



Designation: D4884/D4884M – 22

## Standard Test Method for Strength of Sewn or Bonded Seams of Geotextiles<sup>1</sup>

This standard is issued under the fixed designation D4884/D4884M; 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 This test method covers the determination of the factory and field seam strength of geotextiles, using a wide specimen and wet and dry specimens.

1.2 The long-term performance of a seaming technique is not addressed by this test method. This test method will provide data to indicate the short-term seam strength that can be achieved for each particular geotextile and seam assembly construction. To assess the long-term performance of a seaming technique, it is possible to use Practice D6389, using this test method to determine the anticipated strength reduction in the initial, short-term wide-width tensile strength (Test Method D4595) results.

1.3 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system are not necessarily exact equivalents; therefore, to ensure conformance with the standard, each system shall be used independently of the other, and values from the two systems shall not be combined.

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 standardization 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:<sup>2</sup>

<sup>1</sup> This test method is under the jurisdiction of ASTM Committee D35 on Geosynthetics and is the direct responsibility of Subcommittee D35.01 on Mechanical Properties.

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<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

D76/D76M Specification for Tensile Testing Machines for Textiles

D1776/D1776M Practice for Conditioning and Testing Textiles

D1777 Test Method for Thickness of Textile Materials

D4439 Terminology for Geosynthetics

D4595 Test Method for Tensile Properties of Geotextiles by the Wide-Width Strip Method

D6389 Practice for Tests to Evaluate the Chemical Resistance of Geotextiles to Liquids

E178 Practice for Dealing With Outlying Observations

E691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method

2.2 *Federal Standard*.<sup>3</sup>

Fed. Std. No. 751a Stitches, Seams, and Stitchings

### 3. Terminology

3.1 For definitions of terms relating to geotextiles, refer to Terminology D4439.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *adhered seam, n*—in geotextiles, a seam made by the application of an adhesive.

3.2.2 *seam weld, n*—the process by which a seam is formed through the thermal bonding of separate layers of geotextile.

3.2.3 *selvage, n*—the woven edge portion of a geotextile parallel to the machine direction.

3.2.4 *sewing thread, n*—a flexible, small diameter yarn or strand, usually treated with a surface coating, or lubricant, or both, intended to be used to stitch one or more pieces of material or an object to a material.

3.2.5 *stitch, n*—the repeated unit formed by the sewing thread in the production of seams in a sewn geotextile (see Fed. Std. No. 751a).

### 4. Summary of Test Method

4.1 Material is divided into lots and a lot sample taken as described in an applicable material specification, or as agreed upon between the purchaser and the supplier.

<sup>3</sup> Available from DLA Document Services, Building 4/D, 700 Robbins Ave., Philadelphia, PA 19111-5094, <http://quicksearch.dla.mil>.



4.2 Specimens with seams are prepared from the samples per applicable specification or prior agreement between the purchaser and the supplier; otherwise, prepare at least six test specimens.

4.3 A specimen is placed in the test machine with a seam 200 mm [8 in.] wide being gripped on both sides across the entire width in the clamps depending on the type of seam.

4.4 The test specimen is subjected to a longitudinal (perpendicular) force at a prescribed rate of extension until the seam or geotextile ruptures.

4.5 Test specimens are evaluated for how they failed and specimens that are judged invalid are removed from the analysis.

## 5. Significance and Use

5.1 As explained in Test Method [D4595](#), narrow geotextile specimens demonstrate the tendency to contract (neck down) in the gauge area when under stress. The wider width specimen will minimize this phenomenon in seams during strength testing. The results achieved in this test method can more accurately correlate to the seam strength values anticipated in the field.

5.2 This test method can be used to measure the seam strength of geotextiles from the factory or field, and may also be used for acceptance testing of commercial shipments of geotextiles.

5.3 This test method can be used to help determine seam design engineering for the geotextiles being evaluated, as well as comparing wet-conditioned specimens with dry specimen results.

