

T-Lam 130-1 Slow

Epoxy Tooling Laminating System

- **Thermally stable up to 130°C (266°F) when fully postcured**
- **Low viscosity for wet-out of heavy weight reinforcements**
- **Low exotherm and extended pot-life makes this product ideal for large or complex moulds**
- **Ambient curing and low shrinkage for accurate mould manufacture**
- **Good Health and Safety**

Introduction

T-Lam 130-1 Slow is an epoxy tooling system for manufacturing glass or carbon moulds by wet laminating. T-Lam 130-1 Slow is part of the 130°C tooling systems and is compatible with the range of gelcoats, infusion, and repair materials.

T-Lam 130-1 Slow is a low shrinkage ambient curing system, which simplifies accurate mould manufacture. Designed for laminating and cure at 20°C, it should then be mid-cured at 40°C (104°F) for 4 hours to guarantee the strength needed for demoulding. It can then be postcured off the plug to give a material that is thermally stable to 130°C (266°F). Exceeding this temperature will cause a rapid loss in stiffness and a safety margin is required for the maximum tool operating temperature to prevent distortion or tool damage.

Instructions for Use

Mix Ratio

T-Lam 130-1 Slow should be mixed at the following mix ratio:

T-Lam 130-1 Slow Resin	T-Lam 130-1 Slow Hardener
100	40.0 (by weight)
100	50.3 (by volume)

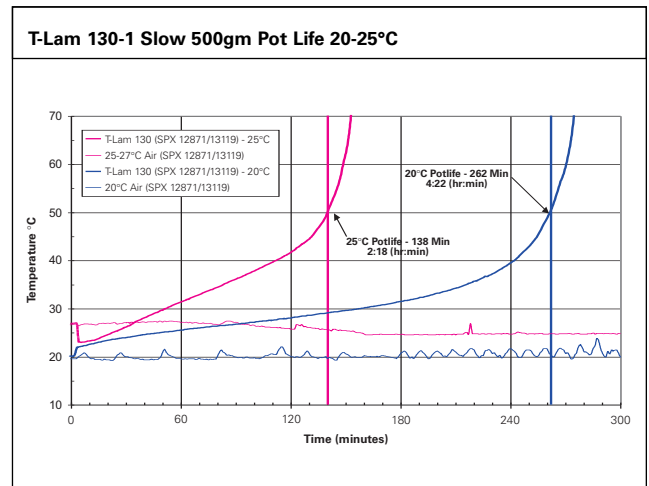
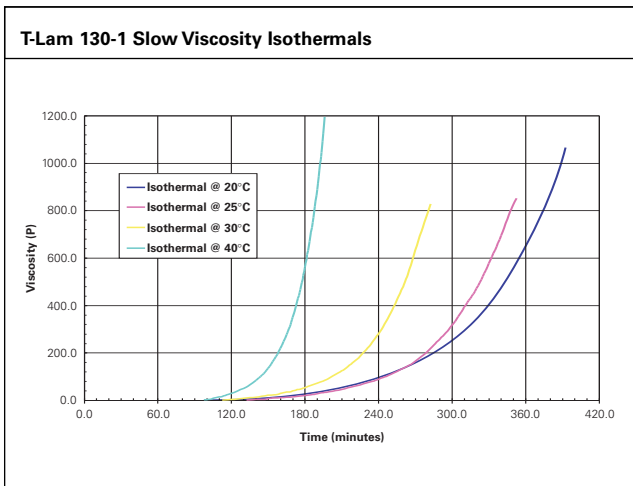
Any deviation from the prescribed mix ratio may degrade the thermal capability and physical properties of the material.

