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Standard Specification for Rubber Insulating Sheeting[1]

This standard is issued under the fixed designation F2320; 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 testing of rubber insulating sheeting for use as a covering for the protection of workers from accidental contact with live electrical conductors, apparatus, or circuits.

1.2 Two types of sheeting, differing in chemical and physical characteristics, are provided and are designated as Type I, non-resistant to ozone and Type II, resistant to ozone.

1.3 Six classes of sheeting, differing in electrical protection characteristics are provided and designated as Class 00, Class 0, Class 1, Class 2, Class 3, Class 4.

1.4 Two styles of sheeting, differing in construction characteristics, are provided and are designated as Style A and Style B.

1.5 The follow safety hazards caveat applies only to the test method portion, Sections 17-19, of 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 requirements prior to use.*

NOTE 1—Rubber Insulating Sheeting should remain flexible for use through normal temperature ranges.

NOTE 2—Rubber as used in this specification is a generic term that includes elastomers and elastomeric compounds, regardless of origin.

2. Referenced Documents

2.1 *ASTM Standards:*[2]

D149 Test Method for Dielectric Breakdown Voltage and Dielectric Strength of Solid Electrical Insulating Materials at Commercial Power Frequencies

D412 Test Methods for Vulcanized Rubber and Thermoplastic Elastomers—Tension

D471 Test Method for Rubber Property—Effect of Liquids

D518 Test Method for Rubber Deterioration—Surface Cracking (Withdrawn 2007)[3]

D570 Test Method for Water Absorption of Plastics

D751 Test Methods for Coated Fabrics

D1048 Specification for Rubber Insulating Blankets

D1149 Test Methods for Rubber Deterioration—Cracking in an Ozone Controlled Environment

D1388 Test Method for Stiffness of Fabrics

D2136 Test Method for Coated Fabrics—Low-Temperature Bend Test

D2240 Test Method for Rubber Property—Durometer Hardness

2.2 *Other Standards:*

MVSS 302 Motor Vehicle Safety Standard 302 Flammability of Interior Materials[4]

UL 214 Standard for Tests for Flame-Propagation of Fabrics and Films[5]

ANSI C84.1 Voltage Ratings for Electric Power Systems and Equipment (60 Hz)[6]

3. Terminology

3.1 *Definitions:*

3.1.1 *user*—the entity employing the actual worker(s) utilizing the equipment; if no separate employer, then the individual.

3.1.2 *voltage, maximum use*—the ac voltage (rms) classification of the protective equipment that designates the maximum nominal design voltage of the energized system that may be safely worked. The nominal design voltage is equal to phase-to-phase voltage on multiphase circuits.

3.1.2.1 *Discussion*—If there is no multiphase exposure in a system area, and the voltage exposure is limited to phase (polarity on dc systems) to ground potential, the phase (polarity on dc systems) to ground potential shall be considered to be the nominal design voltage.

[1] This specification is under the jurisdiction of ASTM Committee F18 on Electrical Protective Equipment for Workers and is the direct responsibility of Subcommittee F18.25 on Insulating Cover-Up Equipment.

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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] The last approved version of this historical standard is referenced on www.astm.org.

[4] Available from the U.S. Department of Transportation, 400 7th Street SW, Room 6111, Mail Code: NSA-30, Washington, DC 20590.

[5] Available from Underwriters Laboratories (UL), Corporate Progress, 333 Pfingsten Rd., Northbrook, IL 60062.

[6] Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036.

3.1.2.2 *Discussion*—If the electrical equipment and devices are insulated or isolated or both, such that the multiphase exposure on a grounded wye circuit is removed, then the nominal design voltage may be considered as the phase-to-ground voltage on that circuit.

3.1.3 *voltage, nominal design*—a nominal value consistent with the latest revision of ANSI C84.1, assigned to the circuit or system for the purpose of conveniently designating its voltage class.

4. Significance and Use

4.1 This specification covers the minimum electrical, chemical and physical properties guaranteed by the manufacturer and the detailed procedures by which such properties are to be determined. The purchaser may as his/her option, perform or have performed any of these tests in order to verify the guarantee. Claims for failure to meet the specification are subject to verification by the manufacturer.

