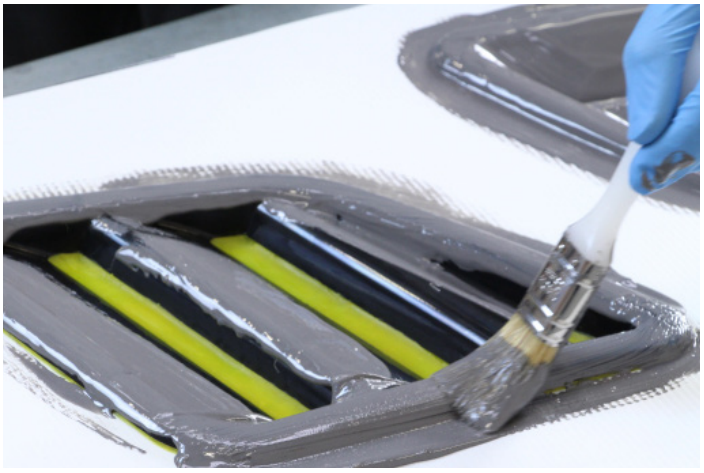
HIGH TEMP EPOXY TOOLING GELCOAT

EG160

TECHNICAL DATASHEET



Key Features

- High temperature use up to 160°C
- Suitable for prepreg tooling
- Highly polishable
- Superior surface finish
- Simple brush application

EG160 High Temperature Epoxy Tooling Gelcoat

For use with:

- EMP160 High Temp Epoxy Moulding Paste
- EL160 High Temp Epoxy Laminating Resin

EG160 is an advanced epoxy gelcoat designed primarily for use in the production of high temperature moulds/tools for prepreg and resin infusion. EG160 uses a unique unfilled formulation which results in superior surface finish and polishability whilst still achieving excellent stability at service temperatures up to 160°C.

EG160 is applied by brush onto the pattern or master mould. The medium viscosity of the gelcoat makes it easier to apply at an even thickness whilst it is sufficiently thixotropic to allow application onto vertical surfaces.

The gelcoat is typically backed up using either EMP160 High Temp Epoxy Moulding Paste or EL160 High Temp Epoxy Laminating Resin (and suitable reinforcement) to produce a dimensionally stable, high service temperature mould or component.

Typical Applications

- Gelcoat on moulds for prepreg manufacture (see service temperature notes above)
- Gelcoat on moulds for high temperature epoxy infusion
- Gelcoat on high service temperature epoxy components

Tooling/Moulds for XPREG® Prepregs

EG160 is ideally suited as the surface layer on composite moulds intended for use with the XPREG range of prepregs. Moulds can be made by hand-layup (using either EP160 paste or EL160 laminating resin and suitable reinforcement) and will be dimensionally stable and reliable at the optimum cure temperature of 120°C for most XPREG® prepregs.

A compatible high temperature release agent, should always be used.

Maximum Service Temperatures

Any air voids present within the laminate can cause blisters or imperfections on the surface of a mould or component 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 without any vacuum consolidation (by vacuum bag or resin infusion).

If service temperatures in excess of 125°C (up to a maximum of 160°C) are required, it is likely that vacuum consolidation - either by vacuum bagging after hand laminating or by resin infusion of the reinforcement - will be required. These processes will ensure the negligeable void-content required to avoid the risk of blistering or delamination at the highest service temperatures.

Effect of Gelcoats on Flat Moulds at Temperature

It should be noted that the use of *any* gelcoat (including EG160) on moulds intended for high temperature use will introduce a certain amount of 'imbalance' to the laminate, whereby the unreinforced gelcoat will have a slightly different CTE (coefficient of thermal expansion) than the reinforced backing.

Although often not noticeable on many mould geometries, this effect can result in noticeable temperature distortion on particularly large or flat moulds. In such cases, it is often preferable to forgo a gelcoat altogether.

Easy Composites Ltd | Tel +44 (0)1782 454499 | www.easycomposites.co.uk | sales@easycomposites.co.uk

Compatibility Information

Backing up EG160:

EG160 can only be backed-up using a compatible epoxy-based system such as further layers of EG160 gelcoat, EMP160 epoxy paste or EL160 epoxy laminating resin. Compatibility with other high temperature epoxy 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

Patterns or moulds should be prepared with an appropriate release agent according to the manufacturer's instructions. Easy Composites' *Easy-Lease Chemical Release Agent* is recommended. Porous surfaces (such as MDF or tooling board) should be well sealed beforehand using *S120 Tool Sealer* or similar.

Mixing

EG160 gelcoat should be mixed with EG160 hardener at a ratio of 100:25 by weight. Use digital scales and be as accurate as possible.

Thoroughly mix the gelcoat and hardener being careful to avoid air entrapment and ensure that all resin and hardener from the bottom and sides of the container have been properly combined.

Mixed EG160 gelcoat will produce significant heat when curing. Mix in small batches and use expediently.

Application

EG160 should be applied onto the pattern or mould in two even layers of approximately 0.5mm per layer. The second gelcoat layer as well as main reinforcement application must be made whilst the previous gelcoat application is still in its 'b-stage' which means that it is firm but still tacky. The gelcoat must not be allowed to cure past this point without the next layer having been added otherwise delamination (especially at elevated temperature) is likely.

The two layers of gelcoat should be backed-up using EMP160 High Temp Epoxy Moulding Paste or EL160 High Temp Epoxy Laminating Resin with suitable reinforcement.

Backing-up with EL160 High Temp Laminating Resin

Backing -up with EMP160 High Temp Moulding Paste

When backing up with EMP160 moulding paste, a third thin layer of EG160 should be used to 'couple' the paste (wet-on-wet) to the first gelcoat layers:

See also: "Easy Composites Process Guide - Producing High Temperature Composite Tools by Hand Layup".

Cure and Post-Cure

Before components or moulds made using EG160 gelcoat 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.

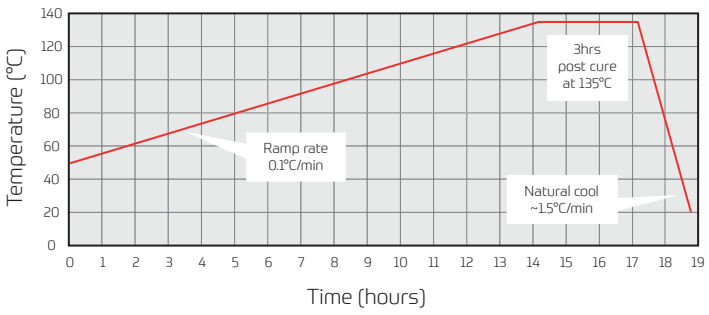
Once the initial room temperature cure is complete, the piece can then be demoulded ready for the full post-cure.

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 (hrs: mins)	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	00:45	~20°C	18:55

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 Filled?		No
Colour		Grey
Density at 25°C	g/cm^3	1.09 - 1.12
Pot-Life (200g at 25°C)	Minutes	30
B-Stage (Back-up Time)	Hrs : Mins	1 : 30
Demould Time (200g at 25°C)	Hrs	24

Cured Mechanical Properties

Property	Units	Value
Hardness	Shore D	80-85
Heat Distortion Temperature	°C	160°C

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