



Designation: D315 – 95 (Reapproved 2004)^{ε1}

Standard Specification for Woven Asbestos Tape¹

This standard is issued under the fixed designation D315; 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.

^{ε1} NOTE—Asbestos warning was moved from 13.3 to 1.3 in September 2004.

1. Scope

1.1 This specification covers woven asbestos tape having a minimum of 75 % asbestos fiber by weight, excluding the weight of other inorganic reinforcing strands that 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 **Warning**—Breathing of asbestos dust is hazardous. Asbestos and asbestos products present demonstrated health risks for users and for those with whom they come into contact. In addition to other precautions, when working with asbestos-cement products, minimize the dust that results. For information on the safe use of chrysotile asbestos, refer to “Safe Use of Chrysotile Asbestos: A Manual on Preventive and Control Measures.”²

1.4 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. For specific hazard warning, see 1.3.*

2. Referenced Documents

2.1 ASTM Standards:³

D123 Terminology Relating to Textiles⁴

D299 Specification for Asbestos Yarns⁴

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 Available from The Asbestos Institute, http://www.chrysotile.com/en/sr_use/manual.htm.

³ 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.

⁴ Withdrawn.

D1118 Test Method for Magnetic Rating of Asbestos Fiber and Asbestos Textiles

D1682 NO TITLE⁴

D1777 Test Method for Thickness of Textile Materials

D1918 Test Method for Asbestos Content of Asbestos Textiles

D2100 Specification for Asbestos Textiles Used for Electrical Insulating Purposes

D2946 Terminology for Asbestos and Asbestos-Cement Products

D3774 Test Method for Width of Textile Fabric

D3775 Test Method for Warp (End) and Filling (Pick) Count of Woven Fabrics

3. Terminology

3.1 For definitions of other textile terms used in this specification, refer to Terminology D123. For asbestos terms, refer to Terminology D2946.

3.2 *asbestos textile, n*—the hydrous magnesium silicate serpentine mineral designated as chrysotile and having the empirical formula $\text{Mg}_3\text{Si}_2\text{O}_5(\text{OH})_4$.

4. Classification

4.1 *Classes*—The classes of asbestos tapes are based on the nature of the yarns from which they are woven.

4.1.1 *Class A*—Tape constructed of asbestos yarns containing no reinforcing standards.

4.1.2 *Class B*—Tape constructed of asbestos yarns containing wire reinforcement.

4.1.3 *Class C*—Tape constructed of asbestos yarns containing organic reinforcing strands.

4.1.4 *Class D*—Tape constructed of asbestos yarns containing nonmetallic inorganic reinforcing strands.

4.1.5 *Class E*—Tape constructed of two or more of the yarns used in tape classes A through D.

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

4.3 Types:

4.3.1 Asbestos tubing as made for the electrical industry is furnished in three types, classified on the basis of magnetic rating determined by Test Method D1118, which serve to



TABLE 1 Grades of Woven Asbestos Tape

Grade	Asbestos Content, mass %
Commercial	75 up to but excluding 80
Underwriters	80 up to but excluding 85
A	85 up to but excluding 90
AA	90 up to but excluding 95
AAA	95 up to but excluding 99
AAAA	99 to 100 inclusive

identify performance limits.

Type II Magnetic Rating 0.75 maximum

Type IV Magnetic Rating 2.00 maximum

Type VI Magnetic Rating 4.00 maximum

4.3.2 *Type II* is intended only for special applications where the asbestos is of primary importance as electrical insulation used on magnet wire and when used primarily as a dielectric.

4.3.3 *Type IV* is intended for use where the asbestos is of secondary importance as electrical insulation and where it is applied in combination with other materials of comparably higher dielectric strength, as in the construction of heat and flame resistant electrical insulating walls over unit conductors of electric cables.

4.3.4 *Type VI* is intended for use where the asbestos is of minor importance as a dielectric, as in the construction of filler or heat and flame resistant walls of electric cables or when used as a lining for control enclosures (arc chutes) subject to exposure to electric arcs.

5. Ordering Information

5.1 Woven asbestos tape is normally purchased on the basis of class, grade, type, mass per unit length (weight), width, length, and thickness as specified in the order.

