Designation: D 1459 – 93 (Reapproved 2003)

An American National Standard

Standard Specification for Silicone Varnished Glass Cloth and Tape for Electrical Insulation[1]

This standard is issued under the fixed designation D 1459; 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 clear silicone varnished glass fabrics in the form of sheets, rolls, and tapes for use as electrical insulation.

1.2 The product covered by this specification shall be designed to conform to Class 180 electrical insulating materials as classified by IEEE Standard No. 1.

1.3 The values stated in inch-pound units are to be regarded as the standard except temperature which is stated in degrees celsius.

2. Referenced Documents

2.1 *ASTM Standards:*

D 902 Test Methods for Flexible Resin-Coated Glass Fabrics and Glass Fabric Tapes Used for Electrical Insulation[2]

D 1711 Terminology Relating to Electrical Insulation[2]

D 1830 Test Method for Thermal Endurance of Flexible Sheet Materials Used for Electrical Insulation by the Curved Electrode Method[2]

D 3636 Practice for Sampling and Judging Quality of Solid Electrical Insulating Materials[3]

2.2 *IEEE Standard:*[4]

No. 1 General Principles Upon Which Temperature Limits are Based in the Rating of Electric Machines and Other Equipment

3. Terminology

3.1 *Definitions:* For definitions of terms used in this standard, refer to Terminology D 1711.

4. Types

4.1 This specification covers two types of silicone varnished glass fabrics as follows:

4.1.1 *Type A*—For use where primarily electrical properties are required, and

4.1.2 *Type B*—For use where primarily physical properties are required.

5. Ordering Information

5.1 Orders for material covered by this specification shall include the following information:

5.1.1 The form and type (Sections 1 and 4),

5.1.2 The desired nominal thickness, width, and length (Section 8),

5.1.3 The number of rolls in a package (Section 15), and

5.1.4 The marking on a package (Section 15).

6. Materials and Manufacture

6.1 The glass fabric shall be treated with a baking type of silicone varnish so as to penetrate the fabric and produce a smooth, non-tacky surface, substantially free of wrinkles, creases, blisters, and other imperfections.

6.2 The material shall not be spliced. No more than two pieces shall be used in each multiple of 25 yd (23 m) of linear length in any one roll of full-width cloth, and no more than two pieces shall be used in each multiple of 36 yd (33 m) of linear length in any one roll of tape.

7. Physical Properties

7.1 *Breaking Strength*—The warp average breaking strength of the material in the warp thread direction shall be not less than that prescribed for the corresponding types and nominal thicknesses designated in Table 1.

8. Dimensional Requirements

8.1 *Thickness*—The average thickness shall not vary more than ±0.5 mil (0.013 mm) from the nominal thicknesses for specified thicknesses up to and including 5 mils (0.13 mm), and ±10 % from the nominal thickness for specified thicknesses above 5 mils.

8.2 *Width*—Full-width rolls and sheets shall be 36 ±1 in. (900 ±25 mm) in width, and shall be supplied trimmed unless otherwise specified. The width of individual tapes shall not vary more than ±1/32 in. (0.8 mm) from the specified width for

[1] This specification is under the jurisdiction of ASTM Committee D09 on Electrical and Electronic Insulating Materials and is the direct responsibility of Subcommittee D09.07 on Flexible and Rigid Insulating Materials.

Current edition approved March 10, 2003. Published April 2003. Originally approved in 1957. Last previous edition approved in 1998 as D 1459 – 93 (1998).

[2] *Annual Book of ASTM Standards*, Vol 10.01.

[3] *Annual Book of ASTM Standards*, Vol 10.02.

[4] Available from The Institute of Electrical and Electronics Engineers, Inc., 445 Hoes Lane, Piscataway, NJ 08854–1331.

