



Designation: D 299 – 04

Standard Specification for Asbestos Yarns¹

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1. Scope

1.1 This specification covers asbestos yarns having a minimum of 75 % asbestos fiber by mass, excluding the mass of other inorganic reinforcing strands which may be present.

1.2 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

1.3 The following safety hazards caveat pertains only to the test methods, Section 13, described in this specification: *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

- D 76 Specification for Tensile Testing Machines for Textiles
- D 123 Terminology Relating to Textiles
- D 861 Practice for Use of the Tex System to Designate Linear Density of Fibers, Yarn Intermediates, and Yarns
- D 1118 Test Method for Magnetic Rating of Asbestos Fiber and Asbestos Textiles
- D 1423 Test Method for Twist in Yarns by the Direct-Counting Method
- D 1918 Test Method for Asbestos Content of Asbestos Textiles
- D 2100 Specification for Asbestos Textiles Used for Electrical Insulating Purposes
- D 2260 Tables of Conversion Factors and Equivalent Yarn Numbers Measured in Various Numbering Systems
- D 2946 Terminology Relating to Asbestos

¹ This specification is under the jurisdiction of ASTM Committee C17 on Fiber-Reinforced Cement Products and is the direct responsibility of Subcommittee C17.03 on Asbestos-Cement Sheet Products and Accessories.

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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. Terminology

3.1 For definitions of other textile terms used in this specification, refer to Terminology D 123. For asbestos terms, refer to Terminology D 2946.

3.2 Definitions:

3.2.1 *asbestos, n*—1. *general*—a group of impure silicate minerals occurring in fibrous form. 2. *textile*—the hydrous magnesium silicate serpentine mineral designated as chrysotile, and having the empirical formula $\text{Mg}_3\text{Si}_2\text{O}_5(\text{OH})_4$.

3.2.2 *asbestos yarn construction number, n*—a system of numbers designed to show the construction, namely, the cut of the single yarn, the number of plies, and whether reinforcements are present.

3.2.2.1 *Discussion*—Yarns up to 9-cut, inclusive, have 3-digit construction numbers; the first digit indicates the cut, the second digit the number of plies, and the third digit, the number of reinforcements. Yarns of 10-cut and over have 4-digit construction numbers; the first 2 digits indicate the cut, the third digit, the number of plies, and the fourth digit, the number of reinforcements.

Yarns containing reinforcement are designated by the yarn construction number followed by the description of the reinforcing strands.

Examples:

No. 1010 yarn	10-cut, single, no reinforcement
No. 1420 yarn	14-cut, 2-ply, no reinforcement
No. 931 yarn	9-cut, 3-ply, 1 reinforcement (as specified)

When wire is the reinforcement the cut indicates the yards per pound of asbestos yarn only (mass of the wire not included). When the reinforcement is other than wire, the cut indicates the yards per pound of the complete assembly.

3.2.3 *atmosphere for testing asbestos textiles, n*—air maintained at a relative humidity of $50 \pm 2\%$ at $21 \pm 1^\circ\text{C}$.

3.2.4 *cut (asbestos), n*—the number of 100-yd lengths/lb (453.6 g) of asbestos yarn.

3.2.4.1 *Discussion*—The term “cut” represents a length-per-unit-mass unit, and is derived by cutting (dividing) 7000 grains (453.6 g) by the mass of 100 yd in grains or the mass of 91.44 m in grams of a single yarn. The number of such units expresses the number of the cut, and when multiplied by 100, indicates the nominal yards per pound (metres/kilogram).

Example 1—If 5 30-m skeins of single roving, or 150 m, weigh 45.2 g, then 201.6 m weigh 60.7 g.



Cut = 1 kg/60.7 g

= 16.47, or 16.47-cut, which is 16-cut on the light side; and $16 \times 201.6 = 3226$ m/kg, nominal.

Example 2—If 5 30-yd skeins of single yard, or 150 yd, weigh 637.5 grains, then 100 yd weigh 425 grains:

Cut = 7000/425

= 16.47, or 16.47-cut, which is 16-cut on the light side; and $16 \times 100 = 1600$ yd/lb, nominal.

The term “cut” as applied to asbestos may be defined differently in countries other than the USA.

3.2.5 ply, *n*:

3.2.5.1 The number of single yarns twisted together to form a plied yarn; also the number of plied yarns twisted together to form a cord.

