



Designation: D1059 – 01

Standard Test Method for Yarn Number Based on Short-Length Specimens¹

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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 yarn number of all types of cotton, woolen, worsted, and man-made fiber yarns taken from packages; or from any textile fabrics in which the yarns are intact and can be removed in measurable lengths. The test method is not applicable to yarns taken from napped or cut pile fabrics. Because this method is based on short-length specimens, the results should only be considered as approximations of yarn number.

NOTE 1—For a more precise procedure for the determination of yarn number, refer to Test Method D1907.

NOTE 2—The following additional methods for the determination of yarn number have been approved for yarns made from specific fibers: Specifications D541, D578, and D681.

1.2 This test method is applicable to yarns which stretch less than 5 % when tension on yarn is increased from 0.25 to 0.75 cN/tex (0.25 to 0.75 gf/tex). By mutual agreement it may be adapted to yarns which stretch more than 5 % by use of tension lower than that specified in the method for elastomers or use of tension higher than that specified in the method to pull the crimp out of textured yarns.

1.3 The values stated in SI units are to be regarded as standard; the values in inch-pound units are reported as information only.

1.4 *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 and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards*:²

D123 Terminology Relating to Textiles

D541 Specification for Single Jute Yarn

D578 Specification for Glass Fiber Strands

D629 Test Methods for Quantitative Analysis of Textiles

D681 Specification for Jute Rove and Plied Yarn for Electrical and Packing Purposes

D1423 Test Method for Twist in Yarns by Direct-Counting

D1776 Practice for Conditioning and Testing Textiles

D1907 Test Method for Linear Density of Yarn (Yarn Number) by the Skein Method

D2258 Practice for Sampling Yarn for Testing

3. Terminology

3.1 *Definitions*:

3.1.1 *cotton count, n*—an indirect yarn numbering system generally in the cotton system equal to the number of 840-yd lengths of yarn per pound.

3.1.2 *cut, n*—in asbestos and glass yarns, the number of 100-yd lengths of yarn per pound; an indirect yarn numbering system.

3.1.3 *cut, n*—in wool yarns, the number of 300 yd lengths of yarn per pound; an indirect yarn numbering system.

3.1.4 *denier, n*—a unit of linear density, equal to the mass in grams per 9000 m of fiber yarn, or other textile strand that is used in direct yarn numbering system. (See also *linear density*.)

3.1.5 *direct yarn numbering system, n*—a system that expresses yarn linear density (number). (See also *denier, spynle number, and tex*.)

3.1.6 *grex, n*—an obsolete direct numbering system for fiber yarn, or other textile strand equal to the mass in grams per 10 000 m. (See also *linear density*.)

3.1.7 *indirect yarn numbering system, n*—a system that expresses yarn as the reciprocal linear density (number). (See also *cotton count, metric count, worsted count, cut, and run*.)

3.1.8 *lea, n*—in cotton yarns, the number of 120-yd lengths of yarn per pound; an indirect yarn numbering system.

3.1.9 *lea, n*—in linen yarns, the number of 300-yd lengths of yarn per pound; an indirect yarn numbering system.

3.1.10 *linear density, n*—for fiber and yarn, mass per unit length.

3.1.11 *metric count, n*—an indirect yarn numbering system for sliver roving, and yarn, equal to the number of 1000 m per kilogram.

¹ This test method is under the jurisdiction of ASTM Committee D13 on Textiles and is the direct responsibility of Subcommittee D13.58 on Yarns and Fibers.

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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.

3.1.12 *run, n*—in the American woolen system, the number of 1600-yd lengths of yarn per pound; an indirect yarn numbering system generally used for yarns spun on the woolen system.

3.1.13 *tex, n*—the unit of linear density, equal to the mass in grams of 1000 metres of fiber, or other textile strand that is used in a direct yarn numbering system. (See also *linear density and direct yarn numbering system*.)

3.1.14 *typp, n*—an obsolete indirect yarn numbering system equal to the number of 1000-yd lengths per pound.

3.1.15 *worsted count, n*—an indirect yarn numbering system in the worsted system equal to the number of 560-yd lengths per pound.

3.1.16 *yarn number, n*—a measure of the linear density of a yarn expressed as “mass per unit length,” or “length per unit mass” depending upon the yarn numbering system used. (Syn. *yarn count*.) (See *yarn numbering system*.)

