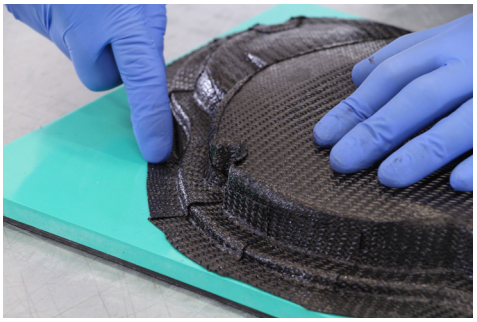
XT135

OUT-OF-AUTOCLAVE TOOLING PREPREG

PREPREG TECHNOLOGY

TECHNICAL DATASHEET



XT135 tooling prepreg being laminated onto a complex pattern in individual panels.

Once laminated, the part is vacuum bagged and cured in an oven at 65°C for its initial cure.

The cured mould has an excellent surface finish and is temperature stable up to 135°C.

XT135 | OUT-OF-AUTOCLAVE CARBON FIBRE TOOLING PREPREG

XT135 is a specialist tooling prepreg system designed to produce dimensionally accurate carbon fibre composite moulds using vacuum bag and oven cure only (out-of-autoclave).

The tooling system is made up of the XT135/S surface ply and XT135/B backing ply. A lightweight composite mould suitable for low production volumes can be produced using just one surface and two backing plies (subject to mould geometry) whilst the recommended laminate for a production mould is one surface and four backing plies finished with another surface ply, for balance.

XT135 has a low initial cure of just 65°C and a maximum service temperature of 135°C (after post-cure). Due to its use of carbon fibre reinforcement throughout, moulds made using XT135 exhibit high strength and an extremely low CTE.

The XT135 surface ply uses a black toughened resin layer to provide a hard-wearing and lightly polishing tool surface with minimal print.

RECOMMENDED USES

XT135 is ideal for the manufacture of accurate and temperature stable moulds used for the production of prepreg components. Moulds made using the system are fully compatible with all XPREG® prepreg systems including the XC110 out-of-autoclave system.

XT135 is the recommended system for the production of accurate and stable composite moulds when an autoclave is not available.

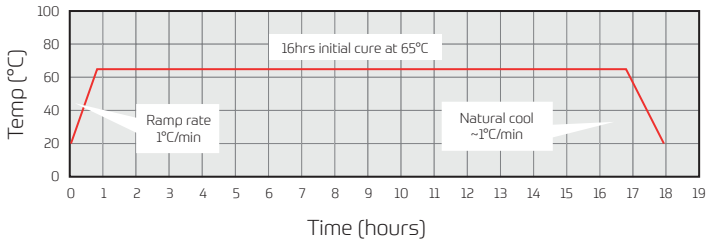
CURING

XPREG® XT135 is designed to be oven cured in a vacuum bag at full vacuum pressure however it can also be cured in an autoclave or hot-press. Minimum vacuum pressure is 10mbar.

XT135 features a low initial cure temperature allowing patterns to be made from a range of materials and minimising thermal expansion of the pattern during initial cure.

INITIAL LOW-TEMP CURE CYCLE (ON THE PATTERN)

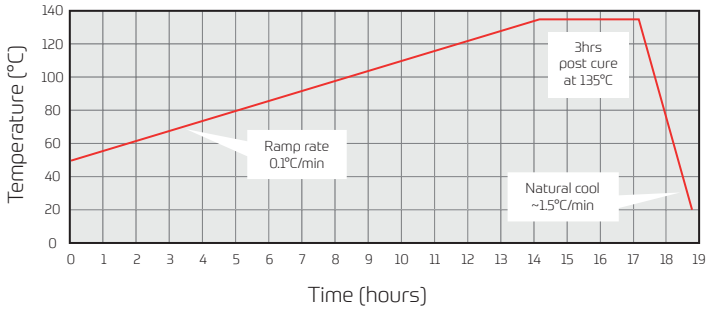
Step	Start Temp	Ramp Rate	Duration	End Temp	Elapsed Time
1	~ 20°C	1°C /min	00:45	65°C	00:45
2	65°C	Soak	16:00	65°C	16:45
3	65°C	Natural Cool	00:45	20°C	17:30



HIGH-TEMP POST-CURE CYCLE (OFF THE PATTERN)

After initial cure, the new mould should be removed from the pattern and then post-cured - using a very gradual ramp rate to avoid distortion - up to its full service temperature.

Step	Start Temp	Ramp Rate	Duration	End Temp	Elapsed Time
1	50°C	0.1°C /min	14:10	135°C	14:10
2	135°C	Soak	3:00	135°C	17:10
3	135°C	Natural Cool	00:45	~20°C	18:40



For detailed information, including alternative cure cycles see the *XT135 Processing Handbook*.

