



Designation: D5035 – 11 (Reapproved 2024)

Standard Test Method for Breaking Force and Elongation of Textile Fabrics (Strip Method)¹

This standard is issued under the fixed designation D5035; 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.

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

1. Scope

1.1 This test method covers raveled strip and cut strip test procedures for determining the breaking force and elongation of most textile fabrics. Provision is made for wet testing.

1.1.1 The raveled strip test is applicable to woven fabrics while the cut strip test is applicable to nonwoven fabrics, felted fabrics, and *dipped* or coated fabrics.

1.2 This test method is not recommended for knitted fabrics or for other textile fabrics which have high stretch (more than 11 %).

NOTE 1—For the determination of the breaking force and elongation of textile fabrics using the grab test and modified grab test procedures, refer to Test Method [D5034](#).

NOTE 2—For determination of the breaking force and elongation of some specific types of fabrics which use the strip test, refer to Specifications [D579/D579M](#) and [D580/D580M](#).

1.3 This test method shows the values in both inch-pound units and SI units. Inch-pound units is the technically correct name for the customary units used in the United States. SI units is the technically correct name for the system of metric units known as the International System of Units. The values stated in either acceptable metric units or in other units shall be regarded separately as standard. The values expressed in each system may not be exact equivalents; therefore, each system must be used independently of the other, without combining in any way.

1.4 *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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.5 *This international standard was developed in accordance with internationally recognized principles on standard-*

ization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.

2. Referenced Documents

2.1 *ASTM Standards:*²

[D76/D76M](#) Specification for Tensile Testing Machines for Textiles

[D123](#) Terminology Relating to Textiles

[D579/D579M](#) Practice for Greige Woven Glass Fabrics

[D580/D580M](#) Practice for Greige Woven Glass Tapes and Webbing

[D629](#) Test Methods for Quantitative Analysis of Textiles (Withdrawn 2024)³

[D1776/D1776M](#) Practice for Conditioning and Testing Textiles

[D4848](#) Terminology Related to Force, Deformation and Related Properties of Textiles

[D4849](#) Terminology Related to Yarns and Fibers

[D4850](#) Terminology Relating to Fabrics and Fabric Test Methods

[D5034](#) Test Method for Breaking Strength and Elongation of Textile Fabrics (Grab Test)

3. Terminology

3.1 For definitions of textile terms used in this test method: breaking force, elongation, tensile test, refer to Terminology [D4848](#).

3.2 For definitions of textile terms used in this test method: constant-rate-of-extension, constant rate of load, constant rate of traverse, refer to Terminology [D4849](#).

3.3 For definitions of textile terms used in this test method: cut strip test, raveled strip test, strip test, refer to Terminology [D4850](#).

¹ This test method is under the jurisdiction of ASTM Committee [D13](#) on Textiles and is the direct responsibility of Subcommittee [D13.60](#) on Fabric Physical Test Methods B.

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at www.astm.org/contact. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

³ The last approved version of this historical standard is referenced on www.astm.org.

3.4 For other textile terms used in this test method, refer to Terminology **D123**.

4. Summary of Test Method

4.1 A test specimen is clamped in a tensile testing machine and a force applied to the specimen until it breaks. Values for the breaking force and elongation of the test specimen are obtained from machine scales, dials, autographic recording charts, or a computer interfaced with the testing machine.

4.2 This test method describes procedures for carrying out fabric tensile tests using four types of specimen, and three alternative types of testing machines. For reporting, use the following system to identify specific specimen and machine combinations.

4.2.1 Type of specimen:

4.2.1.1 1R—25 mm (1.0 in.) raveled strip test

4.2.1.2 2R—50 mm (2.0 in.) raveled strip test

4.2.1.3 1C—25 mm (1.0 in.) cut strip test

4.2.1.4 2C—50 mm (2.0 in.) cut strip test

4.2.2 Type of tensile testing machine:

4.2.2.1 E—constant-rate-of-extension (CRE)

4.2.2.2 L—constant-rate-of-load (CRL)

4.2.2.3 T—constant-rate-of-traverse (CRT)

4.2.3 Possible combinations can be identified as follows:

Test Specimen	Type of Tester		
	Constant-Rate-of-Extension	Constant-Rate-of-Load	Constant-Rate-of-Traverse
25-mm (1-in.) raveled strip	1R-E	1R-L	1R-T
50-mm (2-in.) raveled strip	2R-E	2R-L	2R-T
25-mm (1-in.) cut strip	1C-E	1C-L	1C-T
50-mm (2-in.) cut strip	2C-E	2C-L	2C-T

4.2.3.1 For example, 1R-E refers to a 25-mm (1-in.) raveled strip test carried out on a constant-rate-of-extension tensile testing machine.

