

Product Bulletin



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EC-439
EPOXY CASTING SYSTEM
HIGH TEMPERATURE
AMBER - UNFILLED

0302

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. ADTECH's 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.

APPLICATIONS

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

TYPICAL UNFILLED PROPERTIES @ ROOM TEMPERATURE 77°F (25°C)

Property	Test Method	Test Values
Mix Ratio by weight R/H		100R/30H
Mix Ratio by volume R/H.....		2.74R/1H
Viscosity (cps)	ASTM D-2392	2,500
Density (pounds/gallons)	ASTM D-792	9.4
Specific Gravity (grams/cc)	ASTM D-792	1.13
Work Life (Minutes)		400
Demold Time (Hours)		***See Post Cure***

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 leak proof containment box around the model, which is strong enough to support the weight of the cast without deflection. Cross bracing may be required. Apply release agent to the containment walls to prevent bonding. Thoroughly mix the resin and hardener at the appropriate mix ratio, and pour the mixture slowly into the lowest points of the cavity until full. Allow the product to cure on the model until the time at which the material can be demolded. If necessary, proceed with the remaining cure schedule per the product Bulletin.

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TYPICAL PHYSICAL PROPERTIES @ ROOM TEMPERATURE

Cast Bar - Unfilled

Property	Test Method	Test Values
Tensile Strength (psi)	ASTM D-638	9,920
Tensile Modulus (psi)	ASTM D-638	483,000
Flexural Strength (psi)	ASTM D-790	16,720
Flexural Modulus (psi)	ASTM D-790	475,000
Compressive Strength (psi)	ASTM D-695	15,970
Compressive Modulus (psi)	ASTM-695.....	243,000
Tg by DMA (°F).....		270
IZOD Impact (in-lbs./inch.)	ASTM D-256.....	4.28
HDT @ 66 psi (°F)	ASTM D-648	260
@ 264 psi (°F)	ASTM D-648.....	245
Coefficient of Thermal Expansion (in/in- °F)	ASTM D-696	10.2 x 10 ⁻⁶
Shore D Hardness	ASTM D-2240.....	89

TYPICAL FILLED MIXED PROPERTIES @ ROOM TEMPERATURE 77°F (25°C)

Property	Test Method	Test Values
Mix Ratio by Weight R/H		100R/30H
N-60 Fine Bulk Filler		156
N-6 Chipped Bulk Filler		687
Viscosity (cps)		Pourable
Density (pounds/gallons)	ASTM D-792	21.6
(pounds/cubic inch)		0.094
(pounds/cubic foot)		162
Specific Gravity (grams/cc)	ASTM D-792	2.59
Linear Shrinkage (4650 cm ³ mold)		0.001
Shore D Hardness		91

RECOMMENDED CURE SCHEDULE

Always allow tools made with ADTECH high temperature systems 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 preliminary post cure schedule for EC-439 systems is as follows:

- Cure for 24 hours at room temperature (77°F)plus
 - Ramp up to 150°F, on the model if possible, and hold for 3 hours
- You may attach a support structure and demold the tool after the preliminary schedule is complete.

If necessary, a conditioning post cure of 25°F above the service temperature of the tool is advised. If an additional post cure is necessary beyond the preliminary cure schedule, the recommended cure schedule is as follows:

- Ramp up and hold for 3 hours at 200°F plus
- Ramp up and hold for 3 hours at 250°F plus

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HEAT CONDITIONING OF CAST EPOXY MOLDS

It is imperative that all high temperature epoxy systems be subjected to a preliminary room temperature cure prior to any heat cure. 24 hours is recommended. It is always advisable to heat cure cast epoxy molds internally on the model to 150°F using the temperature control system built into your mold (i.e. copper tubing or electrical grid). Use thermocouples to determine the mold temperature throughout the post cure process.

If oven curing is your only option, it is advisable to complete the initial cure on the model at 125°F for 6-8 hours or overnight before increasing the oven temperature. Extremely large cast molds should always be heat cured internally and should not be moved or transported prior to an internal heat cure process of 150°F.

RATES OF HEATING AND COOLING OF CAST EPOXY MOLDS

When taking tools through the post cure phase, always place in a room temperature oven and increase the temperature at a rate of no more than 5°F per minute. When cooling, allow the tools to remain in the heated environment and decrease the temperature at a rate of no more than 10°F per minute. Removing a tool heated above 100°F can result in thermal shock and warpage. Ensure proper curing temperatures are met by installing a thermocouple directly in the center of the tool.

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./gallon 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. Divide this number by the material package weight to determine the number of kits needed (See packaging section). For assistance on a material estimation for a specific application, please contact our Technical Service Department at (517)543-7510.

SHELF LIFE INFORMATION

When stored in a tightly closed container at room temperature, this material will remain usable for at least one year from date of manufacture.

CRYSTALLIZATION

Epoxyes 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 130°F and stir until the crystals disappear. **Do not use an epoxy if the crystals will not return to liquid form.**

PACKAGING

EC-439 resin & hardeners are available in the following kits (fillers must be purchased separately):

- 5 Gallon Pail Kits - Consists of 43.75# of resin and 13.15# of hardener
Recommended filler quantities per 5-gallon pail kit of resin & hardener:
6 bags (50# each) of N-6 Chipped Bulk Filler
2 Pails (31# each) of N-60 Fine Bulk Filler

- 55 Gallon Drum Kits - Consists of 437.5# of resin and 131.5# of hardener
Recommended filler quantities per 5-gallon pail kit of resin & hardener:
60 bags (50# each) of N-6 Chipped Bulk Filler
20 Pails (31# each) of N-60 Fine Bulk Filler

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ORDERING INFORMATION

Please phone our Customer Service Department at (800)344-7776 to place an order, check prices and availability, or to request literature. ADTECH can help you directly, or assist you in locating an authorized distributor near you.

TECHNICAL SERVICE

Adtech's Technical Staff are here to assist you with the application of our material. Feel free to call and take advantage of our experience in the polymers industry. Call now at (517)543-7510 and ask for our Technical Service Department or visit our website at www.casspolymers.com.