3.2.5.2 The individual yarn in a plied yarn or in a cord.

3.2.5.3 One of several layers of fabric.

3.2.6 *twist, direction of, n*—the direction of twist in yarns and other textile strands is indicated by the capital letters “S” and “Z” (see Fig. 1).

3.2.6.1 *Discussion*—Yarn has “S” twist if, when the yarn is held in a vertical position, the visible spirals or helices around its central axis conform in direction of slope to the central portion of the letter “S”; and “Z” twist if the visible spirals or helices conform in direction of slope to the central portion of the letter “Z.”

When two or more yarns, either single or plied, are twisted together, the letters “S” and “Z” are used in a similar manner to indicate the direction of the last twist inserted.

The letters “S” and “Z” are also used to indicate the direction of winding or wrapping of a yarn around a wire or any other core.

4. Classification

4.1 Classes of asbestos yarn are based on their structural component as follows:

4.1.1 *Class A*—Yarn consisting of asbestos fiber or asbestos and other fiber(s).

4.1.2 *Class B*—Asbestos yarn containing wire reinforcement(s).

4.1.3 *Class C*—Asbestos yarn containing organic reinforcing strand(s).

4.1.4 *Class D*—Asbestos yarn containing nonmetallic inorganic reinforcing strand(s).

4.1.5 *Class E*—Asbestos yarn containing a combination of the reinforcing strands used in Classes B through D.

4.2 *Grade*—The grades of asbestos yarn are based on the percentage of asbestos content by mass as stated in Table 1.

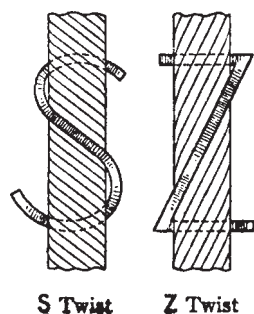


FIG. 1 Direction of Twist

TABLE 1 Grades of Asbestos Yarn

Grade	Asbestos Content, mass %
Commercial	75 up to but not including 80
Underwriters'	80 up to but not including 85
A	85 up to but not including 90
AA	90 up to but not including 95
AAA	95 up to but not including 99
AAAA	99 to 100 inclusive

5. Ordering Information

5.1 Asbestos yarn is normally purchased on the basis of yarn construction number, class, grade, amount and direction of twist, and breaking strength. Finished yarn package size is as agreed upon between the buyer and the seller.

6. Materials and Manufacture

6.1 *Roving*—Asbestos yarn shall be uniformly spun from a specified grade and cut of roving with or without reinforcement(s).

6.2 *Reinforcement(s)*— The reinforcement(s) may be inserted during the carding process, spinning process, twisting process, or combination of these.

6.3 *Wire Reinforcements*—The wire reinforcement may be brass, copper, zinc, nickel, nichrome, inconel, and monel or other metal or alloy as specified in the order.

6.4 *Organic Reinforcements*—The organic reinforcement(s) may be cotton, nylon, rayon, or other spun or filament yarn(s) as specified in the order.

6.5 *Nonmetallic Inorganic Reinforcements*—The inorganic reinforcement(s) may be glass, or other ceramic or vitreous spun or filament yarn(s) as specified in the order.

7. Chemical Composition

7.1 *Asbestos Content*— The asbestos content of the grade specified shall conform with requirements in Table 1.

7.2 *Magnetite Content*—Yarns to be used for electrical insulating purposes shall conform to the electromagnetic requirements in Specification D 2100.

7.3 *Reinforcements*— Chemical properties of the reinforcements shall meet the specifications for such materials as agreed upon the purchaser and the seller.

8. Physical Properties

8.1 *Electromagnetic Properties*—Yarn to be used for electrical insulating purposes shall conform with Specification D 2100.

8.2 *Reinforcements*— The physical properties of the reinforcements shall meet the specifications for such materials as agreed upon by the purchaser and the seller.

9. Mechanical Properties

9.1 *Tensile (Breaking) Strength*—The tensile (breaking) strength (breaking load) of asbestos yarn shall be as agreed upon by the purchaser and seller.

10. Dimensions, Mass, and Permissible Variations

10.1 The properties of asbestos yarn shall conform to the applicable material specification, subject to the following tolerances:

