Designation: F363 – 99 (Reapproved 2011)

Standard Test Method for Corrosion Testing of Gaskets[1]

This standard is issued under the fixed designation F363; 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 (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This test method covers the evaluation of gaskets under corrosive conditions at varying temperature and pressure levels. The test unit may be glass lined if the flanges are sufficiently plane (industry accepted), thus providing resistance to all chemicals, except hydrofluoric acid, from cryogenic temperatures to 260°C (500°F) at pressures from full vacuum to the allowable pressure rating of the unit, or made of other suitable material. The test unit described (Fig. 1) has an internal design pressure rating of 1034 kPa (150 psi) at 260°C (500°F).

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

1.3 *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.* For specific hazards statements, see Section 5.

2. Referenced Documents

2.1 *ASTM Standards:*[2]
F112 Test Method for Sealability of Enveloped Gaskets
2.2 *ASME Standards:*[3]
B16.21 Nonmetallic Gaskets for Pipe Flanges
2.3 *ASTM Adjuncts:*[4]
Leakage Test Unit

3. Significance and Use

3.1 This test method is designed to compare all types of gaskets under simulated field operating conditions. Performance of a gasket can thus be measured prior to the start-up of chemical processes.[5] The design of the test unit provides maximum range of corrosion resistance so that meaningful results are possible. This test method may be used as a routine test when agreed upon between the purchaser and the seller.

4. Apparatus

4.1 *Corrosion Test Unit*—The unit[6] shall contain a suitable thermowell, strategically placed near the center so that correct temperature readings may be made. The gasket seating size shall be such as to accommodate a standard 102-mm (4-in.) size gasket.

4.2 *Heat Source*—A 3-A (660-W, 220-V) electric heater has been found to be satisfactory to heat the unit in the vertical position to 232°C (450°F). If the unit is to be tested horizontally, the fixture should be in a suitable environmental chamber or oven capable of attaining the desired temperatures.

4.3 *Necessary Control Equipment*—A suitable thermoswitch with damping capacitor and indicator light to provide means of adjusting as well as control of temperature. The circuitry shown in Fig. 2 will control the unit within ±3°C (±5°F).

4.4 *Thermometer,* having 0.5°C graduations.

5. Hazards

5.1 Since the test unit is not vented, corrosive liquids that are likely to be unstable at the test temperature should not be used. The heater wattage should be limited so that a runaway condition will not produce a dangerously high temperature. The user should be aware that under certain conditions of testing, these safety considerations may prove to be inadequate. Additional safety precautions that may be highly desirable under certain conditions are left to the discretion of the user.

6. Test Specimen

6.1 The test specimen shall be dimensioned in accordance with ASME Class 150, 4 in. size with inside diameter 114 mm

[1] This test method is under the jurisdiction of ASTM Committee F03 on Gaskets and is the direct responsibility of Subcommittee F03.40 on Chemical Test Methods.
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[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

[3] Available from American Society of Mechanical Engineers (ASME), ASME International Headquarters, Three Park Ave., New York, NY 10016-5990, http://www.asme.org.

[4] Available from ASTM International Headquarters. Order Adjunct No. ADJF0363.

[5] Supporting data have been filed at ASTM International Headquarters and may be obtained by requesting Research Report RR:F03-1002.

[6] The sole source of supply of the apparatus known to the committee at this time is The Pfaudler Co., P.O. Box 23600, Rochester, NY 14692. If you are aware of alternative suppliers, please provide this information to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee,[1] which you may attend.

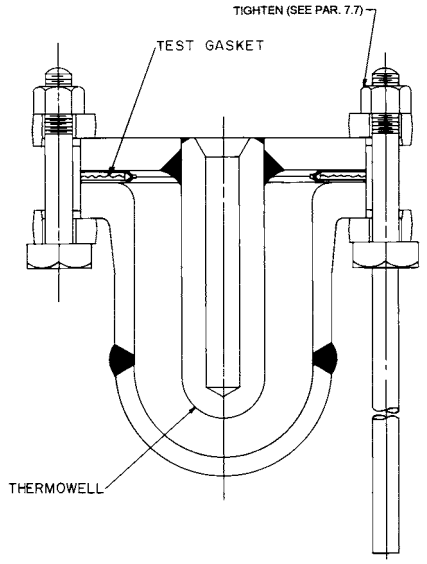


FIG. 1 Test Unit

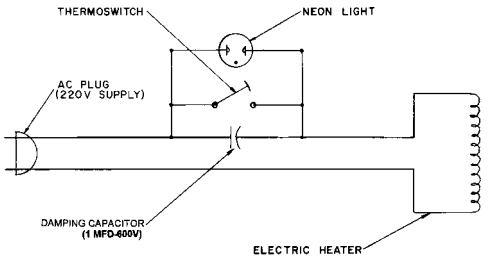


FIG. 2 Control Circuit

(4.50 in.) and outside diameter 175 mm (6.88 in.) as stated in Document ASME B16.21. The thickness of the test gasket will depend on the expected usage and must be specified in the report.