TABLE 1 Dielectric and Breaking Strength Requirements

Nominal Thickness, mils (mm)	Breaking Strength, lbf/in. (N/mm) of width		Dielectric Strength, as Received V/mil (kV/mm)		Breakdown Voltage, after Bending, total, V	
	Type A	Type B	Type A	Type B	Type A	Type B
3 (0.076)	70 (12.25)	... ...	1300 (51.2)	... ...	3 700	...
4 (0.102)	70 (12.25)	... ...	1300 (51.2)	... ...	5 000	...
5 (0.127)	70 (12.25)	100 (17.51)	1300 (51.2)	1000 (39.4)	6 200	4 500
7 (0.178)	100 (17.51)	150 (26.27)	1200 (47.3)	1000 (39.4)	8 000	6 000
10 (0.254)	150 (26.27)	250 (43.79)	1100 (43.3)	450 (17.7)	10 500	4 000
12 (0.305)	150 (26.27)	250 (43.79)	1100 (43.3)	600 (23.6)	12 500	6 000
15 (0.381)	250 (43.79)	300 (52.54)	650 (25.6)	400 (15.8)	9 000	5 000
20 (0.508)	300 (52.54)	350 (61.29)	400 (15.8)	300 (11.8)	7 200	5 000
25 (0.635)	... ...	350 (61.29)	... ...	300 (11.8)	...	6 000

tapes 1½ in. (38 mm) or less in width, nor more than ±1⁄16 in. (1.6 mm) for tapes over 1½ in. in width.

8.3 *Length*—The nominal length per roll shall be as specified in the purchase order. The measured lengths of individual rolls or sheets shall be not less than that specified.

8.4 *Core*—Material in roll or tape form shall be supplied on cardboard cores the inside diameter of which shall be 1½ in. (38 mm), unless otherwise specified.

9. Thermal Requirements

9.1 Silicone varnished glass fabric shall have a temperature index at 20 000 h of 180 minimum when tested in accordance with Test Method D 1830.

10. Electrical Requirements

10.1 *Dielectric Strength (As Received)*— Minimum acceptable average values of dielectric strength, as received, are given in Table 1.

10.2 *Dielectric Breakdown (Before and After Baking*)—Use the procedure for Effect of Elevated Temperature of Test Methods D 902.

10.2.1 Minimum acceptable average dielectric breakdown voltages after bending with no baking are given in Table 1.

10.2.2 Minimum acceptable average dielectric breakdown voltages after baking and then bending are as follows:

10.2.2.1 *Type A*—85 % of the values obtained in 10.2.1,

10.2.2.2 *Type B*—25 % of the values obtained in 10.2.1 but not less than 150 V/mil (5.9 kV/mm) when the breakdown voltage obtained is converted into a dielectric strength value.

10.3 *Dissipation Factor and Permittivity (Type A only)*—Type A material shall conform to the following requirements for dissipation factor and permittivity, after conditioning for 96 h at 23°C at both 50 % and 96 % relative humidity and when tested at 23°C and at 60 Hz.

Relative Humidity %	Dissipation Factor, max	Permittivity, max
50	0.020	4.5
96	0.20	7.0

11. Sampling

11.1 Select samples in accordance with Method D 3636, using the Inspection Levels and Acceptable Quality Levels (AQL) as agreed upon between the purchaser and the supplier.

12. Test Methods

12.1 Condition and test silicone varnished glass fabric in accordance with Test Methods D 902.

12.2 Number or mark all specimens taken from a single roll so that any failures can be identified with the roll.

13. Inspection

13.1 Unless otherwise agreed upon between the purchaser and seller, the material shall be inspected and tested within 3 weeks of receipt by the purchaser.

13.2 Inspection of the material shall be agreed upon between the purchaser and the supplier as part of the purchase contract.

14. Rejection and Rehearing

14.1 Material that fails to conform to the requirements of this specification may be rejected. For purposes of this specification, the failure of any roll or sheet to meet one or more of the requirements of Sections 6 through 8 shall constitute one roll or sheet failure. Failure of 20 % or more of the rolls or sheets sampled shall constitute cause for rejection of the entire lot.

14.2 Rejection shall be reported to the producer or supplier promptly and in writing within 4 weeks after the receipt of the material, unless otherwise agreed upon.

14.3 In the case of a dispute concerning the results of the tests, the producer or supplier shall be permitted to make a claim for a rehearing.

15. Packaging and Package Marking

15.1 The purchaser shall specify the number of rolls or sheets in each package and whether the rolls or packages or both shall be sealed with a moisture-resistant wrap or coating. The wrapping shall be secure and shall protect the contents.

15.2 The purchaser shall specify the marking to be applied to each package. In the absence of specific instructions, the packages shall be marked in accordance with acceptable industry practice.

16. Keywords

16.1 electrical insulation; glass cloth tape; silicone varnished glass fabric