



Designation: D4034/D4034M – 19

# Standard Test Method for Resistance to Yarn Slippage at the Sewn Seam in Woven Upholstery Fabrics<sup>1</sup>

This standard is issued under the fixed designation D4034/D4034M; 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 measures the resistance to slippage of warp yarns over filling yarns, or filling yarns over warp yarns, in woven upholstery fabrics, using a specific standard seam assembly by comparing the differences in test curves from a sewn and unsewn sample.

NOTE 1—This test method is derived from Test Method D434, from which appropriate changes have been made to make the method more applicable for upholstery fabrics.

NOTE 2—This test method is designed to be a fabric test and is considered to be technically different than Test Method D1683, which is considered to be a yarn / seam test.

1.2 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.

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

1.4 *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 specification is under the jurisdiction of ASTM Committee D13 on Textiles and is the direct responsibility of Subcommittee D13.59 on Fabric Test Methods, General.

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<sup>2</sup> 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.

- [D76/D76M Specification for Tensile Testing Machines for Textiles](#)
- [D123 Terminology Relating to Textiles](#)
- [D434 Test Method for Resistance to Slippage of Yarns in Woven Fabrics Using a Standard Seam \(Withdrawn 2003\)<sup>3</sup>](#)
- [D1683 Test Method for Failure in Sewn Seams of Woven Fabrics](#)
- [D1776 Practice for Conditioning and Testing Textiles](#)
- [D4850 Terminology Relating to Fabrics and Fabric Test Methods](#)
- [D5034 Test Method for Breaking Strength and Elongation of Textile Fabrics \(Grab Test\)](#)
- [D6193 Practice for Stitches and Seams](#)
- [E177 Practice for Use of the Terms Precision and Bias in ASTM Test Methods](#)
- [E691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method](#)

## 3. Terminology

3.1 *Definitions:*

3.1.1 *direction of slippage, n*—at the seam, the line of movement parallel to either the filling or the warp on a woven fabric.

3.1.2 *resistance to yarn slippage, n*—the force in Newtons or pounds-force required to displace one or more yarns in a woven fabric from the original position, resulting in differences in alignment, or spacing, or both.

3.1.3 *sewn seam, n*—in sewn fabrics, a juncture at which two or more planar structures such as textile fabrics, are joined by sewing, usually near the edge.

3.2 For definitions of other textile terms used in this test method, refer to Terminologies D123 and D4850.

## 4. Summary of Test Method

4.1 Resistance to yarn slippage is determined on a specimen made from pieces of the same fabric that have been stitched together in a specified manner (see 9.3). First, tension is

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



applied to the unseamed part of the specimen using a constant rate-of-extension (CRE) or a constant rate-of-traverse type (CRT) machine and the force-extension curve recorded. Next, tension is applied with the seams centered between and parallel to the jaws and results are recorded on the same chart. The distance between the recorded force-extension curves is measured from the point where slippage began (see 12.1)

## 5. Significance and Use

5.1 Test Method D4034 for measuring the resistance to fabric yarn slippage is considered satisfactory for acceptance testing of woven upholstery fabrics.

5.1.1 In case of disagreement arising from differences in values reported by the purchaser and the supplier when using this test method for acceptance testing, the statistical bias, if any, between the laboratory of the supplier and the laboratory of the purchaser should be determined with comparisons being based on the testing of specimens taken from a lot of material of the type evaluated to be as nearly homogeneous as possible and then randomly assigned in equal numbers to each of the laboratories.

5.2 This test method is intended to measure fabric yarn slippage at the sewn seam in upholstery fabrics under controlled conditions. This test method may not indicate actual field performance.

5.3 Fabrics that do not meet the requirements agreed upon between the purchaser and supplier should be classified as “delicate yarn slippage resistance” and the purchaser and furniture manufacturer so notified.

