

## STANDARD TEST PROCEDURES

### EFFECT OF IMMERSION IN LIQUID - RUBBER HARDNESS

#### ASTM D471    ASTM D2240

#### 1. Scope

- 1.1 This test procedure measures the ability of rubber to withstand the effect of liquids. It is designed for testing specimens of elastomeric vulcanizates cut from standard sheets (D3182). Blair Rubber Co. can supply these for the lining specified.
- 1.2 In view of the wide variations often present in service conditions, this test may not give direct correlation with service performance unless the actual vessel considered for lining is utilized. However, this test method yields data on which to base judgment as to expected service quality.

#### 2. Referenced Documents

- 2.1 **ASTM Standards:**  
D471 Test Methods for Rubber Property Effect of Liquids
- D2240 Test Method for Rubber Property Durometer Hardness
- D3182 Practice for Rubber - Materials, Equipment, and Procedures for Mixing Standard Compounds and Preparing Standard Vulcanized Sheets

#### 3. Description of Test

- 3.1 This test procedure provides a method for exposing test specimens to the influence of liquids under definite conditions of temperature and time. The resulting deterioration is determined by noting the changes of volume, weight and hardness before and after immersion in the test liquid.

#### 4. Test Conditions

- 4.1 *Temperature* - Unless otherwise specified the test temperature shall be one of the following, depending upon the anticipated service temperature:

Temperature °C

- 25 ± 2
- 10 ± 2
- 0 ± 2
- 23 ± 2
- 50 ± 2
- 70 ± 2
- 85 ± 2
- 100 ± 2
- 125 ± 2
- 150 ± 2
- 175 ± 2

- 4.1.1 When the temperature of the testing room is other than the standard 23 ± 2°C the temperature of test shall be reported.

- 4.2 *Immersion Periods* - The following immersion periods are recommended:

- 24 h
- 168 h
- 672 h

- 4.3 *Light* - Immersion tests shall be made in the absence of direct light.

#### 5. Standard Test Liquids

- 5.1 For purpose of test, it is desirable to use the liquid with which the vulcanizate will come in contact in service.

**6. Preparation of Sample**

6.1 Except as otherwise specified, specimens shall be prepared in accordance with the requirements of Practices D3182. Blair Rubber Co. can supply the proper sheet for the lining specified.

**7 Immersion Apparatus**

7.1 For the purpose of testing validity and predictive analysis, the samples should be immersed in the actual unit (tank, vessel, evaporator, etc.) proposed to be lined.

OR

7.2 If desirable, laboratory testing apparatus as outlined in D471 may be utilized.

**8. Test Specimens**

8.1 The standard specimen shall be square having dimensions of 6" x 6". Thickness of sample shall be .125. Blair Rubber Co. can supply the proper sheet for the lining specified.

8.2 Three sample specimen squares shall be prepared for each composition to be tested. Two shall be immersed and one retained for original data.

**9. Immersion**

9.1 Immersion as outlined in 7.1 should be done for a minimum of 168 hours.

9.2 The second sample shall remain immersed for a minimum of 504 additional hours.

9.3 If necessary, this procedure can continue for more immersion cycles but the testing of samples taken in 9.1 and 9.2 are normally sufficient to be predictive.

9.4 During immersion, records of temperature and concentration which vary from the normal operating conditions should be maintained.

**10. Rubber Hardness**

10.1. Test Shore A hardness per ASTM D2240

**11. Report**

11.1 State that the test was conducted in accordance with this test procedure.

11.2 Date and temperature of room.

11.3 Dates of various periods of immersion.

11.4 Immersion liquid utilized.

11.5 Temperature of exposure.

11.6 Statement of condition of exposed specimens from visual and manual examination.

11.7 Results of immersed and non-immersed specimens in accordance with test method D471.

11.8 Report hardness before and after immersion ASTM D224