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Designation: D 4237 - 90

AMERICAN SOCIETY FOR TESTING AND MATERIALS  
1916 Race St., Philadelphia, Pa. 19103

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## Standard Test Methods for Rubber Hose Used for Steam Applications<sup>1</sup>

This standard is issued under the fixed designation D 4237; 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.

### 1. Scope

1.1 These test methods cover testing procedures simulating service conditions for rubber hose exposed to saturated steam.

1.2 The values stated in SI units are to be regarded as the standard. The values in parentheses are for information only.

1.3 *This standard may involve hazardous materials, operations, and equipment. This standard does not purport to address all of the safety problems 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 Document

2.1 *ASTM Standard:*  
D 380 Test Methods for Rubber Hose<sup>2</sup>

### 3. Significance and Use

3.1 The purpose of these test methods is to provide producers, distributors, and users with nationally recognized test methods. These are used for evaluating the characteristics of hose products for steam applications.

### 4. Description of Test Methods

4.1 The special tests described in these test methods shall be applied as required in order to comply with the detailed specifications. Otherwise, the general procedures in Test Methods D 380 shall be used and are hereby made a part of these test methods.

4.2 In case of a conflict between the provisions of these test methods and those of detailed specifications or test methods for a particular hose, the latter shall take precedence.

4.3 Four test methods for hose steam exposure are described, as follows:

| Test Method                            | Section |
|----------------------------------------|---------|
| A Vertical rack                        | 6       |
| B Horizontal rack                      | 7       |
| C Flexing test, vertical arrangement   | 8       |
| D Flexing test, horizontal arrangement | 9       |

4.4 The temperature or pressure of the steam and time of exposure, the physical properties to be used to assess hose deterioration, as well as the permitted changes in these properties should be stated in the relevant hose specification.

Requirements commonly specified are hydrostatic bursting strength, tensile strength, and elongation of the tube and/or cover and adhesion between component parts of the hose. Tests for these requirements are described in Test Methods D 380. Visually assessed test criteria may also be specified; such as (1) rupture of the hose structure, (2) cracking of the cover to a specified depth, and (3) pitting, blistering, and chunking out (popcorning) of the tube. Exposure time until the hose fails may also be specified.

4.5 *General Apparatus Requirements*—For all four test methods, manifolds shall be provided with shut off valves at each opening in each manifold. Should the apparatus be confined within an enclosure as a safety precaution, such enclosure should be so designed that the ambient temperature measured 25 mm (1 in.) from the outer surface of the hose shall be not greater than 11°C (20°F) above room temperature.

### 5. Test Conditions

5.1 *General Procedure Requirements*—For determining the physical properties before exposure to steam, use a portion of the hose specimen not required for the test. The temperature of the test hose specimen shall be stabilized at the testing room temperature prior to testing for a period of not less than 16 h. After exposure to the steam test condition, remove the hose from the apparatus, allow it to cool, and stabilize under testing room atmospheric conditions for not less than 16 h nor more than 100 h before further testing is conducted on the hose.

### 6. Test Method A—Vertical Rack Method

6.1 *Summary of Test Method*—A length of hose is held in a fixed vertical position and saturated steam passed through the bore of the hose.

6.2 *Apparatus*—Two fixed horizontal steam manifolds having suitable connections for attaching test specimens shall be placed one above the other at such a distance that the test specimens will just fit between the connections in a vertical position without distortion. Supply dry saturated steam at the required pressure to the specimens through the upper manifold, which shall be equipped with a pressure regulating valve, a recording gage, and suitable indicating gages. Connect the lower manifold to a steam trap.

6.3 *Test Specimen*—The test specimen shall be a length of hose as required by the apparatus except that the length shall not be less than 400 mm (16 in.) nor more than 630 mm (25 in.).

6.4 *Procedure*—Mount the specimen for steam exposure in the apparatus and subject the bore of the hose to the steam conditions specified.

<sup>1</sup> These test methods are under the jurisdiction of ASTM Committee D-11 on Rubber and are the direct responsibility of Subcommittee D11.31 on Rubber Hose.

Current edition approved April 27, 1990. Published June 1990. Originally published as D 4237 - 83. Last previous edition D 4237 - 83.

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