4.2 Rubber Insulating Sheeting is used for personal protection; therefore, when authorizing its use a margin of safety shall be allowed between the maximum voltage at which it is used and the proof-test voltage at which it is tested. The relationship between proof-test and the maximum voltage at which Sheeting shall be used is shown in Table 1.

4.3 Work practices vary from user to user, depending upon many factors. These factors may include, but are not limited to operating system voltages, design, work procedures and techniques, weather conditions, etc. Therefore, except for the restrictions set forth in this specification because of design limitations, the use and maintenance of the equipment is beyond the scope of this specification.

4.3.1 It is common practice and the responsibility of the user of this type of protective equipment to prepare complete instructions and regulations to govern the correct and safe use of such equipment.

5. Classification

5.1 Sheeting covered under this specification shall be designated as Type I or Type II: Class 00, Class 0, Class I, Class 2, Class 3, or Class 4; Style A or Style B.

5.1.1 *Type I,* non-resistant to ozone, made from any elastomer or combination of elastomeric compounds of natural or synthetic origin.

5.1.2 *Type II,* ozone resistant, made from any elastomer or combination of elastomeric compounds of natural or synthetic origin, which may include one or more of the following special properties:

A—Flame Resistance
B—Oil Resistance

5.1.3 The class designation is based on the electrical properties as shown in Tables 1-3.

5.1.4 *Style A,* constructed of the elastomers indicated under Type I or Type II, shall be free of any reinforcements.

5.1.5 *Style B,* constructed of the elastomers indicated under Type I or Type II, shall incorporate a reinforcement or reinforcements; this shall not adversely affect the dielectric characteristics of the sheeting.

6. Ordering Information

6.1 Orders for Rubber Insulating Sheeting under this specification should include the following information:

6.1.1 Type,
6.1.2 Class,
6.1.3 Width,
6.1.4 Length, and
6.1.5 Style.

6.2 The listing of types, classes, widths, length and styles is not intended to mean that all shall necessarily be available from manufacturer; it signifies only that, if made, they shall conform to the detail of this specification.

7. Manufacture and Marking

7.1 The sheeting shall consist of a rubber compound with a surface free of harmful physical irregularities, as defined in 11.1, and may have one or more fabric inserts. Any such fabric insert shall not affect adversely the dielectric characteristics of the sheeting.

7.2 The sheeting shall be marked clearly and permanently at a maximum interval of 0.33 m (1ft) with the name of the manufacturer or supplier, ASTM (this specification#), Type, and Class.

TABLE 1 Proof Test/Use Relationship

Class of Insulating Sheeting	Maximum AC Use Voltage ms,V[A] Phase-Phase ac rms, max	AC Proof-Test Voltage, rms V	Maximum DC Use Voltage, avg, V	DC Proof-Test Voltage, avg V
00	500	2500	750	10 000
0	1000	5000	1500	20 000
1	7500	10 000	11 250	40 000
2	17 000	20 000	25 500	50 000
3	26 500	30 000	39 750	60 000
4	36 000	40 000	54 000	70 000

[A] Except for Class 00 and 0 equipment, the maximum use voltage is based on the following formula: maximum use voltage (maximum nominal design voltage) = 0.95 ac proof-test voltage–2000.

TABLE 2 AC Electrical Test Requirements

Class	AC Electrode mm	Clearances min[A] in.	Proof Test Voltage rms V	Dielectric Breakdown Test Voltage rms V
00	76	3	2500	4000
0	76	3	5000	6000
1	76	3	10 000	20 000
2	127	5	20 000	30 000
3	178	7	30 000	40 000
4	254	10	40 000	50 000

[A] These nominal clearances are intended to avoid flashover and may be increased from the standard of 100 kPa (1 atm) barometric pressure and average humidity by no more than 51 m (2 in.) when required by change in atmospheric conditions. These clearances may be decreased if atmospheric conditions permit.

