

Product Bulletin

CASS POLYMERS

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EC-440 EPOXY SYSTEM
HIGH TEMPERATURE
EPOXY MASS CAST

UNFILLED SYSTEM DEVELOPED
FOR USE WITH N-6 & N-61
CERAMIC FILLERS

0302

DESCRIPTION

EC-440 High Temperature Epoxy Mass Cast System was developed for use in prototype or low volume production tooling applications. EC-440, used in conjunction with our N-6 and N-61 ceramic fillers, offers the user a complete tooling system with excellent physical properties while maintaining a lower cost when compared with conventional aluminum filled mass cast systems. The EC-440 Tooling System will reach a B-stage cure overnight at room temperature, however, it can be used at elevated temperatures when subjected to a moderate post-cure. The EC-440 High Temperature Epoxy Mass Cast System can be utilized as a back-fill material for nickel-shell tooling applications or used in conjunction with one of ADTECH's high temperature epoxy surface coats, including ES-219 and ES-224.

USES

- ◆ Resin Transfer Molds (RTM)
- ◆ Compression Molds
- ◆ Reaction Injection Molds (RIM)
- ◆ Other High Temperature, Mass Cast Tooling Applications

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

Property (Unfilled)	Test Method	Test Values
Mix Ratio by weight R/H		100/30
Mix Ratio by weight R/H/N-61/N-6 Fillers		100/30/208/687
Viscosity (cps)	ASTM D-2393	760
Density (pounds/gallon)	ASTM D-792	9.4
Specific Gravity	ASTM D-792	1.13
Work Life (260g mass)		80-100 minutes
Demold Time		18-24 hours
Shelf Life (Stored in closed container at ambient temperature)		1 year

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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PHYSICAL PROPERTIES*(Cast Bar – Unfilled)*

Properties	Test Method	Test Values per Post Cure Schedule
Tensile Strength (psi)	ASTM D-638	9,924
Tensile Elongation (%)	ASTM D-638	3%
Tensile Modulus (psi)	ASTM D-638	481,000
Flexural Strength (psi)	ASTM D-790	19,480
Flexural Strain (%)	ASTM D-790	5.9%
Flexural Modulus (psi)	ASTM D-790	424,300
Compressive Strength (psi)	ASTM D-695	15,780
Compressive Modulus (psi)	ASTM D-695	278,900
IZOD Impact (in-lbs./in)	ASTM D-256	6.35
HDT (°F)	ASTM D-648	182
Glass Transition Temperature	By DMA	196

(Cast Bar – Filled per Mix Ratio w/ N-6 & N-61 Fillers)

Properties	Test Method	Test Values per Post Cure Schedule
Linear Shrinkage (in./in.)	4650 cm ³ mold	0.0009
Linear Shrinkage (in./in.)	3 ft. ³ mold	0.0013
Peak Exotherm (°F)	3 ft. ³ mold	110
Hardness	Shore D	92
Coefficient of Thermal Expansion (in/in-°F)	By TMA	12.28 X 10 ⁻⁶

RECOMMENDED CURE SCHEDULE

Always allow tools made with ADTECH high temperature systems to gel at room temperature before subjecting them to the post cure. 24 hours is recommended. This will prevent excessive exotherm and shrinkage from occurring. The recommended post cure schedule for the EC-440 system is as follows:

- ◆ Cure for 24 hours at room temperature (77°F)
- ◆ Heat cure on the model, if possible, for 8 hours at 150°F

Heat Conditioning of Metal Reinforced, Cast Epoxy Molds

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).

If oven curing is your only option, it is advisable to complete an 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 to another location prior to an internal heat cure process of 150°F.

Rates for Heating and/or 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. Never remove the tool from the oven until it has reached 100°F. 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 EC-440 at the appropriate mix ratio (by weight) of 100 parts resin: 30 parts hardener: 208 parts N-61 Fine Bulk Filler: 687 parts N-6 Chipped Bulk Filler is 21.7 lbs./gallon or 162.3 lbs./cu. ft. To determine the volumetric yield for EC-440, calculate the amount of cubic feet that will be cast and multiply this number by 162.3.

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 tightly closed containers at room temperature, this material will remain usable for one year from the date of shipment.

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

PACKAGING

EC-440 resin & hardener is available in the following kit sizes:

- ◆ 5 Gallon Pail Kits
 - Recommended filler quantities per 5-gallon pail kit of resin & hardener:*
 - ◆ bags (50# each) of N-6 Chipped Bulk Filler 6
 - ◆ pails (41.6# each) of N-61 Fine Bulk Filler 2

A 5 gallon pail kit plus the recommended fillers yields 2.68 cubic feet of cast material

- ◆ 55 Gallon Drum Kits
 - Recommended filler quantities per 55-gallon drum kit of resin & hardener:*
 - ◆ bags (50# each) of N-6 Chipped Bulk Filler 66
 - ◆ pails (41.6# each) of N-61 Fine Bulk Filler 22

A 55 gallon drum kit plus the recommended fillers yields 29.5 cubic feet of cast material

ORDERING INFORMATION

Please phone our customer service department at (800)344-7776 to place an order, check price and availability, or request literature. ADTECH can help you directly, or assist you in locating an authorized dealer near you.

TECHNICAL SERVICE

ADTECH's technical staff is here to assist you with the application of your material. Feel free to call and take advantage of our extensive 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.