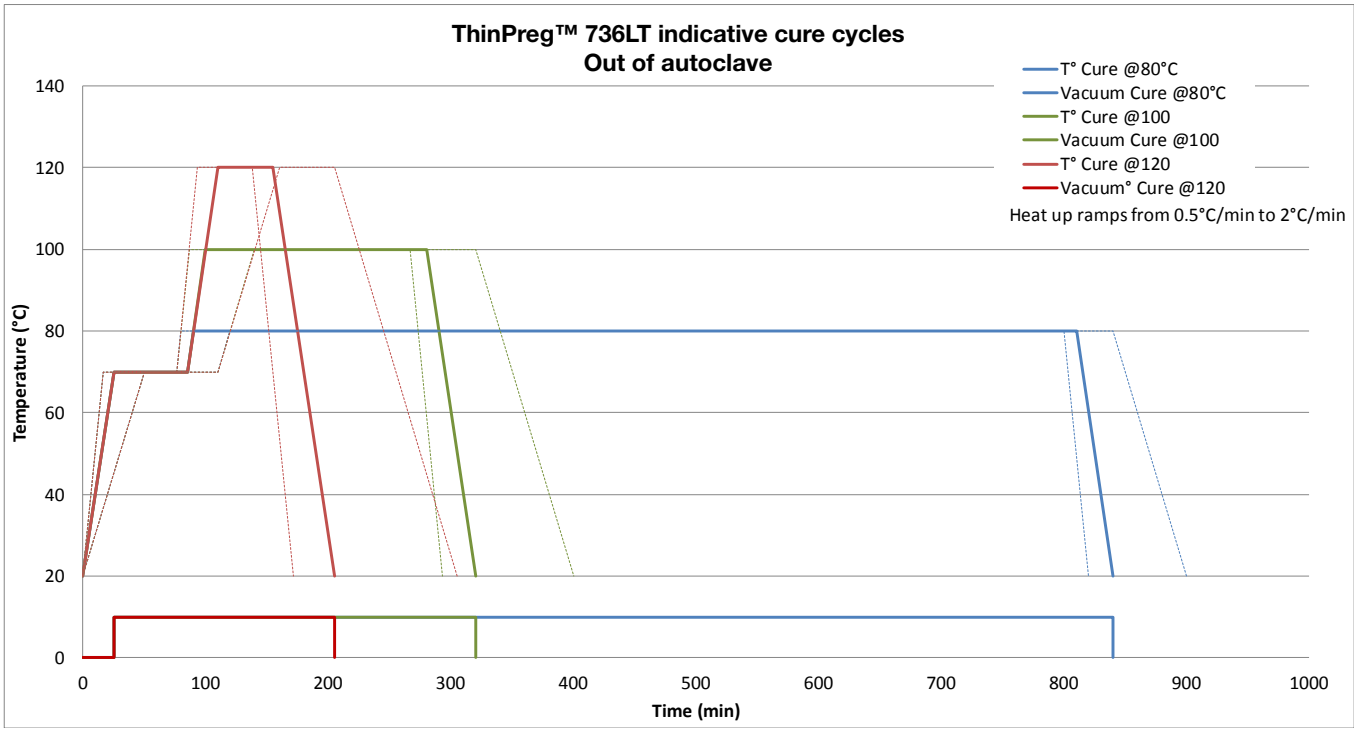
Cure cycles

For a good balance of composite properties, the laminate can be cured at 80°C (176°F) for a minimum of 12 hours.

ThinPreg™ 736LT may be cured at higher temperatures for a shorter time. At a cure temperature of 100°C (212°F) cure can be achieved in 3 hours or at 120°C (250°F) cure can be achieved in 45 minutes.



A laminate may be cured in stages if, for example, making a cored component. However, in a two stage cure, a minimum of 4 hours at 85°C (185°F) or 5 hours at 80°C (176°F) is recommended before debagging a skin, and it must be ensured that this skin is cured for the equivalent of at least 10 hours at 85°C (185°F) or 12 hours at 80°C (176°F) before going into service.