TABLE 3 DC Electrical Test Requirements

Class	DC Electrode mm	Clearances min[A] in.	Proof Test Voltage[B] rms V	Dielectric Breakdown Test Voltage rms V
00	76	3	10 000	13 000
0	76	3	20 000	35 000
1	76	3	40 000	60 000
2	152	6	50 000	70 000
3	203	8	60 000	80 000
4	305	12	70 000	90 000

[A] These nominal clearances are intended to avoid flashover and may be increased from the standard of 100 kPa (1 atm) barometric pressure and average humidity by no more than 51 mm (2 in.) when required by change in atmospheric conditions. These clearances may be decreased if atmospheric conditions permit.
[B] DC Proof Test voltages were determined using negative polarity.

8. Chemical and Physical Requirements

8.1 Insulating Sheeting shall conform to the applicable chemical and physical requirements in Table 4.

9. Electrical Requirements

9.1 The entire length when new (unused) shall withstand the 60-Hz ac proof-test voltage (rms value), Table 2 or the dc proof-test (average value) specified in Table 3. The test voltage shall be applied continuously for at least 3 min.

9.2 The sheeting material, when tested between 50-mm (2 in.) disk electrodes with edges rounded to a radius of 6 mm (0.25 in.), shall show a 60-Hz dielectric strength of not less than the value shown in Table 2, when tested in accordance with 18.4.

10. Dimensions and Permissible Variations

10.1 *Width*—Standard width shall be 914 ± 25 mm (36 ± 1 in.)

10.2 *Thickness*—The thickness of the sheeting shall be as specified in Table 5.

11. Workmanship and Finish

11.1 The sheeting shall be free of harmful physical irregularities, which can be detected by a thorough test or inspection.

11.1.1 Harmful physical irregularities may be defined as any feature that disrupts the uniform surface and represents a potential hazard to the user, such as pinholes, cracks, blisters, cuts, conductive imbedded foreign matter creases, pinch marks, voids (entrapped air), and prominent ripples.

TABLE 4 Physical Requirements for Sheeting

	Type I		Type II	
	Style A	Style B	Style A	Style B
Tensile strength, min Mpa(psi)	4.83 (700)	4.83 (700)	4.83 (700)	4.83 (700)
Resistance to Accelerated heat-aging, max. loss warp and fill %[A]	20	20	20	20
Bursting Strength, min, Mpa (psi)	1.72 (250)	1.72 (250)	1.72 (250)	1.72 (250)
Tear Resistance, Min., N (lb)				
Warp	1.3 (6)	1.3 (6)	1.3 (6)	1.3 (6)
Fill	1.3 (6)	1.3 (6)	1.3 (6)	1.3 (6)
Low temperature Resistance[B]	No Cracking	No Cracking	No Cracking	No Cracking
Puncture resistance, min KN/m (lbf/in.)	18 (100)	29 (150)	18 (100)	18 (100)
Moisture absorption, max Increase[C] %	3	3	3	3
Flame resistance, Type II A				
Horizontal	N/A	N/A	Self-Extinguishing	Self-Extinguishing
Vertical	N/A	N/A	Pass	Pass
Ozone resistance, Type II[D] Bent Loop	N/A	N/A	No Cracking	No Cracking
Oil resistance, max, volume Increase,[E] % Type II B	N/A	N/A	4	4
Elongation, min %	500	500	500	500
Tension set, max, mm (in.)	6.4 (0.25)	6.4 (0.25)	6.4 (0.25)	6.4 (0.25)
Drape Stiffness, max at 25°C (77°F), min (in.)	89 (3.5)	89 (3.5)	89 (3.5)	89 (3.5)
Drape Stiffness, max at -10° (14°F), mm (in.)	110 (4.5)	110 (4.5)	110 (4.5)	110 (4.5)
Flex Stiffness, max at 25°C (77°F), N·m (in.·lbf)	0.028 (0.25)	0.028 (0.25)	0.028 (0.25)	0.028 (0.25)
Flex Stiffness, max at -10°C (14°F), N·m (in.·lbf)	0.034 (0.30)	0.034 (0.30)	0.034(0.30)	0.034 (0.30)

[A] 70°C (158°F) for 7 days.
[B] -40°C (-40°F) for 4 h.
[C] Distilled water 23°C (75°F).
[D] 50 pph for 3 h 40°C.
[E] ASTM Oil No. 2 room temperature for 24 h.

