



Designation: D2594/D2594M – 21

Standard Test Method for Stretch Properties of Knitted Fabrics Having Low Power¹

This standard is issued under the fixed designation D2594/D2594M; 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 covers the measurement of fabrics that exhibit high stretch and good recovery from low tension. Fabric stretch is measured when a known load is applied. Fabric growth is evaluated after a known extension is applied and subsequently removed.

1.2 The procedures for fabric stretch and fabric growth can be used together, or individually.

1.3 While this test method can be used for a knit fabric, fabrics intended for support or other applications are better evaluated using other test methods: [D3107](#), [D4964](#), [D6614](#).

1.4 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.

1.5 *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.*

1.6 *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

[D123 Terminology Relating to Textiles](#)

[D1776 Practice for Conditioning and Testing Textiles](#)

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 Test Methods, General.

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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.

[D2904 Practice for Interlaboratory Testing of a Textile Test Method that Produces Normally Distributed Data](#) (Withdrawn 2008)³

[D2906 Practice for Statements on Precision and Bias for Textiles](#) (Withdrawn 2008)³

[D3107 Test Methods for Stretch Properties of Fabrics Woven from Stretch Yarns](#)

[D4849 Terminology Related to Yarns and Fibers](#)

[D4850 Terminology Relating to Fabrics and Fabric Test Methods](#)

[D4964 Test Method for Tension and Elongation of Elastic Fabrics \(Constant-Rate-of-Extension Type Tensile Testing Machine\)](#)

[D6614 Test Method for Stretch Properties of Textile Fabrics – CRE Method](#)

3. Terminology

3.1 Definitions:

3.1.1 For definition of textile terms used in this test method: bench marks, refer to Terminology [D4849](#).

3.1.2 For definitions of textile terms used in this test method: fabric growth; fabric stretch; low-power stretch and tension, refer to Terminology [D4850](#).

3.1.3 For definitions of other textile terms used in this test method, refer to Terminology [D123](#).

4. Summary of Test Method

4.1 *Fabric Growth*—Tension is applied to a looped fabric specimen until it is extended to a specified elongation. The test specimen is held in place for 2 h. The percent change in the test specimen length is measured immediately after removal of the tension. The test specimen is then allowed one hour to recover without tension. The percent change in test specimen length is measured again after this recovery period.

4.2 *Fabric Stretch*—A specified tension is applied to and removed from a looped fabric specimen for five cycles. On the fifth time tension is applied, the tension is held and the percent change in the test specimen length is measured.

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

5. Significance and Use

5.1 Fabric stretch and fabric growth are useful in selection of fabrics that are required to stretch, but also recover to their original shape.

5.1.1 In apparel, fabric stretch can be caused by a variety of factors. A momentary stress occurs when a fabric is required to accommodate movement, such as sportswear and other loose-fitting apparel (also known as comfort stretch apparel) or external stress such as grabbing and pulling. Additionally, comfort apparel can be subjected to prolonged stress, such as stretching to accommodate positions such as sitting. Another example of prolonged stress occurs when a fabric is required to stretch to accommodate fitting the form of the body, such as swimwear, anchored slacks, and other form-fitting apparel (also known as semi-support apparel).

5.1.2 Fabric growth can also be in response to a variety of stresses. This method evaluates fabric growth due to exposure to prolonged stresses. In form-fitting apparel, fabric growth can apply as garments are worn for a prolonged period of time or under long periods of stress such as sitting. Upon removal of garments or stress, its growth can be seen and evaluated.

5.2 This test method is not recommended for acceptance testing of commercial shipment because the between-laboratory precision is known to be poor.

5.2.1 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, ensure the test samples to be used are as homogeneous as possible, are drawn from the material from which the disparate test results are obtained, and are assigned randomly in equal numbers to each laboratory for testing. The test results from the two laboratories should be compared using a statistical test for unpaired data, at a probability level chosen prior to the testing series. If a 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

6.1 *Frame*, suitable for supporting the hanger assembly and tension forces applied during testing.

6.2 *Hanger Assembly*, consisting of hangers, hanger rods, and chain. One suitable hanger assembly is shown in Fig. 1. Other commercially available hanger assemblies may be used.

6.3 *Lightweight Rule*, fitted with a pin hook at the zero point of the scale for attachment to the specimen, graduated either in units of percent of original gage length of 125 mm [5 in.] or in units of 1 mm [$1/16$ in.].

6.4 *Tensiometer or Weights*, that can be attached to the bottom hanger of the hanger assembly, capable of providing total tensions of 2.27 kgf [5 lbf] and 4.54 kgf [10 lbf] to the specimen, ± 1 %.

6.5 *Turnbuckle*, or equivalent, having a length of 25 to 75 mm [1 to 3 in.].

6.6 *Sanforized Marker*, to establish bench marks on the specimen.

6.7 *Timer*, with increments of at least 1 min.

7. Sampling and Test Specs

7.1 *Primary Sampling Unit*—Consider rolls of fabric, fabric components of fabricated systems, or garments to be the primary sampling unit, as applicable.

7.2 *Laboratory Sampling Unit*—As a laboratory sampling unit take from rolls at least one full-width piece of fabric that is 2 m [2 yd] in length along the selvage (machine direction), after removing a first 1 mm [1 yd] length. For fabric components of fabricated systems use the entire system. For garments use the entire garment.

7.3 *Test Specimens*—From each laboratory sampling unit, cut 6 wale-wise (lengthwise) and 6 course-wise (widthwise) test specimens 125 ± 3 mm [5 ± 0.1 in.] by 400 ± 10 mm [15.5 ± 0.3 in.]. Cut the long dimension of the wale-wise specimens parallel to the wale direction and the course-wise specimens parallel to the course direction. In cases where the

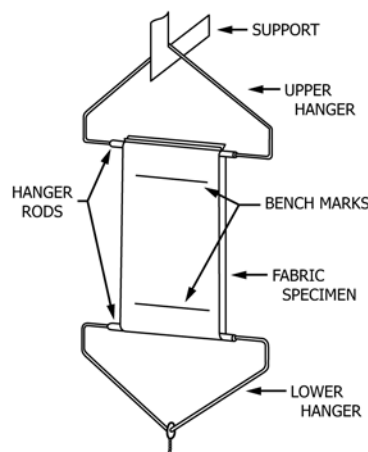


FIG. 1 Hanger Assembly