EPOXY LAMINATING BIO RESIN

LB2

Key Features

- Easy to use
- Medium Viscosity Resin
- Outstanding Wetting Abilities
- Good Mechanical Properties
- Lower Environmental Impact

Product Description

LB2 Epoxy Laminating Bio Resin is medium viscosity and optimized for hand laminated applications, while it is compatible with all common fibre reinforcements it is particularly well paired with flax reinforcements to provide composite parts with a significantly reduced environmental impact.

Our bio resins are not compromised in performance but simply derive the same chemicals from plant-based sources. A key component of epoxy, epichlorohydrin, is manufactured using renewable plant-based Glycerol in place of petroleum-based propylene. Additionally, the raw materials going into our bio resins are co-products or waste products of other industrially important processes which means they do not compete with food sources or displace food-based agriculture. Once mixed with its hardener the overall plant-based content is ~27% which is amongst the highest in the industry.

LB2 is a high-performance bio epoxy resin suitable for use with a wide range of reinforcements including glass, carbon and aramid fibres as well as natural reinforcements such as flax and jute fibre. Its viscosity profile is particularly suitable for hand laminating and bonding applications including open hand layup and vacuum bagging processes. For resin infusion or RTM processes we have another Bio Resin, IB2, which has a lower viscosity and a cure profile that is better suited.

Recommended Uses

IB2 is the perfect choice for use in combination with our range of sustainable natural flax reinforcements from Eco-Technilin. Used together, these materials allow the development and production of greener products with significantly reduced environment impact.

Having excellent mechanical and processing properties the IB2 Epoxy Infusion Bio Resin can be used for a wide range of uses including but not limited to:

- Sports/recreational equipment - skis, boards, canoes, archery.
- Motorsport – panels, aerodynamic elements, structural members.
- Marine – hulls, foils, masts.
- Wind energy – masts, blades, nacelles.

Properties

The table below shows the typical uncured properties:

Property	Units	Resin	Hardener	Combined
Material	-	Epoxy Resin	Formulated Amine	Epoxy
Appearance	-	Clear Liquid	Amber Liquid	Clear Liquid
Viscosity @20 °C	mPa.s.	3240	190	1300
Density @20 °C	g/cm^3	1.16	1.01	1.12

How to Use

LB2 is a chemical product for professional use. It is essential to read and understand the safety and technical information before use.

Follow the guidelines for safe use outlined in the SDS which include the use ofappropriate hand and eye protection during mixing and use.

Mix Ratio

Mix Ratio 100:27 by Weight

LB2 Epoxy Laminating Bio Resin should be mixed with its Hardener at a ratio of 100 parts of resin to 27 part sof hardener, by weight. You must still maintain the correct overall ratio of resin to hardener to ensure a proper cure.

When working with any epoxy resin, it is essential to mix the resin and hardener exactly at the correct mix ratio. Failure to do so will result in a poor or only partial cure of the resin, greatly reduced mechanical properties and possibly other adverse effects. Under no circumstances add ‘extra hardener’ in an attempt to speed up the cure time; epoxies do not work in this way.

Mixing Instructions

LB2 is a highly reactive (fast curing) resin system. Only weigh out and mix as much resin as you can use within the pot life.

Weigh or measure the exact correct ratio of resin and hardener into a straight sided container. Using a suitable mixing stick begin to mix the resin and hardener together to combine them completely.

Spend at least one minute mixing the resin and hardener together, paying particular attention to the sides and base of the container. Remember: Any resin that has not been thoroughly combined with hardener will not cure.

Once you have finished mixing in one container, it is good practice to transfer the mixed resin into a second container and undertake further mixing of the resin using a new mixing stick. Doing so will eliminate the risk of accidentally using unmixed resin from the bottom or sides of the container.

Pot-Life / Working Time / Cure Time

LB2 is a highly reactive resin system and once the resin has been mixed with the hardener, the reaction will start to give off heat (exotherm) which will further accelerate the cure of the resin, especially when the resin is in the mixing pot.

Transfer the resin from the mixing pot onto the part as soon as possible to extend the working time and avoid the risk of uncontrollable rapid cure in the mixing pot.