TABLE 5 Thickness Measurement

Class	Thickness	
	mm	in.
00	0.45 to 0.56	0.018 to 0.022
0	0.75 to 1.02	0.030 to 0.040
1	0.90 to 1.50	0.035 to 0.059
2	2.40 to 3.20	0.094 to 0.126
3	2.80 to 3.60	0.100 to 0.142
4	3.05 to 4.05	0.100 to 0.159

11.2 *Nonharmful Irregularities*—Surface irregularities or imperfections may be present on all rubber sheeting due to inherent difficulties in the manufacturing process. These irregularities or imperfections may appear as indentations, protuberances, or imbedded foreign material that are acceptable provided that:

11.2.1 The indentation or protuberance tends to blend into a smooth slope upon stretching of the material. The rubber thickness at any irregularity conforms to the thickness requirements.

11.2.2 The rubber thickness at any irregularity conforms to the thickness requirements.

11.2.3 Foreign material remains in place when the sheeting is bent and stretches equally with the material surrounding it.

12. Guarantee

12.1 The manufacturer or supplier shall replace without charge to the purchaser, unused sheeting which, at any time within a period of (12) months from date of initial delivery of shipment to the purchaser or his/her designee, fails to pass the tests in this specification. The guarantee will be binding on the manufacturer or supplier only if the sheeting has been properly stored and has not been subjected to more than an original acceptance test and one retest.

12.2 Any acceptance test made by the purchaser, or the purchasers designee, shall be performed within the first two (2) months of the guarantee period unless otherwise specified.

NOTE 3—Proper storage means that the sheeting is stored without distortion, and not stored directly above or in proximity to steam pipes, radiators, or other sources of artificial heat, or exposed to direct sunlight or sources of ozone. It is desirable that the ambient storage temperature not exceed 36°C (95°F).

13. Sampling

13.1 Each roll of sheeting in a lot or shipment shall be subject to inspection and test to meet the requirement of Sections 7, 9.1, 11 and 15.

13.2 An original sample of one roll or 1 % of the lot or shipment, whichever is greater, shall be selected at random from the lot or shipment for the test requirements of 9.2 and Sections 8 and 15. If a failure occurs in the first sample, a second sample of the same quantity shall be selected and tested. A sufficient amount of material shall be cut from the end of a roll or rolls selected from the lot for the test.

14. Rejection

14.1 Individual rolls shall be rejected if they fail to meet the manufacturing and marking requirements of Section 7, the electrical requirements of Section 9, the width requirements of 10.1, the thickness requirements of 10.2, or the workmanship requirements of Section 11.

14.2 The entire lot or shipment of sheeting shall be rejected under any of the following conditions:

14.2.1 If 5 % or more of the sheeting in a shipment fails to meet the requirements of 9.1.

14.2.2 If two dielectric breakdowns that do not meet the dielectric strength value specified in 9.2 occur in five tests on the specimen.

14.2.3 If one dielectric breakdown of five tests on the original and one or more dielectric breakdowns of five tests on an additional specimen fail to meet the dielectric strength value specified in 9.2.

14.2.4 If the coating sample specimens of Type II sheeting, using the sampling methods and criteria specified in 19.1.1.1-19.1.1.3 fail to meet the ozone resistance requirements of 9.2.

14.2.5 *(If Applicable)*—If the coating sample specimens of Type II sheeting using the sampling methods and criteria specified in 19.1.3 fail to meet the oil resistance requirements of Table 4.

14.2.6 *(If Applicable)*—If the Sheeting sample specimens of Type II sheeting using the sampling methods and criteria specified in 19.2.8 fail to meet the flame-resistant requirements of Table 4.

14.3 The testing shall be terminated and the manufacturer or supplier notified if, during the course of testing, 5 % or more, of the sheeting in a lot or shipment fail to meet the requirements of 9.1, 9.2 or as determined by the rejection criteria of 14.1 and 14.2. The manufacturer or supplier may in such case require the purchaser to submit proof that the test procedure and equipment conform to the appropriate paragraphs of Section 18. When such proof has been furnished, the manufacturer or supplier may request that his representative witness the testing of additional rolls from the shipment.

