



Standard Tolerances for Yarns Spun on the Cotton or Worsted Systems¹

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1. Scope

1.1 These tolerances are applicable to all yarns spun on the cotton or the worsted system, either carded or combed, and composed of any fiber or mixture of fibers, except cotton tire cords and novelty or fancy yarns.

1.2 These tolerances are applicable only to yarns taken from packages, and not to yarns taken from greige or processed fabrics.

NOTE 1—For tolerances for other spun yarns, see Tolerances [D2644](#), Methods [D179](#) and [D738](#), and Specifications [D541](#) and [D681](#).

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 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](#)

[D179 Methods of Testing Cotton Tire Cords and Cord Fabrics Made from Cotton](#) (Withdrawn 1974)³

[D541 Specification for Single Jute Yarn](#) (Withdrawn 1996)³

[D681 Specification for Jute Rove and Plied Yarn for Electrical and Packing Purposes](#) (Withdrawn 2000)³

[D738 Methods of Testing and Tolerances for Rope Made from Bast and Leaf Fibers](#) (Withdrawn 1971)³

[D1422 Test Method for Twist in Single Spun Yarns by the Untwist-Retwist Method](#)

[D1423 Test Method for Twist in Yarns by Direct-Counting](#)

[D1578 Test Method for Breaking Strength of Yarn in Skein Form](#)

[D1907 Test Method for Linear Density of Yarn \(Yarn Number\) by the Skein Method](#)

[D2255 Test Method for Grading Spun Yarns for Appearance](#)

[D2256 Test Method for Tensile Properties of Yarns by the Single-Strand Method](#)

[D2257 Test Method for Extractable Matter in Textiles](#)

[D2258 Practice for Sampling Yarn for Testing](#)

[D2494 Test Method for Commercial Mass of a Shipment of Yarn or Manufactured Staple Fiber or Tow](#)

[D2644 Tolerances for Yarns Spun on the Woolen System](#)

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

3. Terminology

3.1 For all terminology relating to [D13.58](#), Yarns and Fibers, refer to Terminology [D4849](#).

3.1.1 The following terms are relevant to this standard: cotton system, tolerances, worsted system.

3.2 For all other terminology related to extiles, refer to Terminology [D123](#).

4. Sampling

4.1 Take samples as directed in the applicable material specification, or in the absence of specifications, proceed as directed in Practice [D2258](#).

5. Tolerances

5.1 *Strength*—The average breaking force of each lot shall be equal to or greater than the specified minimum.

5.2 Yarn Number:

5.2.1 The average yarn number of yarns spun on cotton system or the worsted system shall conform to the limits: specified value \pm 4.0 % of the specified value.

5.3 Twist:

5.3.1 The direction of twist in each package or end shall be S or Z, as specified.

5.3.2 In all cotton-system yarns except single yarns made of cotton, the average twist shall conform to the limits: specified value \pm 5.0 % of the specified value. In single cotton yarns, including the single yarn components of plied cotton yarns, the average twist shall conform to the limits: specified value \pm 10.0 % of the specified value. In yarns spun on the worsted system the average twist shall conform to the limits: specified value \pm 7.5 % of the specified value.

¹ These tolerances are under the jurisdiction of ASTM Committee [D13](#) on Textiles and are 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 The last approved version of this historical standard is referenced on www.astm.org.

5.4 *Extractable Matter*—The average percent extractable matter in yarns spun on the worsted system shall not exceed the following values:

	%
Oil-spun yarns	4.0
Dry-spun yarns	1.75

5.5 *Appearance*—At least 80 % of the specimens examined shall be equal in appearance to the standard for the specified grade. The remaining 20 % shall not fall below the next lower grade.

5.6 *Uniformity:*

5.6.1 *Yarns Spun on the Cotton System*—The coefficients of variation of individual observations shall not exceed the limits in **Table 1**.

5.6.2 *Yarns Spun on the Worsted System*—The average twist of the package containing the highest average twist shall not be higher than that of the package containing the lowest average twist by more than 15.0 % of the lower average.

5.7 *Commercial Mass*—In the absence of other contractual agreements, the invoice mass, that is the commercial mass as adopted in a specific branch of the textile trade, and as determined by the supplier, shall not exceed the commercial mass as determined by the purchaser, by more than 1 %. In branches of the textile trade which use the net mass as the commercial mass, the latter is subject to the same limitation.

NOTE 2—Particular attention is drawn to the results of an interlaboratory test described in Section 10 of Method **D2494**.

6. Test Methods

6.1 *Strength*—Determine the breaking force as directed in Test Method **D1578**, or Test Method **D2256**, as agreed or specified.

TABLE 1 Coefficients of Variation of Individual Observations^A

	Carded, %	Combed, %
	Yarn number	5
Breaking force, skein	8	6
Breaking force, single strand	18	16
Twist (direct-counting method)	25	22
Twist (untwist-twist, 12.5 cm (5 in.))	14	12
Twist (untwist-twist, 25.0 cm (10 in.))	12	10

^A Higher coefficients of variation than those listed may indicate either poor control of the manufacturing processes or mixed yarn from two or more production lots.

6.2 *Yarn Number*—Determine the yarn number by Test Method **D1907**, using Option 1 for cotton system yarns and Option 1, 3, or 6 for worsted-spun yarns, as agreed or specified.

6.3 *Twist*—Determine the twist as directed in Test Method **D1423**, or, by agreement (for single yarns only), Test Method **D1422**.

6.4 *Extractable Matter*—Determine the percent extractable matter as directed in Test Method **D2257**.

6.5 *Yarn Appearance*—Determine the appearance grade of yarns as directed in Test Method **D2255**.

6.6 *Mass*—Determine the net mass and, if required, the commercial mass of the shipment as directed in Test Method **D2494**.

7. Conformance

7.1 The purchaser and supplier may agree on a procedure to establish conformance, including control charts furnished by the supplier, a sequential-sampling plan, or the double-sampling plan outlined in **7.2**.

7.2 In the absence of a control-chart or sequential-sampling plan, proceed as directed in **7.2.1-7.2.3**.

7.2.1 If the test results for the lot conform to the tolerances for all characteristics specified in Section **5**, consider the lot a valid delivery.

7.2.2 If the test results for one or more characteristics do not conform to the tolerances, take a new laboratory sample from either the original lot sample or a new lot sample. Retest the lot for the characteristic(s) that did not conform to the tolerances in the first test, and average the results of the first and second samples as if the results were from one test of double the original number of specimens. If the new average(s) conform(s) to the specified tolerances, consider the lot a valid delivery.

7.2.3 If the test results obtained as directed in **7.2.2** do not conform to the specified tolerances, consider the lot a nonvalid delivery.

8. Keywords

8.1 appearance; commercial mass; cotton system; extractable matter; strand; tolerance; twist; strength; unevenness; worsted system; yarn; yarn-number

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