System Information

Component Properties		
	Resin	Hardener
Viscosity @ 20°C (cP)	TBA	TBA
Viscosity @ 25°C (cP)	2000 +/-200	19 +/-2
Viscosity @ 30°C (cP)	TBA	TBA
Shelf Life (months)	24	24
Colour (Gardener)	7	4
Density g/cm ³ (lb/ft ³)	1.17 (73.04)	0.93 (58.06)
Hazard Category	Xi (Irritant)	C (Corrosive)

Working Properties				
Mixed Density at 20°C gm/cm ³ (lb/ft ³)	1.109 (69.23)			
Initial Mixed Viscosity at 25°C (cP)	447			
Gel Time (150g in Water at 25°C)	6hrs 36mins			
Pot Life (500g in Air at 20°C)*	4hrs 22mins			
Pot Life (500g in Air at 25°C)*	2hrs 18mins			
Working Properties vs Temperature	20°C (68°F)	25°C (77°F)	30°C (86°F)	40°C (104°F)
Earliest Vacuum on time (1000P Theoretical thin film) (hr:min)	6:25	6:00	4:40	3:10
Brushable working time/ Latest flow under vacuum (5,000P Theoretical thin film) (hr:min)	8:10	7:10	5:40	3:25
Earliest Vacuum off time (100,000P Theoretical thin film) (hr:min)	11:10	10:00	7:00	4:35
Demould Time	Recommended 4 hours at 40°C (104°F) after system has gelled to reduced risk of laminate damage			
Overcoating window on T-Gel 130-1 Slow. 20°C (68°F), 50-70% RH	1-6 days.			

* Pot life in larger volumes can be reduced. Material approaching its pot life is typically 40-50°C (104 – 122°F) in the centre of the pot and it will then thicken as it applied to the cooler plug / laminate. This material will have already seen a higher temperature and will reach a higher viscosity more quickly than the thin film data at a given workshop temperature.



Application Notes

- Any deviation from the prescribed mix ratio may degrade the thermal capability and physical properties of the material.
- The recommended workshop temperature is between 18°C and 25°C (64°F and 77°F).
- If “drill” style mixing is used, it is recommended that this is done on the lowest setting to reduce the air introduced. Particular attention is needed to mix the sides and bottom of the container.
- Allowing the mixed resin to stand for 5-10 minutes before use can remove air and improve the final laminate quality.
- Dispensing the mixed material into shallower trays and mixing material as required will significantly extend the working time.
- If large quantities are left at the end of laminating it is recommended to transfer some of the bulk material into a shallow vessel, with a large surface area, to dissipate heat.
- T-Lam 130-1 Slow has been designed to produce low levels of bi-product. Tests at 20°C 50-70% RH show T-Lam 130-1 Slow can be over laminated directly without reduction in adhesion with air exposure even after 12 hrs open time. As not all conditions have been tested it is still best practice, when wet laminating a large part, to arrange the workshop team to work down the tool completing the laminate stack to minimise the air exposure in each layer.
- If using T-Gel 130-1 Slow allow 16 hours at 20°C (68°F) before starting to laminate the mould and a total of 24 hours before applying vacuum to consolidate the laminate to ensure sufficient stiffness of T-Gel 130-1. Applying vacuum too soon can lift the gelcoat and cause sink marks.

Ambient cure

The mechanical strength after 24 hours at 20°C (68°F) is still low and a mid cure is recommended to de-mould or remove peel ply as detailed below. Releasing the mould or vigorous removal of peel ply before this mid cure may result in delaminations and possible blisters evident on the mould surface.

If peel ply is removed before a full cure, the part-cured shards of resin created can contain a significant amount of un-reacted epoxy. Un-reacted epoxy dust is a particular skin irritant and the appropriate personal protective equipment (PPE) should be used.

Mid cure

A mid cure of at least **4 hours at 40°C (104°F) is recommended before de-moulding** to maximise gelcoat adhesion and build sufficient resin strength for demould. Ramp rate is not critical at this stage.

Post Cure

To achieve full postcure ramp at 0.2°C /min to 120°C (8.5 hours) and dwell for 2 hours (0.36°F /min to 248°F). Faster postcure risks thermal softening of the tool. Contact Gurit for advice when in doubt.

