



Standard Test Method for Elongation of Narrow Elastic Fabrics (Static-Load Testing)¹

This standard is issued under the fixed designation D 5278; 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.

1. Scope

1.1 This test method determines the elongation characteristics of narrow elastic fabrics made from natural or man-made elastomers, either alone or in combination with other textile fibers, when tested with a static load testing procedure before or after laundering.

NOTE 1—For determination of similar characteristics using the constant-rate-of-extension (CRE) type tensile testing machine, refer to Test Method D 4964.

NOTE 2—For determination of similar characteristics using the constant-rate-of load (CRL) type tensile testing machine, refer to Test Method D 1775.

1.2 The use of this test method requires the selection of, or mutual agreement upon, the effective static load at which the test results will be determined.

1.3 Laundering procedures used will be those specified in Test Method AATCC 135 for 3 washing and drying cycles.

1.4 The values stated in either inch-pound units or SI units are to be regarded separately as standard. Within the text, the inch-pound units are shown in brackets. The values stated in each system are not exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in nonconformance with the specifications.

1.5 *This standard does not purport to address all of the safety problems, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:

D 123 Terminology Relating to Textile Materials²

D 1775 Test Method for Tension and Elongation of Wide Elastic Fabrics²

D 1776 Practice for Conditioning Textiles for Testing²

D 4964 Test Method for Tension and Elongation of Elastic Fabrics (Constant-Rate-of-Extension Type Tensile Testing Machine)³

2.2 AATCC Test Method:

135 Dimensional Changes in Automatic Home Laundering of Woven and Knit Fabrics⁴

3. Terminology

3.1 Definitions:

3.1.1 *elongation, n*—the ratio of the extension of a material to the length of the material prior to stretching. (Compare extension.)

3.1.2 *marrow elastic fabric, n*—an elastic fabric that is less than 150 mm [6 in.] in width.

3.1.3 *static load, n*—in textile testing, a mass which exerts a force by means of the mass alone without motion (synonym, dead load).

4. Summary of Test Method

4.1 Conditioned test specimens, laundered or unlaundered, are suspended and subjected to a specified loading. The static load is applied for a specified time, released, and the cycle repeated two more times. The percent elongation is read directly from the scale on the apparatus.

5. Significance and Use

5.1 This test method is considered satisfactory for acceptance testing of commercial shipments of narrow elastic fabrics because the test method is used in the trade for acceptance testing.

5.1.1 In case of a dispute arising from differences in reported test results when using this test method for acceptance testing of commercial shipments, the parties should conduct comparative tests to determine if there is a statistical bias between their laboratories. Competent statistical assistance is recommended for the investigation of bias. As a minimum, the two parties should take a group of test specimens that are as homogeneous as possible and that are from a lot of material of the type in question. The test specimens should then be randomly assigned in equal numbers to each laboratory for testing. The average results from the two laboratories should be compared using student's *t*-test for unpaired data and an acceptable probability level chosen by the two parties before testing is begun. If bias is found, either the cause must be found and corrected or the purchaser and the supplier must agree to interpret future test results in the light of the known bias.

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*, Vol 07.01.

³ *Annual Book of ASTM Standards*, Vol 07.02.

⁴ Available from American Association of Textile Chemists and Colorists, P.O. Box 12215, Research Triangle Park, NC 27709.

5.2 This test method specifies the use of a static load apparatus. Users of this test method are cautioned that elongation test data obtained using this test method are not comparable to elongation test data obtained using either constant-rate-of-extension (CRE) or constant-rate-of-loading (CRL) type tensile testing machines.

6. Apparatus

6.1 *Static Load Test Apparatus*, equipped with a vertically mounted, fixed saw-tooth clamp for holding the upper portion of the specimen, a scale for reading percent elongation, and an unattached weighted saw-tooth clamp for holding the lower portion of the specimen.

6.2 *Static Loads* including holder and lower clamp.

6.3 *Bench Marker*, for marking 125.0-mm [5.0-in.] and 250.0-mm [10-in.] distances, with stamp pad.

7. Sampling

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

7.2 *Laboratory Sample*—As a laboratory sample for acceptance testing, take a full-width swatch, 2 m [2 yd] long, from the end of each packaging unit in the lot sample, after first discarding a minimum of 1 m [1 yd] of fabric from the leading end of the packaging unit.

7.3 *Test Specimens*—Take three test specimens from each swatch in the laboratory sample.

8. Test Specimens

8.1 *Preparation*:

8.1.1 When samples exceed 75 mm [3 in.] use a 75-mm width cut from the center of the piece unless the purchaser and seller agree to a different sample width.

8.1.2 Prepare test specimens considered to be high stretch (200 % and above) as follows:

8.1.2.1 Cut the test specimens approximately 230 [9 in.] long with this dimension parallel to the length of the fabric. Unless the fabric width exceeds 75 mm [3 in.], use the full fabric width as the test specimen width.

8.1.2.2 With the bench marker, make two marks on the test specimen that are 125.0 mm [5.0 in.] apart, approximately the same distance from the test specimen ends and perpendicular to the long direction of the test specimen.

8.1.3 Prepare test specimens considered to be low stretch (below 200 %) as follows:

8.1.3.1 Cut the test specimens approximately 356 mm [14 in.] long with this dimension parallel to the length of the fabric. Unless the fabric width exceeds 75 mm [3 in.], use the full fabric width as the test specimen width.

8.1.3.2 With the bench marker, make two marks on the test specimen that are 250 mm [10 in.] apart, approximately the

same distance from the test specimen ends and perpendicular to the long direction of the test specimen.

9. Conditioning

9.1 Condition the laboratory samples as directed in Practice D 1776. Allow the samples to relax, free of tension, for a minimum of 4 h. After this exposure, it may be assumed that moisture equilibrium has been reached.

10. Procedure

10.1 Test all test specimens in the standard atmosphere for testing textiles, which is $21 \pm 1^\circ\text{C}$ [$70 \pm 2^\circ\text{F}$] and $65 \pm 2\%$ relative humidity.

10.2 Mount the test specimen with the upper bench mark aligned with the teeth on the fixed clamp.

10.3 Load the free clamp with the appropriate static load.

10.4 Without putting any tension on the test specimen, attach the static-load clamp at the lower bench mark of the test specimen.

10.5 Carefully lower the clamp vertically, letting the test specimen take up the load gradually. Let the test specimen hang for 10 s.

10.6 Exercise the test specimen to remove static load by raising the clamp vertically to allow full relaxation of the test specimen, lowering it gently, and letting the test specimen hang for another 10 s.

10.7 Repeat 10.6 once more.

10.8 Read and record the percent of elongation to the nearest 0.1 %.

10.9 Repeat the process with the two remaining test specimens.

11. Calculation

11.1 Calculate the average elongation for each sample, to the nearest 0.1 %.

12. Report

12.1 State that the test specimens were tested as directed in Test Method D 5278. Describe the material(s) or product(s) sampled and the method of sampling used.

12.2 Report the following information:

12.2.1 The average percent elongation for each sample,

12.2.2 The loading used, the benchmark length and the width of the test specimen, and

12.2.3 Whether or not the test specimens were laundered.

13. Precision and Bias

13.1 The interlaboratory tests have been completed and the data analysis is awaiting the ASTM program for precision and bias statements.

14. Keywords

14.1 elastic fabric; elongation; static load

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