



Purpose: To determine whether or not a ball plug product will be approved.

Materials:

- Ball plug sample to be tested
- Mixing cups
- Mixing tool, i.e. wooden stir stick or glass stir rod
- Graduated cylinder
- Deionized water
- Digital balance
- All materials listed in SOP-LAB-1
- All materials listed in SOP-BALL-10
- “Plug ball”
- Rex Durometer gage, model DD-3; SN D-01340
- Durometer gage/ball stand
- Laboratory notebook
- Ice cube tray
- Band saw
- Etching pen

Procedure:

1. Drill a hole (no smaller than a quarter in diameter) in the designated “plug ball.”
2. Mix plug according to associated directions in a mixing cup.
3. Pour the plug into the designated “plug ball” and also into an ice cube tray.
4. Use the etching pen and label the plug next its associated hole in the “plug ball.”
5. Allow the plug to set. (This time will be different depending on the plug.)
6. Check the density.
 - a. Use the band saw to cut a piece from the ice cube mold that is small enough to fit in the graduated cylinder.
 - b. Weigh the piece of plug on the digital balance and record the mass in the laboratory notebook.
 - c. Place a specified amount of deionized water in the graduated cylinder and record this initial volume (v1) in the laboratory notebook.
 - d. Holding the graduated cylinder at a 45 degree angle, place the piece of plug in the cylinder so that it slowly slides to the bottom.
 - e. Record the final volume (v2) in the laboratory notebook.
 - f. Calculate the density: $\rho = \frac{mass}{v2 - v1}$
 - g. Record the density in the laboratory notebook.
7. Place “plug ball” in durometer gage/ball stand so that the durometer tip will engage the surface of the ball.
 - a. Press and hold down the green “ON/clr” key (on durometer gage) until a zero appears on the screen.
 - b. Touch “hold” key.



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- c. Slowly pull the durometer gage/ball stand handle down toward the surface of the ball.
 - d. Record the displayed number into the laboratory notebook.
 - e. Move the ball slightly so that the durometer tip will touch a different part of the ball inside the circle.
 - f. Press the “ON/clr” key to zero-out the durometer.
 - g. Repeat this process for a total of 10 hardness readings.
 - h. Press the red “OFF/mode” key to turn off the durometer.
 - i. Record average hardness reading in the laboratory notebook.
8. Take a scan for the FT-IR database.
 - a. Use the band saw to cut a thin piece from the ice cube mold.
 - b. Using sandpaper or an old Abralon pad, smooth the surface of the plug.
 - c. Clean this with Isopropyl alcohol.
 - d. Follow steps listed in SOP-LAB-1.
 9. Take a surface roughness reading with the “plug ball” using the steps listed in SOP-BALL-10.