MICROTEX COMPOSITES

E6-215BS

Low temperature curing tooling epoxy system

TECHNICAL DATA SHEET

E6-215-BS matrix is a thermosetting epoxy matrix designed for low temperature cure.[1]

After initial curing, E6 matrix can be post-cured to allow final service temperature up 180°C.

We recommend using our prepreg with E6-215 LW matrix as the first skin.

PRODUCT VARIANTS

E6-215-BS: Unpigmented version

SHELF LIFE

OUT LIFE
48 hours @ 21 °C

STORAGE LIFE
6 months @ -18 °C

TYPICAL APPLICATIONS

TOOLING

FEATURES

- SHORT POSTCURING "FREESTANDING" CYCLE
- CO-CURE WITH OUR EXISTING TOOLING PRODUCTS E6 215 FAMILY
- TOOLING OPTIONS OF 1-2-1 AND 1-3-1
- INITIAL LOW TEMPERATURE AUTOCLAVE CURE FROM

[1] Where the intended end application is for a cosmetic product, customers are advised to consult a Microtex Composites sales representative for specific advice on fibre selection when placing an order for material.

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CURING CONDITIONS

Autoclave Cure	
Pressure	6 bar
Vacuum bag pressure	-0,9 bar
Start temperature	30°C
Ramp rate	0,7°C/min
Dwell condition	10 h @ 55°C

CURING AND POST-CURING CONDITIONS

A slow controlled temperature ramp rate, not exceeding 0.33°C/min (20°C/Hour) is essential to develop the resin Tg. The slow postcure also ensures the tool retains the correct profile and dimensions.

	Option I	**Option II**
Start temperature	Initial tooling cure temperature, minus 10°C	Initial tooling cure temperature, minus 10°C
Oven ramp rate	No more than 0.33 °C/min (20 °C/h)	No more than 0.33 °C/min (20 °C/h)
Post-cure Dwell Conditions	2 h @ 160 °C (+5/-0 °C)	4 h @ 180 °C (+5/-0 °C)

CURING CYCLES AND Tg's

Cure cycle	**Tg (DMA) Onset (°C)**	**Tg (DMA) tanδ (°C)**
10 h @ 55 °C	72	92
Post-cure opt. I	177	198
Post-cure opt. II	193	213

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TOOL OR MASTER MODEL REQUIREMENTS

The terms “model”, will be used throughout this document to describe the item or shape onto or into which the prepreg is to be laid up.

E6 prepregs can be cured against most non porous materials (e.g. aluminum, closed cell syntactic foams) and some porous materials (e.g. wood, plaster) providing that a suitable epoxy sealant is applied in the latter case.

The model must be constructed in such a manner as to possess perfect vacuum integrity and to withstand the pressure applied during cure. In some cases, E6 prepregs may be cured under oven/vacuum bag moulding conditions, the vacuum required varying from few hundreds mmHg to full vacuum. In other cases, the materials may be cured under autoclave pressure, typically 6 bar (600kPa). Whatever the cure cycle to be used, it is strongly recommended that the tool or model be subjected to a representative cure cycle, including representative bagging arrangement, prior to commencing lay-up.

The curing reaction of E6 prepregs can be inhibited when the material is moulded in contact with certain materials. Cure inhibition results in a sticky, uncured resin surface, which can be thin but sufficient to impair the cosmetic quality of the surface finish of the part or tool. Materials that are known to cause such a reaction are:

- Urethane or phenolic based foams as used in some common tooling Polyurethane based lacquers and sealants;
- Some phenolic resins;
- Some polyester resins;
- Acid catalyzed resins and sealers;
- Some acrylic paints;
- Epoxy tooling board can lead to rough surface and cure inhibition without the proper master model preparation.

The preferred method of preventing cure inhibition when moulding E6 prepregs against such materials is the application of an approved barrier coating.

The Experience lead that the epoxy master model resin should be adequately sealed with an appropriate product and application technique. With urethane or phenolic modelling board, a surface gel-coat should be used as a suitable barrier material.

Whichever product is used, the application instructions as given in the appropriate Microtex Data Sheet must be carefully observed as slight deviations from these instructions can render the barrier coating ineffective.

Microtex should be contacted regarding the availability of chemical surface pretreatments which have in many cases been effective in eliminating or reducing the effects of inhibition reactions.

In all cases where there exists no prior experience of moulding E6 prepregs against specific tool or model materials, Microtex should be consulted and if necessary, a suitable trial conducted.

TOOLING COSTRUCTION

Tooling SMC prepregs are offered as bulk plies. The surface plies are of a lighter weight fabric, and this assists with laminating details and corners. On the cured tooling, the surface ply provides a pit-free finish and an even surface. The bulk plies are of heavier fabrics and used to form the majority of the tooling laminate thickness.

A typical tooling laminate is 5 to 6 mm in thickness, which confers rigidity to the final tool.

It is usual to lay-up tooling smc prepregs in a nominal quasi-isotropic construction, to provide the same coefficient of thermal expansion in all directions for the cured tool. This can be achieved by a 1-3-1 or 1-2-1 construction (surface ply-bulk plies-surface ply). A typical lay-up is:
0° E6 215 family prepreg with light fabric as surface ply and SMC prepreg as bulk ply.

TOOLING LAY-UP

Thaw the frozen prepreg in the sealed bag at room temperature. Cut pieces of surface and bulk ply prepreg appropriate to the shape and dimensions of the tool. Ensure a suitable release agent is applied to the epoxy master model. For additional information, please contact the Microtex Technical Department (see "Tooling prepreg Processing Guide" file).
Lay-up the surface fabric plies, in a nominated 0° direction.

De-bulk after the lamination of the first ply under a vacuum bag for approximately 15 minutes. All de-bulks should be performed using a perforated release film between prepreg and breather (suggested perforation pattern P3; Polyester NW Breather: 150 to 200 g/m2); ensuring no bridging in the bag.

De-bulk after surface ply

De-bulk after first bulk ply, then de-bulk after the last ply.

The last ply will be surface fabric prepreg orientated in the nominated 0° direction.

Perform a final vacuum de-bulk immediately before bagging the laminate for initial cure.

For the final bagging arrangement, the following steps should be observed:
place at least one thermocouple between the surface ply and the first bulk ply, near the thickest part of the master model.

Solid (non-porous) release film must be used between prepreg and breather.

The polyester breather should wrap the laminate ensuring no bridging; for larger tools use VV770 (50 to 100mm Dry fabric) stripes in order to realize a 400x400mm mesh on the breather surface for better air extraction.

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STORAGE CONDITIONS

This prepreg should be stored as received in a cool dry place or in a refrigerator.
After removal from refrigerated storage, prepreg should be allowed to reach room temperature before opening the polyethylene bag, thus preventing condensation.

PRECAUTIONS FOR USE

The usual precautions when handling uncured resins and fibrous materials should be observed, and a Safety Data Sheet is available for this product.

SDS Reference Codes: E6-215 BS: SIS-485

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