## 6. Apparatus

6.1 *Tensile Testing Machine*—A constant rate-of-traverse (CRT) or constant rate-of-extension (CRE) type machine conforming to the requirements of Specification D76/D76M. The machine shall be equipped with an autographic recording device or software and with clamps having front jaws 25 mm [1 in.] in width with back jaws of 50 mm [2 in.] or more in width, except as otherwise provided (Note 2). The clamps shall be set 76 mm [3 in.] apart. The speed of the pulling clamp shall be  $5.0 \pm 0.2$  mm/s [ $12.0 \pm 0.5$  in./min].

NOTE 3—In comparing results with those from another laboratory, both laboratories should use the same type of tensile testing machine, or have established the relationship between test results obtained using a CRT machine and those obtained using a CRE machine when testing fabrics of the type being evaluated.

6.1.1 *Tensile Testing Machine (Other)*—A tensile testing machine other than a CRT or CRE type that conforms to the requirements of Specification D76/D76M and gives results that correlate with those for CRT or CRE testers. The machine must be acceptable to both the purchaser and supplier if the results are to be used for acceptance testing of commercial shipments.

6.2 *Needle*—Size 22 ball point needle.<sup>4</sup>

6.3 *Sewing Thread*—100 % nylon bonded monocord thread. The needle thread shall be 513 denier [57 tex] and shall have a minimum breaking strength of 35 N [8 lbf]. The bobbin

thread shall be 380 denier [42 tex] and have a minimum breaking strength of 23 N [5 lbf].<sup>5</sup>

6.4 *Dividers*—One pair (Note 4).

6.5 *Metal Clamp*—An auxiliary clamp weighing 170 g [6 oz] and having anvils at least 100 mm [4 in.] in width.<sup>6</sup> (Note 4).

NOTE 4—Used for manual systems only.

## 7. Sampling

7.1 *Lot Sample*—For acceptance testing, take at random the number of rolls of fabric directed in an applicable material specification or other agreement between the purchaser and the supplier. Consider rolls of fabric to be the primary sampling units.

7.2 *Laboratory Sample*—Take a full width swatch 1 m [1 yd] long from the end of each roll of fabric in the lot sample, after first discarding a minimum of 1 m [1 yd] from the outside of the roll.

## 8. Number of Specimens

8.1 For testing, ten specimens are required, five with the long dimension parallel to the warp and five with the long dimension parallel to the filling.

## 9. Preparation of Specimen

9.1 Cut two pieces of fabric, one 100 by 100 mm [4 by 4 in.] and one 100 by 250 mm [4 by 10 in.].

9.2 Place the 100 by 100-mm [4 by 4-in.] piece on top of the 100 by 250-mm [4 by 10-in.] piece, face to face, with one end even with the end of the 100 by 250-mm piece. For testing resistance to warp direction slippage, the warp yarn in both pieces should be lengthwise or perpendicular to the seam, and for testing resistance to filling direction slippage, the filling yarn in both pieces should run lengthwise. (See Fig. 1.)

9.3 Stitch a seam across the short dimension of the specimens, placing the seam 12 mm [0.5 in.] from the edge of the specimen, using  $7 \pm 0.5$  stitches per 25 mm [1 in.] and a plain lockstitch.

9.3.1 The plain lockstitch used for the standard seam in this test method shall conform to stitch Type 301 (Figure 11) in Practice D6193. This type of stitch shall be formed with two threads. A loop of one thread shall be passed through the material where it shall be entered by the mass supply of the other thread. The loop of the first thread then shall be drawn into the material to the extent that the concatenation is approximately halfway between the two surfaces of the material. These operations are repeated to form a sequence of stitches (see Fig. 2).

9.4 It is important that the stitches be made under uniform tension and that the seam be perpendicular to the filling or warp yarns.

9.5 Draw a line 35 mm [1.5 in.] from the edge parallel to the long direction to aid in the placement of the specimen in the testing machine.

<sup>4</sup> This needle is commercially available.

<sup>5</sup> This sewing thread is commercially available.

<sup>6</sup> This clamp is commercially available.