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An American National Standard

Standard Specification for Single Jute Yarn¹

This standard is issued under the fixed designation D 541; 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 NOTE—Section 3.4 was changed editorially in August 1988.

1. Scope

1.1 This specification includes tolerances for single jute yarns in Sections 4 through 8 and includes methods for the measurements of various properties in the Sections listed below:

Properties	Sections
Breaking Load (Strength) Single Strand	16 to 23
Matter Extractable with Organic Solvents	28 to 37
Twist	24 to 27
Yarn Number	11 to 15

NOTE 1—For tolerances and test methods for jute rove and plied yarn, refer to Specification D 681 for Jute Rove and Plied Yarn for Electrical and Packing Purposes.

1.2 The values stated in SI units are to be regarded as the standard.

1.3 The following hazards caveat pertains only to the test method portion, Sections 11, 20, 25, 26, and 33, of this specification: *This standard may involve hazardous materials, operations, and equipment. This standard does not purport to address all of the safety problems 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.* See Note 3 and Section 32.

2. Referenced Documents

2.1 ASTM Standards:

- D 76 Specification for Tensile Testing Machines for Textiles²
- D 123 Terminology Relating to Textiles²
- D 681 Specification for Jute Rove and Plied Yarn for Electrical and Packing Purposes³
- D 1233 Specification for Twine Made from Bast and Leaf Fibers³
- D 1423 Test Method for Twist in Yarns by the Direct-Counting Method⁴
- D 1776 Practice for Conditioning Textiles for Testing²
- D 2256 Test Method for Tensile Properties of Yarns by the Single-Strand Method⁴
- D 2257 Test Method for Extractable Matter in Yarns⁴

¹ This specification is under the jurisdiction of ASTM Committee D-13 on Textiles and is the direct responsibility of Subcommittee D13.15 on Bast and Leaf Fibers.

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² Annual Book of ASTM Standards, Vols 07.01 and 07.02.

³ Annual Book of ASTM Standards, Vol 07.02.

⁴ Annual Book of ASTM Standards, Vol 07.01.

D 2258 Practice for Sampling Yarn for Testing⁴

2.2 Other Standard:

U.S. Bureau of Alcohol, Tobacco, and Firearms, Title 27, Code of Federal Regulations⁵

3. Definitions

3.1 *bale (jute), n.*—a bag, sack, etc., containing packages of yarn.

3.1.1 *Discussion*—The bags are usually made of burlap material.

3.2 *breaking load, n.*—the maximum load (or force) applied to a specimen in a tensile test carried to rupture.

3.3 *extractable matter, n.*—nonfibrous material in or on a textile, not including water, which is removable by a specified solvent or solvents, as directed in a specified procedure.

3.3.1 *Discussion*—Nonfibrous material is usually oily, waxy, resinous, or polymeric in nature, but may also include other material such as protein, particularly if ethyl alcohol is used as, or in, the extracting solvent.

3.4 *tolerances, n.*—in mathematics, prescribed limits of variation for specified properties of a particular material based on observed values obtained by specified test methods and on samples that are representative of the material.

3.4.1 *Discussion*—The observed values must be obtained by specified test methods on samples that are representative of the material to be tested.

3.5 *yarn number (jute), n.*—mass per unit length of a yarn measured as the number of pounds per 13 167 m (14 400 yd), and expressed as pounds per spynle.

3.6 For definitions of other textile terms used in this standard, refer to Terminology D 123.

REQUIREMENTS

4. Yarn Number

4.1 The average yarn number shall be as specified within the following permissible variations:

Tex, mg/m	Yarn Number, lb/spynle	Permissible Variations, %
under 275	under 8	±10.0
275 and up to 415	8 and up to 12	±7.5
415 and over	12 and over	±5.0

5. Breaking Load (Strength)

5.1 The average breaking load or strength of the yarn shall

⁵ Available from Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20401.

