EQUISTAR
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Wire and Cable Technical Tip

tech.topic

Environmental Stress Crack Resistance (ESCR)

The Environmental Stress Crack Resistance of a resin is usually designed into the product by controlling raw materials, catalysts and the conditions under which the resin was produced. ESCR problems are usually the result of problems in the preparation of the testing plaques, unless the material is marginal in respect to ESCR. The higher the molecular weight (or the lower the melt index) of the polyethylene, the more resistant it is to stress cracking. As density is lowered, resistance to Environmental Stress Cracking is improved.

When ESCR problems arise, the following questions should be asked:

1. **Is the test performed in a 10% or 100% Igepal solution?** The test using 10% Igepal® solution is more stringent.
2. **Is the plaque to be tested roll-milled or double-pressed from pellets?** Roll-milling is the preferred method, but if the plaque is pressed from pellets, it is preferable to double press, not single press.
3. **Is the press temperature and pressure correct?** Press temperature and pressure is very important, especially for foamed HDPE. If the blowing agent is tripped, the material will not pass ESCR requirements.
4. **What ESCR test method is being used?** ASTM D1693 outlines the industry procedure for performing bent strip ESCR testing. Unless otherwise specified, ASTM D 618, Procedure "A," is recommended for conditioning a sample prior to ESCR testing.
5. **Are the Nicking Jigs on the ESCR tester in good shape?** Examine the jigs for burrs and correct depth setting.

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