3.1.17 *yarn numbering system, n*—a system that expresses the size of a yarn as a relationship between its length and associated mass. (See *direct yarn numbering system* and *indirect yarn numbering system*.)

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

4. Summary of Test Method

4.1 Specimens of prescribed length, usually 1 m (1.1 yd) or less, are cut from a conditioned sample, which is under prescribed tension, and weighed. The yarn number is calculated from the mass and the measured length of the yarn.

5. Significance and Use

5.1 This is a quick method used for the determination of the approximate yarn number of short-length specimens taken from packages or fabrics.

5.2 Because any error present in the reported length of the specimen is multiplied many times when calculating the theoretical yarn number using Eq 2 or Eq 3, it is extremely important that the length be measured as precisely as practicable.

5.3 For the analysis of fabrics, this test method is adequate for estimating the approximate yarn number of the yarn used to weave or knit the fabric, but the results obtained by this method may not agree with the nominal yarn number of the yarns actually used to make the fabric because of the changes in the yarn number produced by the weaving or knitting operations, the finishing treatments, and the dissecting operations. This test method is suitable for the evaluation of yarns as they occur in the finished fabric, when that information is needed.

5.4 The yarn number obtained from short lengths taken from packages should not be expected to agree exactly with the values obtained by the use of the more precise methods of determining the yarn number included in Test Method **D1907**. If a sufficient number of consecutive specimens were tested, however, a close agreement with Option 1 of Test Method **D1907** can be expected.

5.5 This method is designed to measure the yarn number of the single yarns present as a component of a plied yarn and the yarn number of the original single yarns used to produce a high twist yarn for a crepe fabric.

5.6 This method is not recommended for acceptance testing because of the short lengths used. In some cases, the purchaser and the supplier may have to test a commercial shipment of one or more specific materials by the best available method, even though the method has not been recommended for acceptance testing of commercial shipments.

5.6.1 In such a case, if there is a disagreement arising from the differences in values reported by the purchaser and supplier when using this method for acceptance testing, the statistical bias, if any, between the laboratory of the purchaser and the laboratory of the supplier should be determined with each comparison being based on testing specimens randomly drawn from one sample of material of the type being evaluated.

6. Apparatus

6.1 *Twist Tester*, equipped with a tension device and means of measuring the change in length of the specimen due to untwisting, as specified in Test Method **D1423**.

6.2 *Length Measuring Device*—A tape or scale measuring at least 1.00 m (1.1 yd) in length, graduated in millimetres, and with two clamps, one adjustable, to permit measuring various lengths of yarn up to and including 1 m (1.1 yd). The scale should be accurate to 1 part in 1000. Means should be provided for applying a specified tension to the specimen and for cutting it without damaging the scale.

6.3 *Razor-Edge Craft Knife, or Sharp Pointed Scissors or Equivalent*.

6.4 *Tensioning Weights*, accurate to 1 part in 100.

6.5 *Balance*, capable of weighing to within 0.1 % of the specimen mass.

6.6 *Dissecting Needle, Scribe, or Stylus*, (hereafter needle).

6.7 *Auxiliary Equipment for Raveling Tricot Fabric*:

6.7.1 *Metal Clamps*, four to six (1 to 5 g depending on the mass per unit area of the tricot fabric).

6.7.2 *Sharp Pointed Scissors*.

6.7.3 *Tweezers*.

6.7.4 *Magnifying Glass*, 3 to 5 \times , preferably equipped with light

6.7.5 *Stereomicroscope*, 10 to 60 \times , optional.

6.8 *Masking Tape*.

6.9 *Test (or Specimen) Board*—of a stiff material, such as cardboard, covered with a short pile fabric (for example, velvet, velveteen, or a plush or napped surface).

7. Sampling

7.1 *Lot Sample*—As a lot sample for acceptance testing, take at random the number of shipping containers directed in an applicable material specification or other agreement between the purchaser and the supplier, such as an agreement to use Practice **D2258**.

7.2 *Laboratory Sample*—As laboratory sample for acceptance testing, proceed as follows:

7.2.1 For packages such as cones, spools, or bobbins, take a total number of packages as directed in Section 7 of Test Method **D1907**.

7.2.2 For beams, remove 1.5 m (1.5 yd) of yarn from all ends across the beam. Handle carefully to avoid tangling. Secure the ends of the sample yarns by sandwiching them at the ends with strips of masking tape.