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TABLE 1 Specimens Required Under Conditions of Known and Unknown Variability in User's Laboratory, Percent of the Average

Names of Properties	Allowable Variation (Two-Sided)	Equation for n Using a Reliable Estimate of v	No Reliable Estimate of v	
			Number of Specimens	Basis ^A
Yarn number (8 lb/spyndle)	0.100	$n = 384 \times v^2$	2	0.0700
Yarn number (14 lb/spyndle)	0.100	$n = 384 \times v^2$	8	0.140
Yarn number (22 lb/spyndle)	0.100	$n = 384 \times v^2$	8	0.140
Breaking load (strength) (8 lb/spyndle), lbf	0.200	$n = 96.0 \times v^2$	8	0.280
Breaking load (strength) (14 lb/spyndle), lbf	0.200	$n = 96.0 \times v^2$	8	0.280
Breaking load (strength) (22 lb/spyndle), lbf	0.200	$n = 96.0 \times v^2$	8	0.280

^A The percent values of v in the right hand column of Table 1 are somewhat larger than will usually be found in practice (see 9.1.1).

TABLE 2 Components of Variance as Coefficients of Variation, Percent of the Average

Names of Properties	Single-Operator Component	Within-Laboratory Component	Between-Laboratory Component
Yarn number (8 lb/spyndle)	0.0500	0.500	1.00
Yarn number (14 lb/spyndle)	0.100	1.00	1.00
Yarn number (22 lb/spyndle)	0.100	1.50	1.50
Breaking load (strength) (8 lb/spyndle), lbf	0.200	2.00	5.00
Breaking load (strength) (14 lb/spyndle), lbf	0.200	1.00	3.00
Breaking load (strength) (22 lb/spyndle), lbf	0.200	3.00	3.00

be not less than that specified.

6. Direction of Twist

6.1 The direction of twist shall be "S" or "Z," as specified.

7. Twist

7.1 The average turns per inch of yarn shall be not more than 5.0 % over or under the specified twist.

8. Total Matter Extractable with Organic Solvents

8.1 The total matter extractable from the yarn shall not vary from the specified percentage by more than ± 2.0 percentage points.

TEST METHODS

9. Number of Specimens and Sampling

9.1 *Number of Specimens*—Unless otherwise agreed upon, as when specified in an applicable material specification, take a number of specimens such that the user may expect at the 95 % probability level that the test result is no more than the amounts shown in Table 1 above or below the true average (that is, a theoretical average obtained from an infinite number of observations). Determine the number of specimens as follows.

9.1.1 *Reliable estimate of v* —When there is a reliable estimate of v based upon extensive past records for similar materials tested in the user's laboratory as directed in the method, calculate the number of specimens using the equations in Table 1 which are based on Eq 1.

$$n = t^2 v^2 / A^2 \quad (1)$$

where:

- n = number of specimens, rounded upward to a whole number,
- v = reliable estimate of the coefficient of variation of individual observations on similar materials in the user's laboratory under conditions of single-operator precision,

t = 1.960, the value of Student's t for infinite degrees of freedom, for two-sided limits, and a 95 % probability level ($t^2 = 3.842$),

A = values of allowable variations listed in Table 1, and t^2/A^2 = basis for calculations of the constants in Table 1.

9.1.2 *No Reliable Estimate of v* —When there is no reliable estimate of v for the user's laboratory, Eq 1 should not be used directly. Instead specify the fixed numbers of specimens shown in Table 1. These numbers of specimens are calculated using values of v that are listed in Table 1 and which are somewhat larger values of v than are usually found in practice. When a reliable estimate of v for the user's laboratory becomes available, the equations in Table 1, which are based on Eq 1, will usually require fewer specimens than are listed in Table 1 for the condition when there is no reliable estimate of v .

9.2 *Sampling*—For each acceptance sampling lot, ranging from ten bales to 18 000 kg (40 000 lb), take one tube package at random from each of ten bales. From each lot of less than ten bales, take ten tube packages with at least one package from each bale. For quantities larger than 18 000 kg, take one package from each 1800 kg (4000 lb) over 18 000 kg.

10. Conditioning

10.1 Precondition the laboratory sample by bringing it to approximate moisture equilibrium in the standard atmosphere for preconditioning; then bring the sample to moisture equilibrium for testing in the standard atmosphere for testing textiles as directed in Practice D 1776.

YARN NUMBER

11. Preparation of Test Skeins

11.1 Apparatus:

11.1.1 *Yarn Reel*, having a perimeter of not less than 1.37 m (1½ yd) with a tolerance of ± 0.4 %, and a distributor having a traverse of not less than 25 mm (1 in.).

11.1.2 *Balance*, having a capacity of 200 g and a sensitivity of 0.001 g.

11.2 Reeling, Preferred Method: