



**EC-440
EPOXY MASS
CAST SYSTEM
HIGH TEMPERATURE
UNFILLED**



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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-229 and ES-225. **Typical applications include: Resin Transfer Molds(RTM), Compression Molds, Reaction Injection Molds(RIM), Other High Temperature Mass Cast Tooling Applications.**

TYPICAL HANDLING CHARACTERISTICS @ 77°F (25°C)

Mix Ratio (parts by weight)	100R/30H
Mix Ratio by weight R/H/N-61/N-6 Fillers	100/30/208/750
Mixed Viscosity (unfilled)	875 cps
Specific Gravity	1.13 g/cc
Work Life (260g mass)	60-80 minutes
Demold Time	18-24 hours
Shelf Life of Resin and Hardener (in original unopened containers)	2 years

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.

TYPICAL PHYSICAL PROPERTIES CAST BAR (UNFILLED)

Tensile Strength (ASTM D-638)	10,900psi (75MPa)
Tensile Elongation (ASTM D-638)	4%
Tensile Modulus (ASTM D-638)	380,000psi (2,620MPa)
Flexural Strength (ASTM D-638)	20,000psi (138MPa)
Flexural Modulus (ASTM D-790)	464,000psi (3,199MPa)
Compressive Strength (ASTM D-695)	16,700psi (115MPa)
Compressive Modulus (ASTM D-695)	206,400psi (1,423MPa)
IZOD Impact (ASTM D-256)	8.6 ((in-lbf)/in)
Heat Deflection Temperature (ASTM D-648) @ 66 psi (Cured 2hrs@100°C + 2hrs@150°C)	235°F (113°C)
Tg by DMA (ASTM D-4065) @ 66 psi (Heat Cured 8hrs@150°F)	208°F (98°C)

CAST BAR – (FILLED PER MIX RATIO W/N-6 & N-61 FILLERS)

Linear Shrinkage (4650 cm ³ mold)	0.0009 (in/in)
Linear Shrinkage (3 ft. ³ mold)	0.0013 (in/in)
Peak Exotherm (3 ft. ³ mold)	53°C (127°F)
Cured Hardness (ASTM D-2240)	95 Shore D
Coefficient of Thermal Expansion (ASTM D-3386) (ppm/°F (°C))	12 (22)

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 (25°C)
- ◆ Heat cure on the model, if possible, for 8 hours at 150°F (66°C)

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 (66°C) 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 (52°C) 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 (66°C).

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 50°F (30°C) per hour. When cooling, allow the tools 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 tool from the oven until it has reached 100°F (38°). Removing a tool heated above 100°F (38°) can result in thermal shock and warping. 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: 750 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

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 150°F (66°C) until all crystals liquefy then stir and cool to room temperature before adding hardener. **Do not catalyze crystallized epoxy until all crystals are returned to liquid form and resin has cooled to room temperature.**

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:
 - ◆ 2 pails (41.6 lbs each) N-61 Fine Grain Filler
 - ◆ 6 pails/bags (50 lbs each) N-6 Coarse Bulk Filler

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:
 - ◆ 66 bags (50# each) of N-6 Chipped Bulk Filler
 - ◆ 22 pails (41.6# each) of N-61 Fine Bulk Filler

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

EC-440 Tech/Updated 12/30/14
Supersedes 6/9/14

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