

Introduction

ACG's LTF318U surfacing film employs ZPREG® selective impregnation technology to achieve a high quality surface finish on composite mould tools manufactured via low pressure, vacuum bag processing. LTF318U surface ply, used in combination with ACG's LTM®318U tooling prepreg, offers new possibilities for the manufacture of affordable, high temperature capable composite tooling.

This Technical Data Sheet (TDS) should be read in conjunction with the following ACG documents:

TDS1013	LTF318U ZPREG Technology Surfacing Film for Tooling Vacuum Bag Recommendations.
TDS1001	Manufacturing Procedure for LTM Mould Tools.
TDS1005	Tip sheet for the Manufacture of High Quality LTM Tools.

Standard Formats

System	Surface ply	Fabric weight
Carbon	LTF318U/GF1200/CF0300	48gsm + 200gsm (3K)
	LTF318U/GF1200/CF6300	48gm + 200gsm (12K)
Glass	LTF318U/GF1200/GF1100	48gsm + 390gsm

System	Bulk ply	Fabric weight
Carbon	LTM318U CF0700: 41%Rw	660gsm
Glass	LTM318U GF0700: 34%Rw	876gsm

Laminating the LTF318U Surface Ply

1. Allow the roll of surface prepreg to reach room temperature before opening the protective bag. Cut sufficient material to complete the tool, reseal the roll of prepreg and return it to freezer, logging the out life used.
2. Always support the roll by its core tube or stand it vertically, on its end, when not in use.
3. Using a template, cut the surface ply so that the tacky (glass scrim) side will be applied to the pattern.

4. The surface ply should be laid up such that it will extend beyond the bulk plies by at least 10mm (0.4in) around the full perimeter of the tool. This is essential to ensure the provision of air paths from the surface ply into the breather pack during the curing process.
5. A five minute (maximum) debulk, using a perforated (P3) release film and lightweight breather, is recommended before laying-up the bulk plies. **Check the laminate for any bridging in female corners, rectifying where necessary.**

Laminating the Tool Bulk Plies

1. The surface ply should be backed up with fully impregnated bulk plies in accordance with TDS 1001.
2. A complete tooling laminate will, typically, consist of a LTF318U surface ply (tacky glass scrim side to the pattern) and eight bulk plies of fully impregnated GF0700 or CF0700 prepreg which is orientated at 0/90° and +/-45° to achieve a balanced laminate.
3. The final ply can be an LTF318U surface ply or a fully impregnated (bulk ply resin) prepreg of similar fibre weight to the surface ply (CF0300 or GF1100), thus giving a balanced construction.
4. Debulks are recommended after the first and fifth bulk plies and, finally, on completion of the lay-up. Always use a P3 perforated release film and a lightweight breather.
5. **A perforated P3 release film must be applied to the lay-up to ensure continuity of the air paths into the breather layer during the curing process.**
6. Position the vacuum bag stack and apply a minimum vacuum of 950mbar (28in Hg) at room temperature.
7. A vacuum drop test should be performed prior to cure of the part. The test must show a pressure drop of no more than 68mbar (2in Hg) within 10 minutes once vacuum is removed.

Basic Lay-up Checklist for Carbon Tools

Operation	Material	Orientation	Check
PLY 1	LTF318U/GF1200/CF0300	0	
Debulk	P3 Release Film, Lightweight Breather, 950mbar (28Hg), 5 minutes (maximum)		
PLY 2	LTM318U/CF0700	0	
PLY 3	LTM318U/CF0700	+45	
PLY 4	LTM318U/CF0700	-45	
PLY 5	LTM318U/CF0700	90	
Debulk	P3 Release Film, Lightweight Breather, 950mbar (28in Hg)		
PLY 6	LTM318U/CF0700	90	
PLY 7	LTM318U/CF0700	-45	
PLY 8	LTM318U/CF0700	+45	
PLY 9	LTM318U/CF0700	0	
PLY 10	LTF318U/GF1200/CF0300 (or LTM318U/CF0300)	0 (glass scrim side up)	