NTPT does not recommend curing ThinPreg™ 736LT under vacuum pressures of less than 0.85 bars. If a ramp rate of less than 0.3°C/min (0.5°F/min) is used, users should satisfy themselves that this allows adequate flow.

A one hour dwell plateau at 70°C (158°F) with full vacuum pressure is recommended for air removal before going to full curing temperature.

Curing at 80°C: When curing at 80°C (176°F) it is important to ensure the temperature is monitored off the trailing thermocouple. 80°C (176°F) should be treated as the minimum cure temperature for 736LT; 70-75°C (158-167°F) will not generate adequate mechanical properties.

Material preparation

When preparing the lay-up the prepreg should be removed from the freezer and allowed to thaw 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.

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

LAYING-UP

The following procedure is recommended for preparing vacuum cured laminates.

1. Place the lay-up on a tool or caul sheet which has been treated with a release agent or film. Insert a thermocouple into the lay-up near the centre ply of the thickest edge section, outside the net trim line. A separate prepreg nylon peel ply is available for covering a mould tool prior to lay-up in order to leave a clean, textured surface for subsequent bonding.

2. Apply a peel ply to the surface of the lay-up. Note that for good secondary bonding of a peel-plied surface of an ThinPreg™ 736LT prepreg laminate, a nylon peel ply is strongly recommended. This is particularly important where the cure temperatures are in excess of 90°C (194°F). Cover the peel ply entirely with a perforated release film. Normally, no edge resin bleeder system is used.

3. Install a vacuum bag using standard techniques. Insert at least two vacuum stems through the bag connecting one to the vacuum source and the other, at a point on the part furthest from the source, to a calibrated vacuum gauge. Position part in the oven or autoclave and draw vacuum to check for bag or system leaks.

4. Commence the heat-up cycle, typically between 0.3°C(0.5°F)/min and 2°C(3.6°F)/min to the final cure temperature. At 80°C (185°F), the temperature should be held up for 12 hours. Faster cures may be obtained at elevated temperatures, e.g. 6 hours at 90°C (194°F), 3 hours at 100°C (212°F) or ¾ hour at 120°C (248°F). All temperatures measured by the previously installed thermocouple. When curing at 80°C (176°F) a minimum of 12 hours is recommended. Vacuum should be maintained as high as possible, with a minimum of 85% throughout the cure cycle.

5. Upon completion of cure, turn off heat and cool until part temperature has fallen below 60°C (140°F). When fully cooled, the part may be debagged, trimmed and machined as necessary. A post-cure is not required.

CORE BONDING

Various core materials can be used with the prepreg system, including foams and honeycombs. However, due to the wide variety of PVC and other foams available, and the cure temperatures involved, special procedures have been developed which must be carefully followed. For details of these processes, please contact Technical Services.

When using Nomex™ or aluminium honeycombs, the separate GF736 adhesive film is recommended and full details of use are provided on the separate GF736 data sheet. This adhesive film is supplied on a lightweight glass carrier, or in some cases it can be supplied directly coated onto one face of the ThinPreg™ 736LT.

GENERAL INFORMATION

Storage

When stored sealed & out of direct sunlight.

Storage Temperature		Value	Unit
-18°C	0°F	24	Months
+18-22°C	+64-72°C	60	Days

All prepreg materials should be stored in a freezer when not in use to maximize 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.

When not in use ThinPreg™ 736LT products should be maintained at -18°C (0°F). To avoid condensation on their surfaces, allow rolls to reach room temperature before unwrapping.

Health and safety

ThinPreg™ 736LT contains epoxy resins which can cause allergic reaction. When uncured, ThinPreg™ 736LT should be handled with appropriate gloves. When cured, a composite laminate made of ThinPreg™ 736LT should be cut, drilled or machined in a room equipped with an exhaust ventilation and filtration system, by operators wearing protective clothing and masks. Refer to Material Safety Data Sheet for further information.

Notice and disclaimer

The Company strongly recommends that Customers make test panels and conduct appropriate testing of any goods or materials supplied by the Company 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.

All advice, instruction or recommendation is given in good faith but 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.

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.

NTPT continuously reviews and updates its literature. Please ensure that you have the current version, by contacting your NTPT sales contact and quoting the revision number.

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