5. Significance and Use

5.1 The raveled strip test in this test method is considered satisfactory for acceptance testing of commercial shipments of woven textile fabrics because the method has been used extensively in the trade for acceptance testing. The same is true for the cut strip test for felted or nonwoven textile fabrics.

5.1.1 If there are differences of practical significance between reported test results for two laboratories (or more), comparative test should be performed to determine if there is a statistical bias between them, using competent statistical assistance. At a minimum, use the samples for such a comparative test that are as homogeneous as possible, drawn from the same lot of material as the samples that resulted in disparate results during initial testing and randomly assigned in equal numbers to each laboratory. The test results from the laboratories involved should be compared using a statistical test for unpaired data, a probability level chosen prior to the testing series. If bias is found, either its cause must be found and corrected, or future test results for that material must be adjusted in consideration of the known bias.

5.2 The method is not recommended for knitted fabrics because of their high stretch.

5.3 Some modification of the techniques may be necessary for any fabric having a strength in excess of 200 N/cm (1140 lbf/in.) width. Special precautionary measures are provided for use when necessary with strong fabrics, or fabrics made from glass fibers (see Specification **D579/D579M**), to prevent them from slipping in the clamps or being damaged as a result of being gripped in the clamps.

5.4 All of the procedures are applicable for testing fabrics either conditioned or wet.

5.5 Comparison of results from tensile testing machines operating on different principles is not recommended. When different types of machines are used for comparison testing, constant time-to-break at $20\text{ s} \pm 3\text{ s}$ is the established way of producing data. Even then the data may differ significantly.

5.6 Although a constant-rate-of-extension tensile testing machine is preferred in these methods, in cases of dispute, unless there is agreement to the contrary between the purchaser and supplier, a constant-time-to-break ($20\text{ s} \pm 3\text{ s}$) is to be used.

5.7 The raveled strip procedure is applicable to the determination of the force required to break a specific width of fabric. The breaking force information on woven fabrics is particularly useful for comparison of the effective strength of the yarns in the fabric with the combined strength of an equal number of the same yarns which are not woven. The procedure is not recommended for fabrics having fewer than 20 yarns across the width of the specimen. If a 20-yarns-per-specimen width cannot be obtained with a 25-mm (1-in.) strip, a 50-mm (2-in.) strip should be used. In general, the observed force for a 50-mm (2-in.) specimen is not double the observed force for a 25-mm (1-in.) specimen and the results should be reported as observed on a 50-mm (2-in.) strip without mathematical adjustment to 25 mm (1 in.). If a fabric cannot be raveled readily, use either a cut strip or grab procedure.

5.8 The cut strip procedure is applicable to heavily fullled fabrics, woven fabrics that cannot be readily raveled, felted fabrics and nonwoven fabrics. This procedure is not recommended for fabrics which can be raveled because the yarns at the edges tend to unravel during testing. The recommendation regarding the minimum number of yarns in a woven specimen discussed in **5.7** for raveled strips applies equally to cut strips.

6. Apparatus, Reagents, and Materials

6.1 *Tensile Testing Machine*, of the CRE, CRL, or CRT type conforming to Specification **D76/D76M**, with respect to force indication, working range, capacity, and elongation indicator and designed for operation at a speed of $300\text{ mm/min} \pm 10\text{ mm/min}$ ($12\text{ in./min} \pm 0.5\text{ in./min}$); or, a variable speed drive, change gears, or interchangeable loads as required to obtain the $20 \pm 3\text{ s}$ time-to-break (see **5.5** and **5.6**).

6.2 *Clamps and Jaw Faces*—Each jaw face shall be smooth, flat, and with a metallic or other agreed upon surface. The faces shall be parallel and have machining centers with respect to one another in the same clamp and to the corresponding jaw face of the other clamp.

6.2.1 For all strip tests or for narrow fabrics and tapes being tested full width, each jaw face shall measure at least 10 mm