



Designation: E 1069 – 85 (Reapproved 1996)<sup>ε1</sup>

## Standard Test Method for Testing Polymeric Seal Materials for Geothermal and/or High Temperature Service Under Sealing Stress<sup>1</sup>

This standard is issued under the fixed designation E 1069; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

<sup>ε1</sup> NOTE—Keywords were added editorially in April 1996.

### 1. Scope

1.1 This test method covers the initial evaluation of (screening) polymeric materials for seals under static sealing stress and at elevated temperatures.

1.2 This test method applies to geothermal service only if used in conjunction with Test Method E 1068.<sup>2</sup>

1.3 The test fluid is distilled water.

1.4 The values stated in SI units are to be regarded as the standard.

1.5 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

### 2. Referenced Documents

2.1 *ASTM Standards:*

D 1414 Test Methods for Rubber O-Rings<sup>2</sup>

E 1068 Test Method for Testing Non-Metallic Seal Materials by Immersion in a Simulated Geothermal Test Fluid<sup>3</sup>

2.2 *SAE Standard:*

ANSI/SAE AS568A Aerospace Size Standard for O-Rings<sup>4</sup>

### 3. Summary of Test Method

3.1 Standard o-ring specimens are tested in a test fixture that has a closely controlled extrusion gap.

3.2 Temperature is applied to the test fixture, with test specimens, and then pressure is applied.

3.3 The test fluid is distilled water.

3.4 Test pressure and temperature are maintained until specimen seal leaks or until the end of prescribed duration.

3.5 More than one specimen may be tested at one time in the fixture.

### 4. Significance and Use

4.1 Static seal failures are predominately due to incompatibility with media, degradation by temperature extremes, and extrusion stress. This test method may be used for relative performance evaluation screening, and is normally the second stage of the screening process after immersion testing in accordance with Test Method E 1068.

4.2 This test method shows relative performance of materials under the combined effects of temperature, pressure, and extrusion stress. It does not necessarily correlate with actual service conditions. This test method is not intended to include the effect of test media.

4.3 A variety of test parameter combinations are provided so that evaluations can be made for a specific application.

4.4 This test method uses standard o-rings as test specimens.

### 5. Apparatus

5.1 *Test Fixture*, is shown in Fig. 1.

5.2 The apparatus shall include an oven for heating the test fixture to a controlled temperature as selected.

5.2.1 The oven should be protected from damage by test fluid leakage due to seal failure.

5.3 *Safety Controls*, shall be provided to protect the test fixture from overpressure and overheating.

5.4 *Fixture Rings*, should all provide the same clearance gap for any specific test.

5.5 Standard clearance gaps are given in Table 1.

### 6. Test Fluid

6.1 The test fluid is distilled water.

### 7. Test Temperature

7.1 The test temperature shall be one selected from Table 2.

### 8. Test Pressure

8.1 The test pressure,  $\pm 5\%$ , shall be one selected from Table 3.

### 9. Test Specimen

9.1 Standard specimens are o-rings with a 37.47 mm (1.475 in.) inside diameter and 5.33 mm (0.210 in.) diameter cross

<sup>1</sup> This test method is under the jurisdiction of ASTM Committee E-44 on Solar, Geothermal, and Other Alternative Energy Sources and is the direct responsibility of Subcommittee E44.40 on Materials.

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<sup>2</sup> *Annual Book of ASTM Standards*, Vol 09.02.

<sup>3</sup> *Annual Book of ASTM Standards*, Vol 12.02.

<sup>4</sup> Available from Society of Automotive Engineers, 400 Commonwealth Dr., Warrendale, PA 15096.