



EMP160 High Temperature Epoxy Moulding Paste

For use with:

- EG160 High Temp Epoxy Tooling Gelcoat
- EL160 High Temp Epoxy Laminating Resin

EMP160 is an advanced moulding paste (also known as laminating paste) for use in the production of high temperature moulds/tools for prepreg and resin infusion. EMP160 uses a special high-Tg epoxy resin combined with aluminium filler and glass fibre reinforcement to produce a reliable and easy-to-apply structural reinforcement for high temperature moulds.

Patterns should first be gelcoated with EG160 High Temp Epoxy Tooling Gelcoat. For small to medium sized moulds, the paste can then be used on its own with no further reinforcement necessary. For larger moulds, the paste can be used in conjunction with EL160 High Temp Epoxy Laminating Resin and additional reinforcement (such as woven glass or carbon), in which case the paste can be used to fillet tight corners or smooth over complex details on the mould making it easier to produce a void-free mould using woven reinforcement.

In all cases, a ramped temperature post-cure is required before the component or mould can be used at elevated temperature. See *Cure and Post-Cure* heading for full details.

Typical Applications

- Reinforcement (backing) on moulds for prepreg manufacture (see service temperature notes below)
- Reinforcement (backing) on moulds for high temperature epoxy infusion
- Filling or filleting tight corners or complex details on moulds before laminating with compatible epoxy resin and reinforcement

Tooling/Moulds for XPREG® Prepregs

EMP160 is ideally suited as the main reinforcement on composite moulds

Key Features

- Hand laminated tools up to 125°C
- Suitable for prepreg tooling
- Fast and easy to use
- Can be used for filleting and filling

intended for use with the XPREG® range of prepregs. When using EMP160 paste, moulds are usually made by hand-layup using one or two layers of EG160 gelcoat reinforced using EMP160 paste. The resulting mould will be dimensionally stable and reliable at the optimum cure temperature of 120°C recommended for most XPREG® prepregs.

A compatible high temperature release agent, such as Easy-Lease, should always be used. Always follow the correct post-cure procedure before using the mould at elevated temperature.

Maximum Service Temperatures

Any air voids present within the paste or between the paste and the gelcoat can cause blisters or imperfections on the surface of a mould once it is post-cured at elevated temperature. For this reason it is very important to minimise void content as far as possible during lamination and to limit the maximum service temperature to 120°C for moulds or components that have been laminated by hand and use EMP160 paste as their main reinforcement.

If service temperatures in excess of 125°C (up to a maximum of 160°C) are required then special care and processing must be carried out to ensure that no air voids or air entrapment exist within the paste or between the paste and the gelcoat. Practically, this is difficult to achieve when using the EMP160 moulding paste as the main reinforcement for the mould. It is possible however to use small amounts of EMP160 for filleting and filling corners and details on a mould before laminating the main reinforcement using EL160 laminating resin and woven reinforcement and then vacuum bagging the laminate to consolidate it and eliminate air entrapment.

Compatibility Information

Backing up EG160

EMP160 is designed for use with with EG160 High Temp Epoxy Tooling Gelcoat. When applying the paste onto the gelcoat, a fresh 'wet' application of EG160 gelcoat should be used to 'couple' the paste to the gelcoat. See technical datasheet for full details.

If using EMP160 for filleting and filling corners and details on a mould prior to using a traditional fabric reinforcement, the fabric reinforcement

should be laminated using EL160 Epoxy Laminating Resin.

Compatibility with other high temperature epoxy gelcoats and resins is possible but not guaranteed. In all cases, resins or pastes used to back-up EG160 gelcoat must have similar high temperature properties in order to result in a completed mould or component which maintains the high temperature stability of EG160.

Using cured EG160 moulds

Moulds/tools made using EG160 gelcoat can be used to produce parts using epoxy, polyester and vinylester resin systems, including prepregs (subject to maximum service temperature). A suitable release agent is required.

How to Use

Mould Preparation

EMP160 moulding paste should can be used either on its own as the total reinforcement for a mould or as a filleting and filling paste to smooth-out tight corners or details prior to lamination of conventional fabric reinforcement and resin. In either case, the new mould should be prepared with one or two applications of a suitable epoxy gelcoat such as EG160 High Temp Epoxy Tooling Gelcoat.

Similarly to the gelcoating schedule, it is essential that the coupling coat is applied to the existing gelcoat application whilst the previous application is still at the 'B-stage' of its cure (where it is firm but still tacky); failure to do so will result in delamination.

Mix Ratio & Technique

MIX RATIO 100:8

Paste : Hardener (by weight)

EMP160 paste should be mixed with EMP160 hardener at a ratio of 100:8 by weight. Use digital scales and be as accurate as possible.

To mix the epoxy paste and hardener together it is suggested to weigh the required amount of paste into a mixing bucket, make a well in the paste and then weigh-out and pour the correct amount of hardener into the well. Wearing sturdy nitrile (or similar) gloves, thoroughly mix the paste with the hardener to a smooth consistency. Keep mixing (by kneading and blending the mix with your fingers) until there are no lumps.

