TC160 TOOL CAST

HIGH TEMP EPOXY CASTING RESIN

Key Features

- Extremely high 160°C service temperature
- Good thermal conductivity
- Highly polishable
- High compressive strength
- Excellent hardness retention at high temp.
- Very low shrinkage
- Low viscosity with excellent detail reproduction

Product Description

TC160 Tool Cast is an aluminium filled, high service temperature epoxy casting resin suitable for service temperatures up to 160°C. It is designed for the production of high temperature cast resin tooling such as two-part hot press compression moulds for moulding and curing prepregs or particularly high service temperature vacuum forming tools (for regular vacuum forming tools, TC80 Tool Cast is recommended).

TC160 cures with negligeable shrinkage and can be cast in relatively large volumes. The system is highly polishable, very hard-wearing and thermally conductive making it ideally suited to high temperature repetitive pressing/moulding applications such as hot-press moulding of prepregs. The low mixed viscosity of this two-part epoxy system ensures very accurate reproduction of even the finest surface detail.

Subject to use of a suitable release agent (such as Easy-Lease CR1), TC160 is a suitable and compatible mould material for most thermoset resin systems including epoxy (and epoxy prepregs), polyester and vinylester.

TC160 is a two-part epoxy casting resin and is sold as a kit, including the resin and hardener in the correct proportions.

Recommended Uses

TC160 Tool Cast is ideally suited for the following uses:

- Two-part compression moulds for prepregs (hot press moulding)
- Cast single-part moulds for prepreg moulding or other high temperature applications.
- Particularly high temperature vacuum forming tools

Properties

The table below shows the typical uncured properties:

Property	Units	Resin	Hardener	Combined
Material	-	Metal Filled Epoxy Resin	Formulated Amine	Epoxy
Appearance	-	Grey Liquid	Clear Liquid	Grey Liquid
Viscosity @20 °C	mPa.s.	120000- 160000	10 - 20	14000 - 18000
Density @20 °C	g/cm^3	1.83 - 1.88	0.90 - 0.95	1.68 - 1.73

How to Use

Both the TC160 resin and its hardener must be at a temperature between 15 and 25°C for optimal results. If necessary this can be achieved by gently warming the resin by placing it in a warm room or sink of warm water (sealed containers). Ensure the resin and hardener is not over 25C before use.

Ensure that the mould is thoroughly cleaned and a suitable release agent such as our CR1 EasyLease or our RW4 Spray Release wax is used to ensure the casting does not stick to the mould.

Any deep sections over 75mm in the moulding should be 'blocked out' using a tapered wooden block, with rounded corners, to reduce the quantity of resin that will be required and reduce any shrinkage. As the wooden block will need to be removed after curing, cover it in foil or coat in resin to seal the surface, then apply a release agent such as RW4 to help removal.

Always ensure that any such wooden core/block is at least 35mm from the mould surface and that the core is no bigger than 13cm across. Wooden blocks/cores should be removed after the resin has cured, before the mould is used.

Mix Ratio

Mix Ratio 100:10 by Weight

TC160 Tool Cast Epoxy Casting Resin should be mixed with its Hardener at a ratio of 100 parts of resin to 10 parts of hardener, by weight.

You must maintain the correct overall ratio of resin to hardener to ensure a proper cure. 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

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.

Mix thoroughly to ensure that the hardener is well distributed throughout the resin and again ensure that any aluminium filler is evenly distributed throughout the resin before pouring.

Care should be taken to avoid aerating the resin whilst mixing. Use a steady mixing action, moving material from the bottom and edges of the container into the middle.

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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.

To remove any trapped air, pour the resin into the mould in a thin stream into a single part of the mould, allowing it to flow to the rest of the mould from there.

On areas of fine surface detail we suggest painting an amount of the mixed resin directly onto the detailed areas ensuring that the resin is in intimate contact with the mould with no trapped air before pouring the bulk of the resin around it.

Pot-Life / Working Time / Cure Time

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.

	Pot Life @ 20 °C	Demould Time @ 20 °C
Time	100 - 140 mins	12-24hrs

Our TC160 Tool Cast Epoxy Casting Resin can be used in ambient temperatures between 15°C (59°F) and 25°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.

Curing times will depend on the size and shape of the casting and also the ambient working temperature and so will vary between 12 and 24hrs to reach a full cure. Thin castings will take longer than thicker castings to cure.

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.

To ensure that the TC160 cast material achieves its maximum operating temperature a ramped elevated temperature post-cure is recommended. Allow the casting to cure fully at room temperature for a minimum of 24 hours before post curing. The post cure cycle is as follows:

- 40°C for 1 hour
- 60°C for 1 hour
- 80°C for 1 hour
- 100°C for 1 hour
- 120°C for 1 hour

Ideally the casting should be supported during the post cure process to minimise the chances of distortion or sagging. Once the post-cure is complete, allow the mould to return to room temperature naturally before use - preferably by letting it cool down in the oven. If the temperature drops suddenly, distortion or warping can occur. Once the mould is fully cooled, it can then be put into service at temperatures up to 160°C.

Mechanical Properties

Cured Resin Properties

These properties describe the resin after a 24 hour cure at room temperature followed by the recommended post-cure.

	Units	Result
Hardness 25°C	Shore D	91
Hardness 100°C	Shore D	88
Hardness 140°C	Shore D	84
Hardness 160°C	Shore D	80
Linear Shrinkage	%	0.10
Tensile strength	MPa	12.0 - 17.0
Elongation at break	%	2.0 - 3.0
Flexural strength	MPa	56.0 - 61.0
Flexural Modulus	MPa	7400 - 79000
Heat Distortion Temperature	°C	160
Machinability		Average

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 15°C (50°F) and 25°C (77°F).

When stored correctly, the resin and hardener will have a shelf-life of 12 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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