

TECHNICAL DATA SHEET

EC-439

EPOXY CASTING SYSTEM UNFILLED, HIGH TEMPERATURE

DESCRIPTION

EC-439 High Temperature Epoxy Casting System is a two-component, unfilled system designed for use with a wide variety of fillers. When filled, EC-439 can be used in place of more expensive aluminum filled casting materials. EC-439 can be used at elevated temperatures up to 300°F after post cure. EC-439, when mixed with fillers, offers the user low CTE, high HDT, long work life, good thermal conductivity and high compressive strength. When filled, EC-439 can be used as a backing material for nickel-shell tooling or with high temperature surface coats. Typical applications include: Prototype Injection Molds, Resin Transfer Molds (RTM), LPMC Molds, Compression Molds, Vacuum Form Molds, Reaction Injection Molds (RIM), Other High Temperature Mass Cast Applications

APPLICATIONS

- Resin Transfer Molds (RTM)
- Prototype Injection Molds
- LPMC Molds
- Vacuum Form Molds
- Compression Molds
- Reaction Injection Molds (RIM)
- Other High Temperature Mass Cast Tooling Applications.

GENERAL CASTING GUIDELINES Properly prepare your mold, model, or pattern with a sealer followed by several coats of an appropriate mold release or parting agent. Construct and attach a permanent leak proof seal containment structure around the model (see EC-439 Application Guide). Steel re-bar cross bracing will be required. Model must be strong enough to support the weight of the cast without deflection. Stir up the EC-439 Resin side well before mixing with the EC-439 Hardner. Thoroughly mix EC-439 Resin and Hardener at the appropriate mix ratio. Add granular and bulk grain fillers (N-60 & N-6) in the recommended quantity and thoroughly mix. Pour filled mixture slowly into the lowest points of the cavity until full. EC-439 will require a minimum post cure before demolding (see recommended cure schedule on next page).

PROPERTIES

		EC-439 Resin	EC 439 Hardener
Composition		Epoxy	Amine
Mix ratio by weight		100	30
Mix ratio Resin to H / N-60 / N-6 fillers		100	30/156/686
Mixed viscosity at 77°F (25°C) unfilled (cps)	ASTM D2393		2,500
Specific Gravity at 77°F (25°C) unfilled (g/cc)	ASTM D792		1.13
Work life at 77°F (25°C) (260 g) unfilled (hours)	ASTM D2471		6 – 7
Demold time (hours)			See Post Cure

MECHANICAL and THERMAL PROPERTIES¹ (CAST BAR - UNFILLED)			
Property	Method	Units	EC-439
Hardness	ASTM D2240	Shore D	89
Tensile Strength	ASTM D638	psi (MPa)	9,920 (68)
Tensile Modulus	ASTM D638	psi (MPa)	483,000 (3,330)
Flexural Strength	ASTM D790	psi (MPa)	16,720 (115)
Flexural Modulus	ASTM D790	psi (MPa)	475,000 (3,277)
Compressive Strength	ASTM D695	psi (MPa)	15,970 (110)
Compressive Modulus	ASTM D695	psi (MPa)	243,000 (1,675)
IZOD Impact	ASTM D256	ft-lb/in ²	4.28
Tg per DMA (Heat Cured 8hr/150°F)	ASTM D4065	°F (°C)	270 (127)
HDT @ 66 psi (Heat Cured 2hrs/212°F (100°C) + 2 hrs/302°F (150°C))	ASTM D648	°F (°C)	260 (113)

(1) The above properties were obtained under laboratory conditions using standardized specimens. Cure was 24 hours @ 77°F (25°C) + 8 hours @ 150°F (66°C) minimum cure temperature for de-mold + 2 hours @ 200°F (93°C) + 2 hours @ 250°F (121°C) + 2 hours @ 300°F (149°C)

