



Standard Test Methods for Tension Testing of Nonmetallic Gasket Materials¹

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This standard has been approved for use by agencies of the Department of Defense.

1. Scope

1.1 These test methods cover the determination of tensile strength of certain nonmetallic gasketing materials at room temperature. The types of materials covered are those containing asbestos and other inorganic fibers (Type 1), cork (Type 2), cellulose or other organic fiber (Type 3), and flexible graphite (Type 5) as described in Classification F 104. These test methods are not applicable to the testing of vulcanized rubber, a method for which is described in Test Methods D 412 nor for rubber O-rings, a method for which is described in Test Methods D 1414.

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 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 412 Test Methods for Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers— Tension²

D 1414 Test Methods for Rubber O-Rings³

E 4 Practices for Force Verification of Testing Machines⁴

E 691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method⁵

F 104 Classification System for Nonmetallic Gasket Materials³

3. Terminology

3.1 Definitions:

3.1.1 *sample*—a unit or section of a unit taken from a sampling lot.

3.1.2 *specimen*—a piece of material appropriately shaped and prepared so that it is ready for a test.

¹ These test methods are under the jurisdiction of ASTM Committee F-3 on Gaskets and are the direct responsibility of Subcommittee F03.20 on Methods of Test.

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² *Annual Book of ASTM Standards*, Vol 09.01.

³ *Annual Book of ASTM Standards*, Vol 09.02.

⁴ *Annual Book of ASTM Standards*, Vol 03.01.

⁵ *Annual Book of ASTM Standards*, Vol 14.02.

3.1.3 *tensile strength*—the maximum tensile stress applied during stretching a specimen to rupture.

3.1.4 *tensile stress*—the applied force per unit or original cross-sectional area of the specimen.

4. Significance and Use

4.1 These test methods are described in order to standardize procedures for determining the tensile strength of nonmetallic gasket materials. The measurement of this property characterizes various classes and grades of materials of a given type and in so doing it will give the manufacturer a measurement of the quality of his product. It also will aid the purchaser of the gasketing materials to be able to determine whether the gasket material that he has approved for a given application is being manufactured in acceptable quality.

4.2 The measurement of this property should not be misconstrued as to give the purchaser of the gasket material an indication of the performance of that material in application.

4.3 The property may be useful in establishing material specifications.

4.4 Various procedures are given for the different types of materials, and in order to compare the results from one laboratory to another it is imperative that the applicable procedure be selected.

4.5 Various types of tension-testing apparatus are allowed to be used. These types of equipment can produce different indicated results. Laboratories having different equipment may have to establish correlations between each other; otherwise, misinterpretation of the test data could result.

5. Apparatus

5.1 *Dies*—The inside faces of the dies shall be polished and be perpendicular to the plane formed by the cutting edges for a depth of at least 5 mm (0.2 in.). The dies shall be sharp and free of nicks in order to prevent ragged edges on the specimen.

5.2 *Dial Micrometers*—In accordance with 9.1 of Classification F 104.

5.3 *Testing Machine*—Tension tests shall be made on a power-driven machine, so equipped that a constant rate of grip separation shall be maintained, and with an indicating or recording device for measuring the resulting force within $\pm 2\%$. The tester shall have two grips and a mechanism for separating the grips at a uniform rate, which will be maintained during the test within $\pm 5\%$ of the desired rate of separation. The grips shall be either wedged or toggle type, designed to