Basic Lay-up Checklist for Glass Tools

Operation	Material	Orientation °	Check
PLY 1	LTF318U/GF1200/GF1100	0	
Debulk	P3 Release Film, Lightweight Breather, 950mbar (28in Hg), 5 minutes (maximum)		
PLY 2	LTM318U/GF0700	0	
PLY 3	LTM318U/GF0700	+45	
PLY 4	LTM318U/GF0700	-45	
PLY 5	LTM318U/GF0700	90	
Debulk	P3 Release Film, Lightweight Breather, 950mbar (28in Hg)		
PLY 6	LTM318U/GF0700	90	
PLY 7	LTM318U/GF0700	-45	
PLY 8	LTM318U/GF0700	+45	
PLY 9	LTM318U/GF0700	0	
PLY 10	LTF318U/GF1200/GF1100 (or LTM318U/GF1100)	0 (glass scrim side up)	

Initial Cure Data

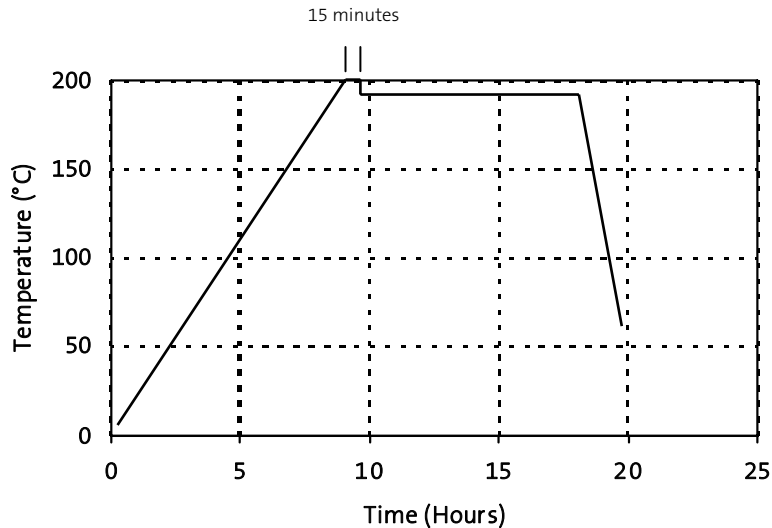
LTF318U/LTM318U	Temperature Cycle
Initial cure	16 hours at 65°C (150°F)

Temperature should be increased at a maximum rate of 2°C (3.6°F)/minute.

Note: 65°C (150°F) is the minimum cure temperature requirement for this system.

Other cure cycles are available. Please consult individual product data sheets or consult ACG's technical staff for further information.

Post-Cure



- Ramp to 200°C (392°F) at a maximum rate of 20°C (36°F)/hour.
- Dwell 15 minutes at 200°C (392°F).
- Maximum rate of cool down, to step from 200 to 190°C (392 to 374°F), is 3°C (5.5°F)/minute.
- Dwell at 190°C (374°F) for 8 hours.
- Maximum rate of cool down from 190 to 60°C (374 to 140°F) is 3°C (5.5°F)/minute.
- Part may be removed <60°C (<140°F).

For tools that will be used at lower temperatures, alternative post-cure temperatures may be applicable. Please contact the Advanced Composites Group technical staff for specific recommendations.

Note: It has been demonstrated that a carbon LTF318U/LTM318U tooling construction will exhibit zero spring back after an initial cure at 65°C (150°F) followed by above post-cure.

Caution:

High tack vacuum bag sealant tape has the potential to cause damage to mould tool flange areas during its removal. Therefore, customers are advised to check the adhesion characteristics of their sealant tape prior to use and determine if removal of the tape is likely to lead to delamination. Where the potential for damage exists, a less aggressive, lower tack sealant tape should be sourced or steps taken, such as using a mould sealer or applying a flash breaker tape, to minimise the risk of damage.

Storage

Storage at -18°C (0°F) (for all material)	>12 months
Work life of LTF318U at 21°C (70°F)	7 days
Work life of LTM318U at 21°C (70°F)	6 to 8 days