MECHANICAL and THERMAL PROPERTIES¹ CAST BAR FILLED (FILLED per mix ratio - N-60 / N-6 fillers per above ratio)			
Property	Method	Units	EC-439
Mixed viscosity at 77°F (25°C) filled (cps)	ASTM D2393	cps	Pourable Level Seeking
Mixed Density		lbs-cu/in	0.094
Mixed Density		lbs-cu/ft	162
Hardness	ASTM D2240	Shore D	91
CTE (Coefficient of Thermal Expansion)	ASTM D386	ppm/°F (°C)	10 (18)
Linear Shrinkage (4650 cm ³ Mold)		In/in	0.001

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PROCESSING

RECOMMENDED CURE SCHEDULE

Allow EC-439 tools to gel at room temperature before subjecting them to a post cure. 24 hours is recommended. This will prevent excessive exotherm and shrinkage from occurring. The recommended minimum 8 hours @ 150°F (66°C) initial self-supporting post cure schedule for EC-439 systems is as follows below (also see heating and cooling rates below):

- Cure for 24 hours at room temperature 77°F (25°C) + **Before moving or de-molding your EC-439 cast mold, you must first heat cure the tool internally for 8 hours @ 150°F (66°C) by using the temperature control system built into the mold (i.e. copper tubing or electrical grid).** A conditioning post cure for 4 hours at a temperature equivalent to the constant operational temperature of your production mold is advised. If an additional post cure is necessary beyond the preliminary cure schedule, the recommended cure schedule is as follows (refer to section on heating and cooling rates):

- Ramp up and cure for 2 hours at 200°F (93°C)
- Ramp up and cure for 2 hours at 250°F (121°C)
- Ramp up and cure for 2 hours at 300°F (149°C)

HEAT CONDITIONING OF CAST EPOXY MOLDS

It is always advisable to heat cure cast epoxy molds internally, using the temperature control system built into your working mold (i.e. copper tubing or insulated electrical grid). If oven curing is your only option, it is advisable to complete the initial cure on the model at 125°F (52°C) for 6-8 hours or overnight before increasing the oven temperatures. Extremely large cast molds should always be heat cured internally and should not be moved or transported to another location prior to an internal heat cure process of 150°F (66°C)

RATES OF HEATING AND/OR COOLING OF CAST EPOXY MOLDS

When taking molds through the post cure phase, always place mold in a room temperature oven and increase the temperature at a rate of no more than 50°F (30°C) per hour. When cooling, allow the mold to remain in the heated environment and decrease the temperature at a rate of no more than 50°F (30°C) per hour. Never remove the mold from the oven until it has reached 100°F (38°C). Removing a mold heated above 100°F (38°C) can result in thermal shock and warp. Ensure proper curing temperatures are met by installing a thermocouple directly in the center of the mold casting. Please contact our Technical Service department with any questions regarding post curing.

MATERIAL ESTIMATOR

The mixed density of the EC-439 at the appropriate mix ratio (by weight) of 100 parts resin: 30 parts hardener: 156 parts N-60 fine bulk filler: 687 parts N-6 chipped bulk filler is 21.6 lbs/gal or 162 lbs/cu.ft. To determine the number of pounds of EC-439 that is required, calculate the amount of material that will be cast (in cubic feet) and multiply this number by 162. This gives you the total number of pounds needed for the job.

CRYSTALLIZATION

Epoxies may form small crystals when exposed to moisture, dirt, low temperatures, or temperature cycling. To return the material back to its original state, heat to 150°F (66°C) until all crystals liquefy then stir and cool to room temperature (stir well again) before adding hardener. Do not use an epoxy if the crystals will not return to liquid form.

HANDLING PRECAUTIONS

Normal health and safety precautions should be observed when handling these products:

- Ensure good ventilation.
- Wear gloves, glasses and protective clothes.

For further information, please consult the Safety Data Sheets.

STORAGE CONDITIONS

- This product has a shelf life of 12 months for the resin as indicated by the expiration date on the container when stored in original unopened containers between 47°F – 77°F (8°C – 25°C). The product shelf life for the hardener is 24 months between 60°F (15°C) and 77°F (25°C). Any opened can must be tightly closed.

PACKAGING

Packaging information on request, please contact your local sales representative or find your local contact on www.sikaadvancedresins.us

LEGAL NOTICE

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