LTM® 350 Tooling Prepregs

LTM® 350 is a low temperature curing epoxy based tooling system optimised for both rapid initial cure and post cure cycles and maximum time savings.

LTM® 350 tools can be continuously cycled to 150°C and are capable of 180°C cures without degradation.

LTM® 350 utilises optimised product formats for the surface and bulk plies delivering the highest quality surface finish with the shortest possible lay-up times thanks to excellent prepreg tack and drape characteristics.

Features and Benefits

- 3 hours at 60°C rapid autoclave cure cycle
- Excellent cured tool surface finish
- 2-3 days out life at 21°C
- Up to 9 months storage at -18°C
- Optimised prepreg tack and drape at 21°C for both surface and bulk plies
- Mould tools directly from low temperature master models
- Minimum recommended cure temperature 45°C
- Free-standing rapid post cure cycle
- 180°C service temperature
- Optimised for autoclave processing but can be used for OOA cures

CURE CYCLE

Autoclave cure

Vacuum bag pressure	Minimum of 980mbar (29”Hg)* †
Autoclave pressure	6.2 bar (90 psi)**
Ramp rate	0.5°C (1°F)/minute
Recommended cure cycle	3 hours at 60°C, +3/-0°C
Cool down	Maximum of 3°C / minute to 30°C

*This is the ideal vacuum level, however, it is recognised that it is not always possible to attain. If in doubt, please contact our technical support staff for advice.

Notes:

- The internal temperature may rise substantially when the pressure is raised.
- Thermocouples should be taped to the external surface of the bagging and the thickest sections of the laminate. These areas will take the longest to reach the cure temperature, and the duration of the autoclave cure cycle will be determined from the time that these areas reach the specified cure temperatures.
- The cool down rate should be chosen depending on the requirements of the customer. For example, if the master model is to be re-used, the cool down should be very slow to account for contraction of the laminate to avoid cracking of the master model.

Alternative cure cycles

Temperature	Duration (hours)
45°C*	10
50°C*	6.0
55°C*	4.5
60°C*	3.0

* Temperature must be measured by the lagging thermocouple attached to the part. For more information on processing at 45°C cure cycle please contact our technical support staff for more information.

POST-CURE

In applications demanding maximum temperature capability, it is essential that the tool is post-cured to develop its full glass transition temperature. The tool skin should be lightly supported during the post-cure cycle. The tool backing structure may be used, but should not be rigidly attached to the tool skin.

Ramp rate	2.0°C / minute to 50°C
Dwell	30 minutes at 50°C (+5/-0°C)
Ramp rate	0.3°C / minute to 80°C
Dwell	30 minutes at 80°C (+5/-0°C)
Ramp rate	1.0°C / minute to 140°C
Dwell	5 minutes at 140°C (+5/-0°C)
Ramp rate	2.0°C / minute to 180°C
Dwell	60 minutes @ 180°C (+5/-0°C)
Cool down	Maximum of 3°C / minute to below 60°C

* Temperature must be measured by the lagging thermocouple attached to the part.

Notes:

- Large components should be adequately supported to avoid distortion.

PHYSICAL PROPERTIES

Test	LTM350
Cured resin density	1.23 g/cm3
Tg	186°C
CTE	2.6×10-6/°C
In-plane shrinkage	0.021%

AVAILABILITY

The standard LTM350 materials for the manufacture of composite tooling are:

LTM®350-T-3KHS-2X2T-220-1250 2 × 2 twill weave, 220gsm 3K carbon

LTM®350-T-12KHS-2X2T-650-1250 2 × 2 twill weave, 650gsm 12K carbon

LTM®350-T-24KHS-2X2T-995-1250 2 × 2 twill weave, 995gsm 24K carbon

These materials are available in roll form at 20 to 25 linear meters per roll depending on the prepreg grade. Please contact our technical support staff for details.

STORAGE

Out life* at 21°C	Prepreg: 2-3 days
Storage at -18°C	Prepreg: 9 months from date of manufacture

*Out life refers to accumulated time out of the freezer before the part is cured.

Note:

The actual freezer storage life and out life are dependent on a number of factors, including; fibre type, format and application. For certain formats, it may be possible for the storage life and out life to be longer than stated. Please contact our technical support staff for advice.

TOOLING LAY-UP :

Ply	Material
1	LTM®350-T-3KHS-2X2T-220-1250 @ 0/90
	DEBULK (15 MIN)
2	LTM®350-T-24KHS-2X2T-995-1250 @ 0/90
3	LTM®350-T-24KHS-2X2T-995-1250 @ +/-45
	DEBULK (15 MIN)
4	LTM®350-T-24KHS-2X2T-995-1250 @ 0/90
5	LTM®350-T-24KHS-2X2T-995-1250 @ +/-45
6	LTM®350-T-24KHS-2X2T-995-1250 @ 0/90
	DEBULK (15 MIN) - Optional
7	LTM®350-T-3KHS-2X2T-220-1250 @ 0/90
	FINAL BAG FOR CURE

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EXOTHERM

LTM® 350 prepregs are reactive formulations which can undergo severe exothermic heat up during the initial curing process if incorrect curing procedures are followed.

Great care must be taken to ensure that safe heating rates, dwell temperatures and lay-up/bagging procedures are adhered to, especially when moulding tooling laminates are typically 6 to 7mm thick. The risk of exotherm increases with lay-up thickness and increasing cure temperature. It is strongly recommended that trials, representative of all the relevant circumstances, are carried out by the user to allow a safe cure cycle to be specified. It is also important to recognise that the model or tool material and its thermal mass, combined with the insulating effect of breather/bagging materials can affect the risk of exotherm in particular cases.

Please contact our technical support staff for further information on exotherm behaviour of this prepreg.

HEALTH & SAFETY

Please refer to the product SDS for safe handling, personal protective equipment recommendations and disposal considerations.

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