14.4 The entire lot or shipment of sheeting may be rejected at the option of the purchaser if two of the five specimens tested fail any of the requirements outlined in Section 8.

14.5 The entire lot or shipment of sheeting may be rejected at the option of the purchaser if 5 % of the sheeting in the lot or shipment fails to meet the requirements of Section 10 or 11.

14.6 All rejected material shall be returned unaltered except as required for sampling, as directed by the manufacturer at his or the supplier's request. However, the material punctured when tested in accordance with 9.1 or 9.2 shall be stamped, punched, or cut prior to being returned to the supplier to indicate that they are unfit for electrical use.

15. Packaging

15.1 Sheeting shall be packaged either flat or in rolls and shall not be distorted mechanically (see Fig. 1).

16. Thickness

16.1 Thickness measurements should be made on complete sheeting samples with a caliper graduated to within 0.03 m

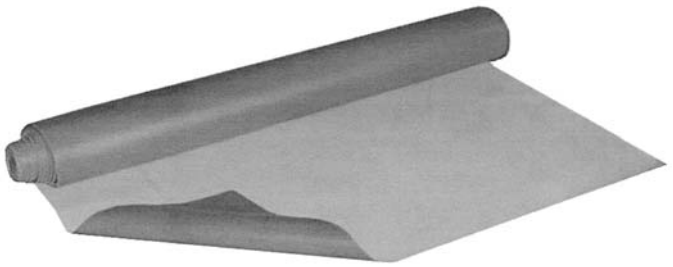

FIG. 1 Sample of Rubber Insulating Sheeting

(0.001 in.). At least five thickness measurements shall be made at selected points uniformly distributed over the test area of the sheeting.

TEST METHODS

17. Sequence of Testing

17.1 The following order of procedure is suggested for testing rubber insulating sheeting:

17.1.1 Inspection of the surface in accordance with Section 11.

17.1.2 The dimensions in accordance with Section 10 and 16.

17.1.3 Electrical proof test in accordance with the appropriate paragraphs of Section 18.

17.1.4 Breakdown voltage test in accordance with appropriate paragraphs of Section 18.

17.1.5 Physical property tests as specified in Table 4 and in accordance with Section 19.

17.1.6 Chemical and physical property test of rubber coatings as specified in Table 5 and in accordance with Section 19.

18. Electrical Tests

18.1 *Conditioning*—Prior to testing, the sheeting shall be placed in an unstressed position. (**Warning**—It is recommended that the test apparatus be designed to afford the operator full protection in the performance of his or her duties. Reliable means of de-energizing and grounding the high voltage circuit should be provided. It is particularly important to incorporate a positive means of grounding the high voltage section of the dc test apparatus due to the likely presence of high-voltage capacitance charges at the conclusion of the test.)

NOTE 4—Both ac and dc proof test methods are included in this section.

18.2 *AC Proof Test:*

18.2.1 *Electrodes*—Where electrodes are to be employed as part of the test apparatus, they shall be of such design so as to apply the electrical stress uniformly over the test area without producing corona at any point, or mechanical strain in the material. The electrodes used in proof tests shall be of such dimensions that the flashover clearances specified in Table 2 are not exceeded. A satisfactory procedure for ac proof testing utilizes electrodes that will provide intimate contact without undue pressure.

NOTE 5—Rectangular metal sheets approximately 3 mm (0.06 in.) thick, having smooth rounded edges and corners, have been found to be satisfactory for this purpose. Also satisfactory are wet felt or sponge-top electrodes.

18.2.2 *Voltage Supply and Regulation:*

18.2.2.1 The test equipment used in both the proof-test voltage and dielectric breakdown voltage tests shall be capable of supplying an essentially stepless and continuously variable voltage to the test specimen. Motor-driven regulating equipment is convenient and tends to provide uniform rate-of-rise to the test voltage. The test apparatus should be protected by an automatic circuit-breaking device designed to open promptly on the current produced by breakdown of a specimen under test. This circuit breaking device should be designed to protect the test equipment under any conditions of short circuit.