5.4 This test method is not intended to address long-term performance of a seam, nor any of its components such as the thread or the adhesive. However, it can be used as an index value to monitor the behavior of a seam exposed to any particular exposure, in example as part of an effort to assess its long-term performance.

## 6. Apparatus

6.1 *Tensile Testing Machine*, must be of the constant-rate-of-extension (CRE) type, conforming to Specification [D76/D76M](#) and equipped with a recorder having an adequate pen response or interfaced computer to record the load elongation curve. The machine must be capable of being set to a rate of extension of  $10 \pm 3\%$ /min.

6.2 *Clamps*—The clamps shall be wide enough to grip the entire width of the specimen and have the appropriate clamping power to hold the test specimen in place without crushing (damaging) the geotextile.

6.2.1 Caution must be taken to ensure that the type of clamp used is adequate for the seam strength being measured.

6.3 *Size of Jaw Faces*—Each clamp shall have a clamping face wider than the width of the specimen, typically 225 mm [8.86 in.] or larger, and a minimum of 50 mm [2 in.] in the direction of the applied force. The size of jaw faces does not apply if roller clamps are used.

## 7. Sampling and Specimens

7.1 The evaluation of field seams and factory seams will be made by taking samples at the stipulated intervals directed in [Table 1](#) unless otherwise stated.

**TABLE 1 Seam Quality Control Sampling Requirements**

| Total Length of Field <sup>A</sup><br>Seams for Project, m [yd] | Sample Interval <sup>B</sup><br>Requirements, m [yd] |
|-----------------------------------------------------------------|------------------------------------------------------|
| Up to 10 000 [Up to 11 000]                                     | 1000 [1100]                                          |
| 10 001 to 150 000 [11 000 to 165 000]                           | 1500 [1666]                                          |
| 150 000 and up [165 000 and up]                                 | 2000 [2200]                                          |

<sup>A</sup> Total length of field seams for project is the sum of all machine direction and cross-machine direction seams required to effect installation of geotextile(s).

<sup>B</sup> Samples will be taken at stipulated intervals along the total length of the field seams. The number of such intervals will be rounded to the next higher whole number.

NOTE 1—To prevent the unnecessary waste of geotextile or impede the installation, it should be agreed upon between the supplier and the purchaser that all seam samples can be taken from alternate sides of panels at or near the end of the rolls.

7.2 The lengthwise direction of these swatches should be parallel to the direction of the seam, either in the machine or cross-machine direction.

7.2.1 It will be necessary to cut additional swatches for both wet and conditioned tests to be performed.

7.3 Prepare test specimens as specified in [7.6.2](#).

7.4 *Division into Lots and Lot Sample*—Divide the material into lots and take a lot sample as described in an applicable material specification, or as agreed upon between the purchaser and the supplier. In the absence of an applicable material specification or prior agreement between the purchaser and the supplier, sampling and testing intervals should be agreed upon between the purchaser and the supplier.

7.4.1 When the installation project requires that seams are made in both the machine and cross-machine directions, the number of samples and the subsequent specimens will increase proportionately.

7.5 *Laboratory Samples*—As a laboratory sample, cut a minimum of two swatches of geotextile from each of the lot units selected for testing. The swatches must be long and large enough to permit seaming and selection of representative sections of seams for specimen preparation, such as, a minimum of 2000 mm [79 in.] in length and a minimum of 300 mm [12 in.] in width. The lengthwise direction of these swatches must be cut from opposite ends and opposite sides of the lot sample rolls and should be parallel to the direction in which the seam will be made.

7.5.1 When seams are made in both the machine and cross-machine direction, it is suggested that some type of special color identification marking be used to distinguish one from the other.

7.5.2 These swatches are then joined using the best seam engineering techniques determined by the purchaser and the supplier to achieve seam interaction.

7.5.3 It will be necessary to cut a sufficient number of swatches for both wet and conditioned tests.