5.2 Rolls of asbestos tape are normally furnished in the following lengths:

Nominal Thickness	Nominal Roll Length
Up to and including 0.75 mm (0.03 in.)	30 m (36 yd)
Over 0.75 mm (0.03 in.) up to and including 1.5 mm (1/16 in.)	30 m (100 ft)
Over 1.5 mm (1/16 in.)	15 or 30 m (50 or 100 ft)

5.3 Special roll lengths shall be as agreed upon between the buyer and seller.

5.4 At least 90 % of the number of rolls in the lots shall be furnished as one piece. No roll shall contain more than two pieces. The shortest piece shall not be less than 20 % of the specified nominal roll length.

6. Materials and Manufacture

6.1 *Yarn*—Asbestos tape shall be uniformly woven from a specified grade of asbestos yarn with or without reinforcement.

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

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

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

6.5 It is permissible to use a maximum of two ends of yarns other than asbestos in each selvage.

7. Chemical Composition

7.1 *Asbestos Content*—The asbestos content of the particular grade specified shall be in accordance with the limits stated in Table 1.

8. Physical Properties

8.1 *Electromagnetic Properties*—Tape to be used for electrical insulating purposes shall conform to the requirements in Specification D2100.

9. Mechanical Properties

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

10. Dimensions, Mass, and Permissible Variations

10.1 The physical properties of woven asbestos tape shall conform to the requirements as specified in the order, subject to the following tolerances:

10.1.1 *Width*—The width of asbestos tape shall be within the following limits:

Nominal Width	Permissible Limits
Up to and including 25.4 mm (1 in.)	±1.5 mm (0.059 in.)
Over 25.4 mm (1 in.) up to and including 75 mm (3 in.)	±2.5 mm (0.098 in.)
Over 75 mm (3 in.)	±3.0 mm (0.18 in.)

10.1.2 *Thickness*—The thickness of asbestos tape shall be within the following limits:

Nominal Thickness	Permissible Limits
Up to and including 0.75 mm (0.03 in.)	±0.05 mm (0.002 in.)
Over 0.75 mm (0.03 in.) up to and including 1.5 mm (1/16 in.)	±0.1 mm (0.005 in.)
Over 1.5 mm (1/16 in.)	+ 0.25 mm (0.01 in.) −0.1 mm (0.005 in.)

10.1.3 *Mass per Unit Length (Weight)*—The linear density (weight) of asbestos tape shall be within ±10 % of the specified mass per unit length (weight).

10.1.4 *Fabric Count*—The total number of warp ends and filling picks per 25 mm (1 in.) shall be within the following limits:

Total Warp Ends	Permissible Limits
All widths	±10 % of the specified number of ends
Picks per 25 mm (1 in.)	
20 or less per 25 mm (1 in.)	±1 pick per 25 mm (1 in.)
More than 20 per 25 mm (1 in.)	±5 % of the specified filling count.

10.1.5 *Yarn Number (Cut)*—The yarn number (cut) shall be as specified and shall conform to the requirements stated in Specification D299.

11. Sampling

11.1 From each lot of tape, take a lot sample in a random manner to be representative of the lot in accordance with the schedule in Table 2. Cut a specimen from each roll taken for test, each specimen to be the full width of the tape and at least 1.5 m (5 ft) long. The specimen may be taken from the cut end of the roll.

TABLE 2 Lot Sample Size

Number of Rolls in Lot or Shipment	Number of Rolls to Be Taken for Test
50 and under	3
51 to 100	5
101 to 250	7
251 to 500	10
501 to 700	12
701 to 1000	15
1001 rolls and over	2 % of shipment rounded off to the next higher integer

**TABLE 3 Components of Variance for the Properties Listed, as
Standard Deviations**

Property	Units	Single-Operator Interlaboratory	
		Repeatability	Reproducibility
Width	mm (in.)	0.719 (0.0283)	0.328 (0.0129)
Thickness	mm (in.)	0.043 (0.0017)	0.030 (0.0012)
Fabric count			
Warp	number	0.196	0.290
Filling	number	(0.1811)	(0.1526)
Tensile (breaking) strength (breaking load) ^A			
Warp	N (lbf)	21.8 (4.91)	71.9 (16.17)
Linear density (weight)	kg/100 m (lb/100 ft)	0.3049 (0.2049)	0.0902 (0.0606)

^A Each laboratory tensile (breaking) strength, or breaking load was on a different value level.

