



Designation: D 434 – 95

An American National Standard

Standard Test Method for Resistance to Slippage of Yarns in Woven Fabrics Using a Standard Seam¹

This standard is issued under the fixed designation D 434; 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 reappraisal. A superscript epsilon (ε) indicates an editorial change since the last revision or reappraisal.

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

1. Scope

1.1 This test method covers the determination of the resistance to slippage of filling yarns over warp yarns, or warp yarns over filling yarns, using a standard seam.

1.2 The test method is not intended for upholstery fabrics.

2. Referenced Documents

2.1 *ASTM Standards:*

D 76 Specification for Tensile Testing Machines for Textiles²

D 123 Terminology Relating to Textiles²

D 1682 Test Methods for Breaking Load and Elongation of Textile Fabrics²

D 1776 Practice for Conditioning Textiles for Testing²

D 1905 Test Method for Dimensional Changes in Laundering of Woven or Knitted Textiles³

D 2721 Test Method for Effects of Drycleaning on Permanence of Durable Water-Repellent Finish²

2.2 *Federal Standard:*

751a Stitch Seam and Stitching⁴

3. Terminology

3.1 *Definitions:*

3.1.1 *resistance to yarn slippage n.*—the force required to separate the parts of a standard seam assembly by a specified amount.

3.2 For definitions of other textile terms used in this method, refer to Terminology D 123.

4. Summary of Test Method

4.1 The load-elongation curve of the fabric is superimposed over a load-elongation curve of the same fabric with a standard seam sewn parallel to the yarns being tested. Resistance to yarn slippage is reported as the load at which a slippage of a specified size is seen.

5. Significance and Use

5.1 This method is considered satisfactory for acceptance testing because the method has been used extensively in the trade for acceptance testing. In case of disagreement arising from differences in values reported by the purchaser and the seller when using this test method for acceptance testing, the statistical bias, if any, between the laboratory of the purchaser and the laboratory of the seller should be determined with each comparison being based on testing specimens randomly drawn from one sample of material of the type being evaluated.

5.2 This test method is used as an indication of the tendency of yarns to slip at a seam. Such slippage results in garment failure at a seam, which is not readily repairable by reseaming.

5.3 The force at which the load-elongation curve of the fabric with the seam is a predetermined distance greater than the load-elongation curve of the fabric without a seam is reported as the pounds-force per inch (newtons per metre) resistance to yarn slippage. Generally, a ¼-in. (6.4-mm) separation is used, but for some fabrics a smaller opening is preferred. If desired, the force to affect complete separation may be obtained by continuing the load-elongation curve until complete separation is obtained. A 1-lbf (4.45-N) compensation is deducted to allow for elongation of the seam.

¹ This test method is under the jurisdiction of ASTM Committee D-13 on Textiles, and is the direct responsibility of Subcommittee D13.59 on Fabric Test Methods, General.

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² *Annual Book of ASTM Standards*, Vols 07.01.

³ Discontinued—See 1977 *Annual Book of ASTM Standards*, Part 32.

⁴ Available from Standardization Documents Order Desk, Bldg. 4 Section D, 700 Robbins Ave., Philadelphia, PA 19111-5094, Attn: NPODS.



5.4 Currently interlaboratory tests are being made to determine accuracy and precision. This method can also be used to evaluate the correlation between the CRE and CRI testing machines.

6. Apparatus

6.1 *Tensile Testing Machine (CRT) (Preferred)*—CRT (pendulum) type with an autographic recorder conforming to the requirements of Method D 76. The machine shall be equipped with clamps having frontjaws 1 in. (25 mm) in width and backjaws 2 in. (50 mm) or more in width, except as otherwise provided. The clamps shall be set in 3 in. (8.0 mm) apart. The speed of the lower clamp shall be $12 \pm \frac{1}{2}$ in. (300 $\pm$ 10 mm)/min.

NOTE 1—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.

6.2 *Tensile Testing Machine (CRE)*—A constant-rate-of-extension type machine equivalent to the CRT machine specified in 6.1.

6.3 *Dividers*, one pair.

6.4 *Metal Rule*, graduated in $\frac{1}{32}$ -in. or 1-mm subdivisions.

6.5 *Metal Clamp*, auxiliary, 6-oz (170 g), at least 4 in. (102 mm) in width.

7. Number of Specimens

7.1 For preliminary testing, two specimens are required, one with the long dimension parallel to the warp and one with the long dimension parallel to the filling. Preliminary tests are not necessary if the direction with the lower resistance to yarn slippage is known.

7.2 For final testing, five specimens in the direction of the greater slippage, are required.

NOTE 2—Fabrics may be tested in either their original condition or after refurbishing on both. Refurbish in accordance with the applicable laundering procedure in Test Method D 1905 or the drycleaning procedure in Test Method D 2721. Sew seams after refurbishing the fabric sample, except when prior agreement requires seams to be sewn before refurbishing. Postcured permanent-press fabrics need to be seamed, then cured before testing.

8. Preparation of Specimen

8.1 Cut a piece of fabric 4 by 14 in. (100 by 350 mm) with the long direction parallel to the filling yarns, if the warp yarns slide over the filling yarns. If the filling yarns slide over the warp yarns the long dimension is parallel to the warp yarns.

NOTE 3—In the instructions for the preparation of a specimen, it is assumed, for simplicity, that the specimen is to be used for determining the slippage of warp yarns, that is, the specimen will be subjected to a pull in line with the direction of the filling. In case the specimen is to be prepared for determining slippage of the filling on the warp, it is only necessary to substitute “warp” for “filling” in the instructions.

8.2 Fold the specimen 4 in. (100 mm) from one end with the fold parallel to the short direction of the fabric. Sew a seam $\frac{1}{2}$ in. (13 mm) from the fold using a needle approximately 0.030 in. (0.76 mm) in diameter (measured at the eye), No. 00 3-cord (approximately 39 tex) white mercerized cotton or approxi-

mately 36 tex polyester cotton core thread, $14 \pm \frac{1}{2}$ stitches to the inch (570 per metre) and a plain lockstitch.

NOTE 4—The plain lockstitch shall conform to Type No. 301 of the Federal Standard for Stitches; Seams; and Stitching (Standard No. 751a) of the General Services Administration. This type of stitch shall be formed of two threads. A loop of one thread 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.

8.3 Be careful to make the stitches under uniform tension and to sew the seam parallel to the warp yarns. Movement of the thread should not be restricted by knotting or backstitching at the end of the seam. After seaming, cut the fold open.

NOTE 5—If the fabric being tested is not suitable for the seam assembly as described in 8.2, a suitable substitute seam assembly may be used. No statement of precision applies in this instance.

8.4 Draw a line 1.5 in. (38 mm) from the edge parallel to the long direction to aid in placement of the specimen in the testing machine.

9. Conditioning

9.1 Condition all specimens being tested, except those for preliminary tests, as directed in Practice D 1776.

10. Procedure

10.1 *Elongation of Seamed Fabric:*

10.1.1 Place the end of the specimen closest to the seam squarely in the upper clamps, being careful that the drawn line is next to the edge of the front jaw and that the seam is midway between the upper and lower clamps. Place the specimen in the lower clamp and attach the auxiliary clamp to obtain tension of the specimen.

NOTE 6—To achieve uniform and equal tension it has been found helpful to use an auxiliary clamp weighing 6 oz (170 g) and having anvils at least 4 in. (100 mm) in width. Attach this auxiliary clamp to the specimen parallel to the yarns being tested and at a point lower than the lower clamp of the testing machine. When correct alignment and tension are achieved, tighten the lower clamp and remove the auxiliary clamp.

10.1.2 Place the pen of the recording device on the zero ordinate and any convenient abscissa. Start the machine and record the load-elongation curve of the fabric with seam.

NOTE 7—If desired, the force to effect complete separation may be obtained by continuing the load-elongation curve of the seamed fabric until complete separation is obtained. Remove the specimen from the clamps and return the clamps to their starting position.

10.2 *Elongation of Base Fabric:*

10.2.1 Using the same specimen, place the end of the specimen farthest from the seam squarely in the upper clamp being careful that the drawn line is next to the edge of the frontjaw, and grip securely. Place the specimen in the lower clamp and attach the auxiliary clamp to obtain equal tension on the specimen. When correct alignment and tension are achieved, tighten the lower clamp and remove the auxiliary clamp.

10.2.2 Place the pen of the recording device on the zero ordinate and on the same abscissa that was used to record the load-elongation curve for the fabric with the seam. Start the