As with all epoxies, the pot-life/working time will vary significantly depending on the ambient temperature, the starting temperature of the resin and hardener and the amount of resin mixed.

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LB2 can be used in ambient temperatures between 15°C (59°F) and 30°C (86°F). For best results, an ambient temperature of at least 20°C (68°F) is recommended. Ensure that both resin and hardener containers are within this temperature range before use.

The table below gives an indication of pot-life and cure properties:

	Pot Life @ 20 °C	Gelation @ 20 °C	Demould Time @ 20 °C
Time	23 mins	4 hrs 30 mins	13 hrs 30 mins

Full Cure / Post-Cure

As with most epoxy systems, where parts cure in normal ambient temperatures, full cure is not reached for several days. Although parts will be handleable after the listed demould time (at 25°C), full mechanical properties will take at least 14 days to develop in (at 25°C). Where possible, avoid exposing the cured resin to full service rigours for at least this time.

As with many post-cure cycles for resins, the post-cure cycle for our LB2 Epoxy Resin is not too sensitive and a range of different post-cure cycles will produce good results, specifically improved mechanical performance and elevated HDT/operating temperature. Post-curing parts that will be used at or exposed to elevated operating temperatures (such as vehicle bonnets/hoods in direct sunlight, engine-bay parts, car interior parts etc.) is strongly recommended to prevent distortion of the parts when they are put into service and experience these higher temperatures.

Where possible, parts should be post-cured still inside the mould to reduce distortion and improve surface finish (i.e. reduce 'print-through'). When post-curing parts in the mould, it is important to post-cure them without demoulding at all (i.e. don't demould and then put them back into the mould) otherwise you can get some strange patterns on the surface where some areas are post cured in direct contact with the mould surface and others are not.

A simple and very effective post-cure cycles for the LB2 Epoxy Laminating Resin is as follows:

CYCLE #1 SUITABLE FOR MOST SITUATIONS

- 16hrs at room temperature
- 24hrs at 40°C

If you're encountering any surface finish issues (faint print-through) then you can experiment with a slower 'ramp rate' which sometimes improves things:

CYCLE #2 SUGGESTED FOR SUBTLE IMPROVEMENTS TO SURFACE FINISH

- 16hrs at room temperature
- 16hrs at 60°C

If you need to push the HDT of the finished part higher then you could increase post-cure up to a maximum of 80°C as follows:

CYCLE #3 SUGGESTED FOR HIGHEST POSSIBLE HDT/OPERATING TEMPERATURE

- 16hrs at room temperature
- 8hrs at 80°C

These are all just suggestions. Most situations just call for option #1; . A cure at ambient temperature before post-cure is generally favoured with most resin systems.

Mechanical Properties

Cured Resin Properties

Property	Units	Post Cure		
		Ambient + 24hrs 40 °C	Ambient + 8hrs 60 °C	Ambient + 4hrs 80 °C
Tensile Modulus	GPa	3.40	3.23	3.05
Tensile Stength	MPa	82.0	78.0	75.0
Elong. at Break	%	4.3	5.8	6.0
Flexural Moulus	GPa	3.40	3.20	2.90
Flexural Strength	MPa	127.0	127.0	125.0
ILSS	MPa	52.0	52.0	53.0
Comp. Strength	MPa	110.0	107.0	104.0
Impact Resistance	KJ/m^2	25.0	25.0	23.0
Tg Onset	°C	69.0	90.0	100.0

Transport and Storage

Resin and hardener should be kept in tightly seal containers during transport and storage. Both the resin and hardener should be stored in ambient conditions of between 10°C (50°F) and 25°C (77°F).

When stored correctly, the resin and hardener will have a shelf-life of 24 months. Although it may be possible to use the resin after a longer period, a deterioration in the performance of the resin will occur, especially in relation to clarity and cure profile.

Pay particular attention to ensuring that containers are kept tightly sealed. Epoxy hardeners especially will deteriorate quickly when exposed to air.

Disclaimer

This data is not to be used for specifications. Values listed are for typical properties and should not be considered minimum or maximum.

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