

Specimen Preparation for Tensile Testing

Materials:

- Stainless steel, Type 4 tensile testing molds in accordance with D638-10
- Mold release (WD40 works)
- Glass plates
- Mylar film (approx 3" x 10" strips), 2 per mold
- Pipettes
- Curing lamp
- Mold ejection tool
- Scalpel and/or scissors

Procedure:

1. Check the molds
 - a. Ensure the molds are free from debris
 - b. Check for any nicks, dents, scratches or other deformations that will change the shape of the specimen
2. Apply mold release agent
 - a. Lay mold flat on paper towel and spray liberally on the inside edges
 - b. Wipe off excess with an additional paper towel
3. Set up mold
 - a. Place glass plate on a flat, level surface
 - b. Place Mylar strip on glass plate
 - i. Position the used side of the film towards the glass plate if reusing mylar
 - c. Place mold on Mylar strip
4. Fill mold
 - a. Use a pipette with the end cut to the appropriate size for the viscosity of the material to be tested.
 - b. Draw up the material to be tested, trying to get as few bubbles in the pipette as possible.
 - c. Start on one end of the mold and gently begin to fill the mold.
 - d. Refill the pipette and continue until the entire mold is filled slightly above the sides.
 - i. Do not pipette material with bubbles into the thin, center area of the mold.
 - ii. Inspect material for bubbles. If possible, remove bubbles.
5. Close the mold
 - a. Place another Mylar strip on top of the mold, covering the material to be tested.
 - b. Take another glass plate and, starting at one end of the mold, press it flat on the top piece of Mylar and slide it up along the mold, squeezing out the excess monomer.
 - c. Place the glass plate flat on top of the mold and press down to ensure everything is set and carry it this way to the curing lamp.

6. Curing
 - a. Remove the glare shield and place it to the side.
 - b. Center the mold under the lamp.
 - c. Replace the glare shield so that it covers as much of the front and sides of the lamp as possible.
 - d. Set the timer for two (2) minutes.
 - e. Ensure the switch on the front of the lamp is set to "Full".
 - f. Press the power switch on the back left side of the lamp (by the cord).
 - i. Beware light leaks! Do not look at the light, even reflected light.
 - ii. Adjust the glare shield if any light is getting past it.
 - g. Start the timer once the light is fully on (not flickering)
 - h. Turn the lamp off with the power switch on the back when the timer alarms.
 - i. Remove the shield and remove the glass plate with the mold from the lamp.
7. Clearing the mold
 - a. Remove the Mylar from both sides of the mold.
 - b. Use your fingers to break off any excess material that is over-hanging the edges of the mold.
 - c. Hold the mold in both hand and carefully push on the back side of one end of the specimen with both thumbs.
 - i. The front side is the side with the most over-hanging material.
 - ii. If it does not come out easily, do not force it, try the other end.
 - iii. If it moves or starts to break loose, move to the next step otherwise see: Troubleshooting.
 - d. Repeat this on the opposite end of the specimen.
 - e. Use the mold ejection tool to remove the specimen the rest of the way from the mold.
 - i. A mold ejection tool is something thin enough to fit through the narrow part of the mold, just a little shorter than the specimen and hard enough not to deform when compressed.
 1. An orangewood stick, cut to length, works well for this.
 - ii. Lay the tool along the back length of the specimen and press on the tool with your thumbs.
 1. Try to distribute the pressure across the specimen rather than allowing it to bend/flex as it comes out of the mold.
8. Final steps
 - a. Remove as much of the flashing from the test specimen as possible.
 - i. Scissors and/or a scalpel may be used for this task.
 - b. Use a scalpel to remove the bulk of any excess material stuck to the mold.
9. Mechanical Testing
 - a. Specimens were tested using a Shimadzu Autograph Series AGS-J Universal Tester with a 5 kN load cell and a crosshead speed of 10 mm/min.
 - b. All specimens were tested to failure.