As soon as the paste has been mixed it will begin to cure and so once mixed it should be applied to the gelcoat immediately.

Application

Using EMP160 as the Complete Mould Reinforcement

When making a mould where then EMP160 paste will be the mould's only reinforcement, a thin film of 'wet' of EG160 gelcoat should be applied all over the mould surface to act as a coupling coat for the paste. This step is very important and will ensure a good bond between the paste and gelcoat.

The EMP160 paste should be applied directly onto the wet 'coupling' layer of EG160 gelcoat in an even layer of around 10-15mm. Take care to ensure that the paste does not exceed 25mm in thickness (in a single application). At all times, try to avoid any air entrapment by ensuring paste is built-up gradually, starting with any inside corners.

Using EMP160 for Filleting and Filling

When using EMP160 paste to fillet or fill details on a mould before laminating the bulk of the reinforcement using laminating resin and woven reinforcement, the paste should be 'coupled' to the EG160 gelcoat using a wet thin film layer of either EG160 gelcoat or EL160 laminating resin to ensure a good interface.

Apply the EMP160 paste as required, typically focussing on the inside of tight corners or other detailed areas of the mould. The paste can be used to completely 'smooth out' the shape of the mould before the woven reinforcement is applied.

The EL160 laminating resin and woven reinforcement can be applied 'wet on wet' onto uncured EMP160 paste. Always pay attention to ensure no air entrapment of voiding between the paste and gelcoat or the woven reinforcement



Cure and Post-Cure

Before components or moulds made using EMP160 Paste can be used at elevated temperature, they must be allowed to cure for a minimum of 24hrs at room temperature and then undergo a ramped (or stepped) post-cure to at least 5°C above the required service temperature.

To minimise the risk of distortion, an initial cure should be undertaken still on the mould (or pattern). This needs to be for a minimum of 24 hours at room temperature (20°C) before you can safely demould the component or mould. This is to allow the resin system to cure enough to ensure that, during the main post-cure, the mould will not deform or distort as the temperature rises.

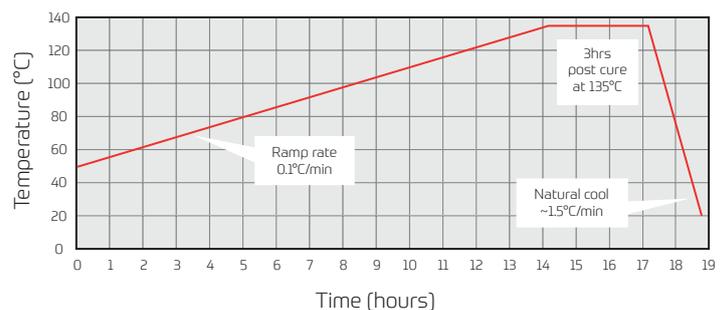
Once the initial room temperature cure is complete, the piece can then be demoulded ready for the full post-cure.

Suggested Post-Cure Cycle for Prepreg Tools

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	45:00	~20°C	18:40

The recommended post-cure cycle (above) calls for a temperature ramp from 50°C to 135°C. If a temperature controller with programmable ramp rate is not available then the oven temperature can be increased by 12°C every 2hours until 135°C is reached.



Technical Specifications

Material Properties and Cure Time

Property	Units	Value
Material Composition		Epoxy Aluminium Powder Glass Fibre
Viscosity		Paste
Aluminium Filled?		Yes
Colour		Grey
Density at 25°C	g/cm ³	1.17 - 1.27
Pot-Life (200g at 25°C)	Minutes	120
Demould Time (200g at 25°C)	Hrs	24

Cured Mechanical Properties

Property	Units	Value
Hardness	Shore D	75 - 85
Heat Distortion Temperature	°C	160
Linear Shrinkage (500 x 50 x 10mm)	%	<0.05
Tensile Strength	MPa	5.5 - 7.5
Elongation at Break	%	2.0 - 3.0
Flexural Strength	MPa	40.0 - 50.0
Flexural Modulus	MPa	5150 - 5750
Coefficient of Thermal Expansion (CTE)	°C ⁻¹	6 -10 x 10 ⁻⁶

Health & Safety Precautions

- Wear respiratory protection when cutting or machining
- Always work in a well ventilated environment
- Wear gloves, safety glasses and waterproof clothes
- Do no smoke when machining

For further information, consult the product safety data sheet.

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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Easy Composites Ltd

Unit 39, Park Hall Business Village,
Stoke on Trent, Staffordshire, ST3 5XA
United Kingdom.
Tel. +44 (0)1782 454499
Email sales@easycomposites.co.uk
Web www.easycomposites.co.uk

Easy Composites (Beijing) Ltd

No.20# A, U Gu Mid Area
Liandong, Majuqiao, Beijing
101102, China
Tel. +86 (0) 1057485810
Email sales@easycomposites.asia
Web www.easycomposites.asia