Designation: D2100/D2100M – 95 (Reapproved 2017)

Standard Specification for Asbestos Textiles Used for Electrical Insulating Purposes[1]

This standard is issued under the fixed designation D2100/D2100M; 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. Scope

1.1 This specification covers asbestos textile materials used for electrical insulating purposes having a minimum of 80% asbestos fiber, by mass, excluding the mass of other inorganic reinforcing material that may be present.

NOTE 1—Specifications for other asbestos textile products are covered in Specifications D299, D315, D375, D1061, and D1571.

1.2 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with the standard.

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 chrysoltile 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 10, 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 safety hazard, see 1.3.*

1.5 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*[3]

D123 Terminology Relating to Textiles
D299 Specification for Asbestos Yarns
D315 Specification for Woven Asbestos Tape
D375 Specification for Asbestos Roving
D1061 Specification for Asbestos Lap
D1118 Test Method for Magnetic Rating of Asbestos Fiber and Asbestos Textiles
D1571 Specification for Woven Asbestos Cloth
D1918 Test Method for Asbestos Content of Asbestos Textiles
D2946 Terminology for Asbestos and Asbestos–Cement Products

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 *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 $Mg_3Si_2O_5(OH)_4$.

4. Classification

4.1 *Types*—The types of asbestos textiles used for electrical insulating purposes are based on the following magnetic rating as determined by Test Method D1118:

Type	Maximum Magnetic Rating
II	0.75
IV	2.0
VI	4.0

4.2 *Grades*—The grades of asbestos textiles used for electrical insulating purposes are based on the percentage of asbestos content by mass as stated in Table 1.

4.3 *Significance of Types and Grades:*

4.3.1 The types of asbestos textiles roughly define the electromagnetic characteristics of the material. Generally, the

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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.

TABLE 1 Grades of Asbestos Textiles Used for Electrical Insulating Purposes

Grade	Asbestos Content, mass percent
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

higher the magnetic rating, the poorer the electrical insulating properties of the material. The three types have the following intended applications:

4.3.1.1 *Type II* is intended for applications where the asbestos is of primary importance, such as electrical insulation used on magnetic wire and when used principally as a dielectric.

4.3.1.2 *Type IV* is intended for use where the asbestos is of secondary importance as electrical insulation or where, as primary electrical insulation, it is applied relatively thickly usually in combination with other materials of comparably high dielectric strength, as in the construction of heat and flame-resistant electrical insulating walls over unit conductors of electrical cables.

4.3.1.3 *Type VI* is intended for use where the asbestos is of minor importance as a dielectric, as in fillers for heat- and flame-resistant cables, overall wraps or braids for such cables, and linings for enclosures subject to exposure to electric arcs (arc chutes).

4.3.2 The grade of asbestos textile used is largely dependent on the service temperature required of the insulation. Specific temperature limits for the various grades cannot be given, as these will depend on the textile construction. In general, the higher the asbestos content, the higher the temperature the textile will withstand.

NOTE 2—Where breaking strength retention is important, good serviceability at temperatures up to approximately 540°C [1000°F] can be expected using the higher grades. If breaking strength retention is not important, asbestos textiles may be used in excess of 815°C [1500°F], depending on the application.

5. Ordering Information

5.1 Asbestos textiles used for electrical insulating purposes are normally purchased on the basis of type and grade as well as the properties listed under the Ordering Information section of the ASTM specification applicable to that particular asbestos product (see Note 1).

6. Materials and Manufacture

6.1 Asbestos textiles used for electrical insulating purposes shall be free of foreign matter not normally present in textiles, which may be detrimental to performance.

7. Chemical Composition

7.1 Asbestos textiles that have been treated with materials to impact certain desirable characteristics, such as moisture resistance, flame resistance, and improved electrical insulating properties, shall conform to the requirements of this specification and also to the ASTM specification applicable to that particular asbestos treatment, either prior to treatment, or after removal of the treating material by appropriate methods.

7.2 Asbestos content shall conform to requirements in Table 1.

8. Physical Properties

8.1 The magnetic rating shall comply with requirements in 4.1.

9. Other Requirements

9.1 In addition to the requirements of this specification, asbestos textiles to be used for electrical insulating purposes shall meet the requirements of the ASTM specification applicable to that particular asbestos textile product (see Note 1).

10. Test Methods

10.1 *Magnetic Rating*—Determine the magnetic rating as directed in Test Method D1118.

10.2 *Asbestos Content*—Determine the asbestos content of specimens from each lot or unit taken for test, as directed in Test Method D1918.

11. Rejection and Rehearing

11.1 In the absence of certification, proceed as follows:

11.1.1 The buyer and the seller may agree on a procedure to establish conformance, including control charts furnished by the seller, a sequential sampling plan, or the double-sampling plan outlined in 11.1.2.

11.1.2 In the absence of a control-chart or sequential-sampling plan, proceed as directed in 11.1.2.1 through 11.1.2.3.

11.1.2.1 If the test results for the lot conform to the tolerance for all characteristics specified in Sections 6 – 9, consider the lot a valid delivery.

11.1.2.2 If the test results for one or more characteristics do not conform to the tolerance, take a new laboratory sample from either the original lot sample or a new lot sample. Test the new sample 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 all 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.

11.1.2.3 If the test results obtained as directed in 11.1.2.2 do not conform to the specified tolerances, consider the lot a nonvalid delivery.

12. Certification

12.1 When agreed upon in writing by the purchaser and the seller, a certification shall be made the basis of acceptance of the material. This shall consist of a copy of the manufacturer's test report or a statement by the seller, accompanied by a copy of the test results, that the material has been sampled, tested, and inspected in accordance with the provisions of the specification. Each certification so furnished shall be signed by an authorized agent of the seller or manufacturer.

12.2 When the product origin (original identity) cannot be established, certification can be based only on the sampling procedure provided by the applicable specification.

12.3 In the absence of certification, proceed as directed in 11.1.1 through 11.1.2.3.

13. Keywords

13.1 asbestos; asbestos textile; electrical insulation; electromagnetic; textile