12. Specimen Preparation

12.1 Condition all specimens (without preconditioning) for a period of 4 h, or until the specimen shows a progressive change in mass of no more than 0.1 % after an exposure of 0.5 h, in an atmosphere having a relative humidity of 50 ± 2 % at $21 \pm 1.1^\circ\text{C}$.

13. Test Methods

MENSURATION

13.1 *Scope*—This test method covers the measurements of the width, thickness, mass per unit length (weight), and fabric count for woven asbestos tape.

13.2 *Significance and Use*—The measurements determined on woven asbestos tapes establish their suitability for use in various product applications. These dimensions constitute an important part of the information specified on purchase contracts.

13.3 *Hazards*—**Warning**—see 1.3.

13.4 *Procedure*:

13.4.1 *Width*:

13.4.1.1 Measure the width of the tape on each roll taken for test by the use of a standard steel rule graduated in millimetres ($\frac{1}{16}$ -in.) or finer divisions. Make the measurements while the tape lies flat and without tension on a smooth surface. Make five measurements at least 300 mm (1 ft) apart in each roll.

13.4.1.2 Report the average of the measurements on all rolls as the width of the lot under test.

13.4.2 *Thickness*:

13.4.2.1 Measure the thickness of the tape as directed in Method **D1777**. Use a gage having a circular pressor foot with

a nominal diameter of 9.5 mm (0.375 in.). The pressor foot and moving parts shall be weighted so as to apply a total load of 170 ± 3 g (6 ± 0.1 oz) equivalent in pressure to 23.4 kPa (3.4 psi) to the specimen. Make ten thickness measurements on a specimen from each roll taken for test distributed approximately uniformly along the specimen. Make no measurement on the selvage edge of the specimen.

13.4.2.2 Report the average of all measurements as the average thickness of the lot.

13.4.3 *Linear Density*:

13.4.3.1 From each roll taken for test, cut a specimen not less than 1.5 m (5 ft) in length and the full width of the tape, measuring the length of the specimen to the nearest 2.5 mm (0.1 in.), using a steel tape or rigid rule. Make sure that the specimen is free from tension, wrinkles, and folds. Weigh the specimen to the nearest 0.1 g (0.01 oz). Using the average length and mass, calculate the linear density (weight) in kg/100 m (lb/100 ft).

13.4.3.2 Report the average linear density (weight) in kg/100 m (lb/100 ft) as the linear density (weight) of the tape.

13.4.4 *Fabric Count*:

13.4.4.1 *Ends*—Determine the fabric count (warp yarn ends per 25 mm (1 in.) and filling yarn picks per 25 mm (1 in.) on one or more specimens from each sample roll as directed in Test Method **D3775**.

13.4.4.2 *Picks*—Report the number of picks per 25 mm (1 in.) counted to the nearest individual warp yarn and the picks per 25 mm (1 in.) calculated to the nearest filling yarn.

13.4.4.3 Report the average number of picks per inch observed for all specimens.

13.5 *Precision and Bias*—Refer to Section 14.

13.6 *Asbestos Content*:

13.6.1 Determine the asbestos content of one or more specimens from each roll taken for test as directed in Test Method **D1918**.

13.6.2 Report the average asbestos content as directed in Test Method **D1918**.

13.7 *Tensile (Breaking) Strength (Breaking Load)*:

13.7.1 Determine the breaking load, as directed in **13.7.2** and **13.7.3**. Use a specimen about 150 mm (6 in.) long and a nominal gage length of 75 mm (3 in.). Use a constant rate of traverse type tensile testing machine operated at 300 ± 10 mm (12 ± 0.5 in.)/min. If agreed upon between the buyer and seller, a constant rate of elongation machine may be used.

13.7.2 *Tapes up to and Including 40 mm (1.5 in.) Wide*—Make five tests full width in the warp direction using clamps having a nominal width of 50 mm (2 in.).

13.7.3 *Tapes over 40 mm (1.5 in.) Wide*—Test five specimens taken in the warp direction by the Grab-Method as directed in Test Methods **D1682**.

13.7.4 Report the average of the results as the breaking load of the lot tested.

14. Precision and Bias

14.1 *Interlaboratory Test Data*⁵—An interlaboratory test was run in 1974 in which randomly drawn samples of three

⁵ ASTM Research Report RR: D-13-1048 is available on loan from ASTM International Headquarters, 100 Barr Harbor Drive, West Conshohocken, PA 19380.