



Designation: D2724 – 19

Standard Test Method for Bond Strength of Bonded, Fused, and Laminated Apparel Fabrics¹

This standard is issued under the fixed designation D2724; 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 U.S. Department of Defense.

1. Scope

1.1 This test method covers procedures for characterizing the bond strength of bonded, fused, and laminated apparel fabrics before or after drycleaning and laundering.

1.2 The values stated in SI units are to be regarded as standard; the values in parentheses are provided as 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, health, and environmental practices and determine the applicability of regulatory limitations prior to use. See 6.1.1 for a specific warning.*

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:²

- D76 Specification for Tensile Testing Machines for Textiles
- D123 Terminology Relating to Textiles
- D1776 Practice for Conditioning and Testing Textiles
- D3135 Specification for Performance of Bonded, Fused, and Laminated Apparel Fabrics (Withdrawn 2021)³
- D4850 Terminology Relating to Fabrics and Fabric Test Methods

¹ This test method is under the jurisdiction of ASTM Committee D13 on Textiles and is the direct responsibility of Subcommittee D13.59 on Fabric Physical Test Methods A.

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² 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.

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

E337 Test Method for Measuring Humidity with a Psychrometer (the Measurement of Wet- and Dry-Bulb Temperatures)

2.2 AATCC Standards:⁴

- LP1 Home Laundering: Machine Washing
- LP2 Home Laundering: Hand Washing
- TM135 Dimensional Changes of Fabrics after Home Laundering
- TM158 Dimensional Changes on Drycleaning in Perchloroethylene: Machine Method

3. Terminology

3.1 For all terminology relating to D13.59, Fabric Test Methods, General, refer to Terminology D4850.

3.1.1 The following terms are relevant to this standard: bonded fabric, bond strength, fused fabric, fusible fabric, interlining, laminated fabric, lot, relative humidity.

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

4. Summary of Test Methods

4.1 Specimens are tested to determine the strength of the bond as received, after drycleaning, or after laundering.

5. Significance and Use

5.1 This test method for the determination of bond strength of bonded, fused, or laminated apparel fabrics, is considered satisfactory for acceptance testing of commercial shipments of bonded and laminated apparel fabrics.

5.1.1 If there are differences of practical significance between reported test results for two laboratories (or more), comparative tests should be performed to determine if there is a statistical bias between them, using competent statistical assistance. As 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. Randomly assign specimens in

⁴ Available from American Association of Textile Chemists and Colorists (AATCC), P.O. Box 12215, Research Triangle Park, NC 27709-2215, <http://www.aatcc.org>.

equal numbers to each laboratory. The test results from the laboratories involved should be compared using a statistical test for unpaired data and 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.

6. Apparatus and Materials

6.1 *Drycleaning Machine*,⁵ as described in AATCC TM158.

6.1.1 Perchloroethylene (commercial), drycleaning grade.

Warning—Perchloroethylene is toxic, and the usual precautions for handling chlorinated solvents should be taken. It should be used only under well-ventilated conditions. The solvent is nonflammable.

6.1.2 Sorbitan mono-oleate.

6.1.3 Ballast fabric.

6.2 *Domestic Automatic Washer*,⁵ as described in AATCC LP1.

6.2.1 1993 AATCC Standard Reference Detergent.

6.2.2 Ballast fabric.

6.3 *Domestic Automatic Tumble Dryer*,⁵ as described in AATCC LP1.

6.4 *Aspirated Psychrometer*, which meets the requirements of Test Method **E337**.

6.5 *Sewing Machine*, suitable for sewing a 301 lockstitch, using a gassed and mercerized cotton sewing thread from tex size 30 to tex size 60 with a stitch density of 6-8 stitches per inch (spi), 25 mm (1 in.) from the edge of the fabric specimen.

6.6 *Steam Iron*, hand type.

6.7 *Steam Press*,⁵ a press, 600 mm by 1250 mm (24 in. by 50 in.), or larger, provided with 60 to 70 psig steam pressure at the press. Any steam press large enough for pressing a specimen 380 mm (15 in.) square may be used.

6.8 *Tensile Testing Machine*, conforming to Specification **D76**, either a constant rate of traverse type⁵ or a constant rate of extension type, equipped with clamps having a width of 76.2 mm (3.00 in.) and preferably calibrated in kilograms with a range from 0 kg to 4.5 kg (0 oz to 160 oz). The constant rate of extension type machine is preferred because of the inherently lower machine-induced errors in this type of machine.

7. Sampling

7.1 *Lot Sample*—As a 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.

NOTE 1—An adequate specification or other agreement between the purchaser and the supplier requires taking into account the variability between rolls of fabric and between specimens from a swatch from a roll of fabric so as to provide a sampling plan with a meaningful producer's risk, consumer's risk, acceptable quality level, and limiting quality level.

7.2 *Laboratory Sample*—As a laboratory sample for acceptance testing, 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) of fabric from the very outside of the roll.

7.3 *Test Specimens*—Proceed as follows:

7.3.1 *For Bond Strength after Drycleaning or Laundering*—Cut three specimens from each swatch in the laboratory sample with each specimen being 380 mm by 380 mm (15 in. by 15 in.) in size, with the one side of the specimens from a single swatch parallel to the selvage. Locate each of the specimens along a diagonal line on the swatch so that they will contain different warp ends and filling picks. Sew a straight line of stitching around each specimen 25 mm (1 in.) from each edge. These specimens may also be used to evaluate dimensional changes as directed in AATCC TM135 or TM158, or appearance as directed in Specification **D3135**.

7.3.2 *For Bond Strength as Received*—Prepare three test specimens, each measuring 76 mm (3 in.) wide, and 152 mm (6 in.) long, the length of the specimens corresponding to the lengthwise direction of the fabric. Do not take the test specimens closer to the selvage than a distance equal to 20 % of the fabric width.

NOTE 2—Samples that are 51 mm (2 in.) wide may be used as the minimum width.

8. Conditioning

8.1 For specimens to be tested as received, condition them in the standard atmosphere for testing textiles as directed in Practice **D1776**. Preconditioning is not necessary.

8.2 For specimens to be tested after drycleaning or laundering, condition only if the same specimens will be tested for dimensional changes. In this case, condition in the standard atmosphere for testing textiles as directed in Practice **D1776** prior to marking. Refer to AATCC TM135 or TM158.

9. Specimen Preparation

9.1 For specimens to be tested after drycleaning, run three complete drycleaning cycles following the procedures described in AATCC TM158.

9.2 For specimens to be tested after machine laundering, run five complete cycles (washing and drying) following the procedures described in AATCC LP1. After the fifth cycle, hand iron following the procedure described in AATCC LP1, as needed.

9.3 For specimens to be tested after hand laundering, run five complete cycles (washing and drying) following the procedures described in AATCC LP2.

9.4 Condition drycleaned or laundered specimens in the standard atmosphere for testing textiles as directed in Practice **D1776**.

9.5 If specimens are to be evaluated for dimensional changes after drycleaning or laundering, complete all measurements as described in the relevant dimensional change test method before cutting 76 mm × 152 mm (3 in. × 6 in.) specimens for bond strength evaluation.

⁵ Apparatus and accessories are commercially available.