



REACTION INJECTION MOLDING (RIM)

USING EC-439 CASTING SYSTEM

ADTECH
Plastic Systems

APPLICATION GUIDE

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STRUCTURAL GUIDE FOR CASTING LOW VOLUME PRODUCTION MOLDS USED FOR THE MANUFACTURING PROCESSES OF REACTION INJECTION MOLDING (RIM) AS COMMONLY PRACTICED BY TOOLING ENGINEERS.

MATERIALS: EC-439 EPOXY RESIN/HARDENER SYSTEM
N-60 CERAMIC POWDER MIXTURE
N-6 CERAMIC BULK FILLER
ES-225 or ES-224 EPOXY SURFACE COAT
MOLD RELEASES MR#1 AND MR#2

PATTERN

The pattern or model must support weight without deflection. Do not assume that the pattern has an adequate positive draft. A minimum positive draft of 3 degrees is needed for rigid cast tooling. It is important to double check these tolerances.

Any hardware that will be needed on the mold surface (impingement mixer having a durable mechanical locking detail feature, pins, knock-outs, inserts, etc.) is located firmly against the pattern and encapsulated with the casting system.

Use Adtech Mold Release MR #1 to release the pattern surface and follow up with a light spray coat of MR #2 PVA for added insurance.

FRAME

A steel perimeter reinforcement frame is welded together. Common frame materials are steel C-BEAM or 3/4" to 1" steel plate. Plan frame dimensions to allow for a 4" to 6" mold flange and a 4" to 6" cast thickness between highest point on the pattern and top of the frame. The 4" formula is generally used when forming shallow depth parts.

Concrete rebar (3/8" or 1/2") is welded into the frame on 10" to 16" spacing, running the length and width of the mold. Spacing of rebar from the mold surface is a minimum of 1". It is important to note that any male detail protruding more than 2" from the general contour needs a rebar structure.

TEMPERATURE CONTROL

Maintaining mold surface temperature is generally accomplished by using 1/4" i.d. soft copper tubing spaced on 3" centers across the mold length and manifolded outside the mold into square steel tubing. Spacing of copper lines from mold surface is generally 2" or greater. It is important to note there should be no contact between the copper lines and re-bar. A 1/2" gap is recommended between the two. Also, copper lines should have a light coat of Adtech Mold Release MR #1 applied before casting.

To plumb the box to your vacuum source, a pipe flange can be attached to the side of the chamber with a corresponding hole drilled through the chamber wall at the pipe flange location. The flange and hole size should be large enough to immediately evacuate the chamber. Generally, 3/4" is ample.

CASTING THE MOLD

1. Catalyze ES-225 and brush coat a 0.015" to 0.020" inch thickness over pattern surface and allow to tack.
2. Repeat step 1 and allow to tack.

Continued on next page

3. Thoroughly mix 43.75 pounds of EC-439 resin with 2 x 6.58 pounds of EC-439 hardener. Divide catalyzed EC-439 equally into two pails and thoroughly blend into each pail one (1) pail of N-60 Powder Filler. Make sure all of the powder is resin coated.
4. Use a portion of this mixture to brush on a generous coating over the ES-225. It is critical to apply this mixture during the tack stage of the ES-225.

Note: If a high temperature epoxy laminate has been used to reinforce the surface the slurry coat should be applied to the laminate during its tack stage to assure a strong chemical bond.

5. Lower and align steel perimeter frame on pattern flange and clamp firmly in place. You may need to seal the outside joint with a polyester product such as ADTECH P-26, or a 5 minute epoxy paste adhesive such as ADTECH EA-624 to prevent any leaks of the casting system between the frame/flange joints.
6. With the remaining contents of the catalyzed EC-439 / N-60 mixture (from step 3), blend with 50 to 100 pounds of N-6 Coarse Bulk Filler and begin pouring your mold. Do not wait for the coating mixture applied in step #4 to tack.
7. Continue to cast your mold using the following batch mixture. Fill the mold to within 1/8" of the frame top. This mixture yields 1.29 cubic feet per divided pail:

Pail EC-439 resin + 2 x 6.58# EC-439 hardener + 1 pail N-60 Powder (31#) + 3 bags/pails (150#) N-6 Bulk Filler.

Pail batches can be mixed with a heavy duty industrial drill and a pail size Jiffy Mixer. After you have mixed resin + hardener + powder in one pail, divide that mixture equally into 3 empty pails before adding the coarse bulk filler. The easiest way to mix when making large pours is to use a portable concrete mixer.

8. When the cast begins to gel you can top off the remaining 1/8" using the EC-440 Resin/Hardener blended with a machineable aluminum grain filler such as ADTECH N-20 Aluminum Grain.
9. Post-cure and demold schedules are listed on the EC-439 Product Bulletin; It is very important to follow these recommendations. Note that EC-439 castings must be heat cured for a minimum of 8 hours at 150°F before demolding or moving your cast mold.

NOTE: Use your temperature control unit to heat condition the mold internally. Do not oven cure.

ESTIMATING MATERIAL USAGE

Using 5-Gallon Pails:

1 EC-439 pail resin/hardener kit
 2 pails N-60 powder filler
 6 bags/pails N-6 coarse bulk filler
(Total yield = 2.58 cubic feet)

Using 55-Gallon Drums:

1 EC-439 drum resin/hardener kit
 20 pails N-60 powder filler
 60 bags/pails N-6 coarse bulk filler
(Total yield = 25.8 cubic feet)

NOTE: When casting with EC-439 System and N-60 Powder Filler please refer to EC-439 Product Bulletin for mixing and estimating guide.

PLEASE REFERENCE THE FOLLOWING PRODUCT DATA BULLETINS

EC-439 Epoxy Mast Cast System
 N-60 Ceramic Powder Mixture
 N-6 Ceramic Bulk Filler
 ES-225 High-Temp Polishable Epoxy Surface Coat
 Mold Releases MR #1 and MR #2

Reaction Injection Molding (RIM) using EC-440/Revised 2/16/10
 Supercedes 8/15/05

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