Properties

Cured Properties			
Property	Unit	Mid Cure 4 Hours at 40°C (104°F)	Mid Cure + Postcure 2 hours at 120°C (248°F)
Tg2 – by DSC	°C (°F)	60 (140)	132 (270)
Interlaminar Shear Strength WRE600T Laminate*	MPa	46	39
Tensile Modulus WRE600T Laminate*	GPa	25	24
Tensile Strength WRE600T Laminate*	MPa	449	461
Flexural Modulus WRE600T Laminate*	GPa	21	20
Flexural Strength WRE600T Laminate*	MPa	588	535
Interlaminar Shear Strength RE301H8 Laminate*	MPa	50	49
Tensile Modulus RE301H8 Laminate*	GPa	24	23
Tensile Strength RE301H8 Laminate*	MPa	473	459
Flexural Modulus RE301H8 Laminate*	GPa	21	21
Flexural Strength RE301H8 Laminate*	MPa	570	579

* Laminates have been infused with T-Lam 130-1 Slow as opposed to hand lay-up for standard comparison of mechanical properties.

Approx Materials Coverage

Approx net resin use and thickness for Gurit woven glass structural laminate (WE581T) manufactured through wet lay-up without vacuum consolidation. Carbon and other glass fabrics such as Tissues and Chop Strand Mat materials will use additional resin test panels may be needed to verify usage for these materials.

Structural Glass Laminates (Average 41% Resin Content by volume) – Resin & Thickness by Fibre gsm			
Fibre gsm	Resin gsm	Total /Kgm ²	Thickness /mm
581	841	1.42	0.57

Net Resin Figures - No waste allowance

A general 10 to 15% waste value is then recommended for purchase estimation

Health and Safety

Users should ensure that some elevated temperature cure is applied to the component before trying to machine it. In a component made from T-Lam 130-1 Slow, which has seen no heat, there will only be a partial cure. Therefore the sanding dust will be more irritating than dust from a laminate cured at elevated temperature, in which there will be more thorough cross linking. Particular care should also be taken when removing peel plies from part cured material as this can also produce a dust like particle, and an elevated cure or personal protective equipment is recommended.

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. Overalls or other protective clothing should be worn when mixing, laminating or sanding. Contaminated work clothes should be thoroughly cleaned before re-use.
3. Eye protection should be worn if there is a risk of resin, hardener, solvent or dust entering the eyes. If this occurs flush the eye with water for 15 minutes, holding the eyelid open, and seek medical attention.
4. Ensure adequate ventilation in work areas. Respiratory protection should be worn if there is insufficient ventilation. Solvent vapours should not be inhaled as they can cause dizziness, headaches, loss of consciousness and can have long term health effects.

5. 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
- before using the lavatory
- after finishing work

6. 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 Material Safety Data Sheet for all hazardous products. Please ensure that you have the correct MSDS to hand for the materials you are using before commencing work. A more detailed guide for the safe use of Gurit resin systems is also available from Gurit, and can be found on our website at www.gurit.com

Applicable Risk & Safety Phrases

Resin

R 36/38, 43, 52/53
S 23, 24, 26, 28, 37/39, 61

Hardener

R 20/21/22, 35, 43, 52/53
S 9, 20, 26, 36/37/39, 45, 61



Transport & Storage

The resin and hardener should be kept in securely closed containers during transport and storage. Any accidental spillage should be soaked up with sand, sawdust, cotton waste or any other absorbent material. The area should then be washed clean (see appropriate Safety Data Sheet).

Adequate long term storage conditions will result in a shelf life of 12 months for both the resin and hardener. Storage should be in a warm dry place out of direct sunlight and protected from frost. The temperature should be between 10°C and 25°C. Containers should be firmly closed. Hardeners, in particular, will suffer serious degradation if left exposed to air. The materials should be stirred before use.

Notice

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