6.2 Preconditioning of the test gasket is not necessary, since this test is designed for shelf-stock gaskets; and, presumably, components affected by aging or normal storage conditions would not be used in their construction.

7. Procedure

7.1 Place the test unit in a restraining jig designed to assist in applying torque to the clamping bolts.

7.2 Carefully introduce 500 mL of the selected corrosive test solution into the test unit.

7.3 Locate the test gasket specimen properly on the lower flange.

7.4 Assemble the cover using the bolts, nuts, and washers.

NOTE 1—Lightly sanding the contacting surfaces of the washers and nuts will minimize variability among torqued bolts aiding in replication of test results.

7.5 Lubricate the bolt threads well using molybdenum disulfide dry film or grease.

7.6 The test torque value may be obtained either (*1*) through the use of the sealability fixture for enveloped gaskets (see Test Method F112), to which 25 % should be added for safety; (*2*) from the gasket manufacturer's recommendation; or (*3*) by establishing an acceptable leak rate and using the corresponding torque figures.

NOTE 2—Check that the additional safety factor does not exceed the permissible load on the bolts.

7.7 To apply the required torque, tighten the bolts gradually and evenly, following the sequence indicated by the numbers in Fig. 3. Progression of the tightening on each bolt should be in approximately 20 N · m (15 lbf · ft) increments.

7.8 If both vapor and liquid phase test results are desired, place the bolted and assembled test unit on its side in an oven or environmental chamber.

7.9 If only vapor phase results are required, place the test unit in an upright position. Use the electric heater to bring the unit to the desired temperature and adjust the thermoswitch as shown by the indicator light.

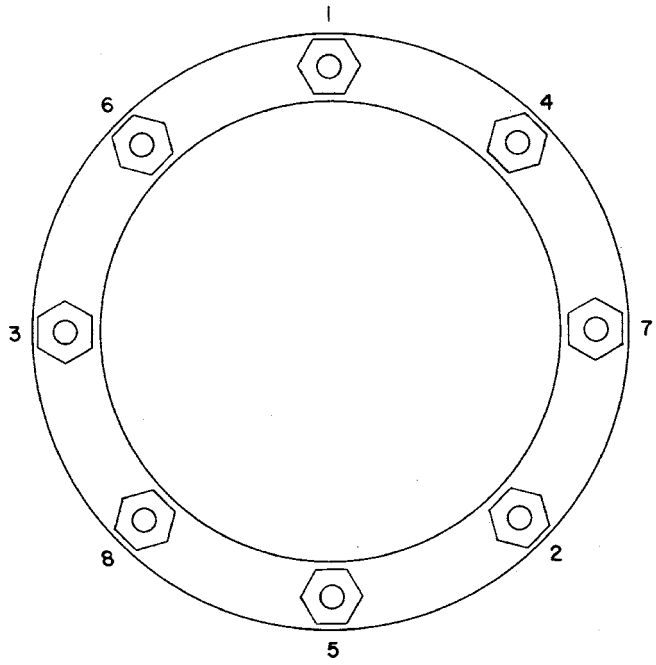
7.10 Retighten the bolts to the final torque previously used after 2 h at the regulated temperature.

7.11 Continue the test for approximately 24 h; turn off the heat supply for an 8-h period during each of the next three days. Continue the test at the desired temperature without cycling for the remainder of the prescribed test period. Two weeks has been found to be sufficient time to provide meaningful performance information.

7.12 Do not dismantle the unit until it has been cooled to room temperature, and then only with suitable protective equipment and with accepted (or standard) safety precautions.

7.13 Measure the liquid remaining in the test unit.

7.14 Examine the remaining liquid for discoloration.



NOTE 1—Tighten bolts evenly. Follow numerical sequence shown.

FIG. 3 Bolt Tightening Sequence

7.15 Examine the gasket for discoloration, cracks, heat effects (such as darkening, carbonizing, hardening), and other indications of attack or failure.

7.16 Check for physical deformations as a result of heat and pressure, or a combination of the two.

8. Report

8.1 Report the following information:

8.1.1 Identification of gasket,

8.1.2 Specimen thickness,

8.1.3 Temperature of test,

8.1.4 Description of corrosive solution,

8.1.5 Test conducted with vapor only (upright) or both vapor and liquid (on the side),

8.1.6 Pressure of test (from temperature-pressure tables of the corrosive used in the test),

8.1.7 Bolt torque used,

8.1.8 Corrosive and heat effects on the gasket, as indicated by darkening, cracking, or disintegration, and

8.1.9 Solution losses, if any.

9. Precision and Bias

9.1 Since the results of this test are reported as visual observations only, no precision or bias statements are possible.

10. Keywords

10.1 corrosion testing; gaskets