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SUITABLE PATTERN MATERIALS

Moulds/tools should use an epoxy-based surface and be temperature stable up to 65°C. Epoxy tooling board (such as Easy Composites' EB700) is particularly well suited.

Polyurethane tooling board should NOT be used due to the cure-inhibition of polyurethane on epoxy resin systems at elevated temperature.

In all cases, patterns should be fully sealed and properly prepared with a release agent suitable for the patten material and elevated temperature use. Easy-Lease CR1 Chemical Release Agent is recommended.

Fully Compatible

- Epoxy matrix composite materials (eg. CFRP, GRP)
- Epoxy tooling board (e.g. EB700 with S120 Board Sealer)
- Aluminium / stainless steel

NOT Recommended

- Vinylester composite moulds (e.g. Uni-Mould™)

NOT Compatible

- Polyester matrix composites
- Polyurethane model/tooling board

For detailed information on mould suitability and preparation, see the *XT135 Processing Handbook*.

STANDARD REINFORCEMENTS

XPREG® XT135 is held in stock in a standard carbon fibre reinforced surface ply and backing ply:

SKU	Fibre	Weight (gsm)	Weave	Width (mm)
XT135S-C311T2-250(1250)	Toray T300 High Strength Carbon 3k	250	2x2	1250
XT135B-C1212T2-415(1250)	Toray T700 High Strength Carbon 12k	415	2x2	1250

TECHNICAL SPECIFICATION

GENERAL PROPERTIES

Cure temperature range	65°C (minimum) 130°C (maximum)
Maximum service temperature	135°C (after post cure)
Surface ply out-life (at 20°C) (for best results OOA)	3 days (see handling notes)
Backing ply out-life (at 20°C)	21 days (see storage notes)
Freezer-life (at -18 °C)	12 months
VOC content	< 0.1% (solvent free)

STORAGE & HANDLING

STORAGE & FREEZER LIFE

When not in use, XPREG® prepregs should be stored frozen at -18°C (0°F) in sealed plastic packaging. When ready to use, the material should be removed from the freezer and allowed to thaw fully to room temperature before being removed from the packaging.

Remaining material should be re-sealed before returning to the freezer to avoid the risk of moisture uptake.

Due to the highly sensitive surface ply (see below), it is recommended to freeze the prepreg immediately upon receipt.

Stored frozen, the freezer-life of XPREG® XT135 is 12 months.

OUT-LIFE

The XPREG® XT135 resin system has an out-life of 21 days at room temperature (20°C), but for a pinhole free surface finish out-of-autoclave, the out-life of the surface ply should be considered as 3 days (see below).

HIGHLY SENSITIVE SURFACE PLY

The XPREG® XT135 surface ply uses a special dry scrim to maintain air paths to the surface and achieve a pinhole-free surface finish from an out-of-autoclave cure.

This scrim is extremely sensitive to out-life and will start to 'wet-out' within just 2-3 days at room temperature (20°C), closing the air paths to the surface and increasing the risk of pinholes on the mould's surface.

For this reason, for best results, the amount of time the surface ply spends at room temperature should be kept to an absolute minimum.

The condition of the surface ply can be determined by inspecting the appearance of the uncured prepreg. A dry scrim will appear white in colour whereas a scrim that has become wetted-out will appear dark as the scrim becomes more transparent.

A wetted-out surface ply that is still within its expiry date and out-life can still be used but the surface finish may be affected and require some post-work. It is also perfectly usable as the inverted final ply on a balanced layup.

PROCESSING GUIDE

XPREG® XT135 is supported by a highly detailed processing guide to help users achieve the best results from this advanced material.

The guide includes information on recommended laminating and vacuum bagging procedures, tooling and mould preparation, process specific cure cycles, working with core materials and adhesive films, and troubleshooting tips.

SAFETY INFORMATION

This material contains uncured epoxy resin which can cause allergic reactions with skin contact. Repeated and prolonged skin contact much be avoided.

Please refer to the product safety data sheet before working with this material.

OTHER XPREG® SYSTEMS

XC110	Out-of-autoclave component prepreg system with a class 'A' surface finish. 110°C service temperature. Co-curable with XC130.
XA120	Adhesive film fully compatible with XC110.
XC130	Autoclave cure, visual quality, high performance prepreg with a service temperature of 130°C. Co-curable with XC110.
XT180	Autoclave cure tooling prepreg with low CTE, long out-life and 180°C service temperature.
XT210	Aerospace industry autoclave cure tooling prepreg with low CTE and very high 210°C service temperature.

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