18.2.2.2 The accuracy of the voltage-measuring circuit shall be within ±2 % of specified test voltage. The correct rms value of the actual sinusoidal voltage wave-form applied to the sheeting may be measured by one of the following methods: (*1*) a voltmeter used in conjunction with a calibrated instrument transformer connected directly across the high-voltage circuit; (*2*) a calibrated electrostatic voltmeter connected directly across the high-voltage circuit; or (*3*) an ac meter connected in series with appropriate high-voltage type resistors directly across the high-voltage circuit.

18.2.2.3 The crest factor may be checked by the use of a peak-reading voltmeter connected directly across the high-voltage circuit. If the electrostatic voltmeter or an rms voltmeter in conjunction with an instrument potential transformer is connected across the high-voltage circuit, a standard sphere gap may be sparked over and the corresponding voltage compared with the reading of the rms voltmeter.

18.2.3 *Test*—The proof-test voltage shall be initially applied at a low value and then gradually increased at a constant rate-of-rise of approximately 1000 V/s ac until the prescribed test voltage level is reached, or failure occurs. The test period starts at the instant that the prescribed testing voltage is reached. Reduce the applied voltage to at least half value, unless an electrical puncture has already occurred, at the end of the test period before opening the test circuit.

18.3 *DC Proof Testing:*

18.3.1 The dc proof-test may be made with dry electrodes that consist of two flat metallic plates, at least one of which is sized so that the flashover distances recommended in Table 3 are not exceeded. The edges of these plates should be rounded to eliminate sharp nicks and protuberances.

18.3.2 *Voltage Supply and Regulation:*

18.3.2.1 The dc proof-test voltage shall be obtained from a dc source capable of supplying the required voltage. The peak-to-peak ac ripple component of the dc proof-test voltage shall not exceed 2 % of the average voltage value under no-load conditions.

18.3.2.2 The dc proof-test voltage shall be measured by a method that provides the average value of the voltage applied to the sheeting. It is recommended that the voltage be measured by the use of a dc connected in series with an appropriate low-voltage circuit. An electrostatic voltmeter of proper range may be used in place of the dc meter-resistor combination. The accuracy of the voltage measuring circuit shall be within ±2 % of specified test voltage.

18.3.3 *Procedure*—The procedure shall be the same as the ac proof test, except that the rate-of-rise shall be approximately 3000V/s dc.

18.4 *Dielectric Breakdown Test*—The dielectric breakdown test shall be performed in accordance with Test Method D149. The voltage should be applied at a rate of 3000 V/s under the short-time procedure. The specimen shall be representative of the sheeting material to be tested. Sufficient material shall be available to permit performing five tests.

19. Chemical and Physical Tests

19.1 *Chemical Tests:*

19.1.1 *Ozone Resistance Test*—The ozone test of the coating shall be made in accordance with one of the following methods to ensure conformance of Type II sheeting with the requirements of Table 4.

19.1.1.1 *Method 1*—The ozone resistance test shall be made in accordance with Test Method D1149. Samples shall be prepared in accordance with Test Method D518, Specimen B (Bent Loop). A temperature of 40°C (104°F) shall be maintained. The ozone concentration shall be maintained at 500 ± 50 mm^3/m^3 (50 ± 5 pphm) by volume for a 3-h test period. No cracking from ozone exposure during this test period shall be visible.

19.1.1.2 *Method 2*—See Method A, Specification D1048, section 18.6.1.

19.1.1.3 *Method 3*—See Method B, Specification D1048, section 18.6.2.

19.1.2 The moisture absorption of the coating shall be performed in accordance with Test Method D570 using the 24-h immersion procedure at a temperature of 23°C (75°F).

19.1.3 The oil resistance of the coating in Type II shall be performed in accordance with Test Method D471.

19.2 *Physical Tests:*

19.2.1 Physical tests should be performed to determine the physical requirements specified in 8.1. The sheeting samples should be conditioned by storing in a flat position for 24 h at room temperature.

19.2.2 The tensile strength of the sheeting shall be performed in accordance with Procedure A, Grab Test Methods D751.

19.2.3 The tensile strength, tension set, and the elongation of the coating shall be performed in accordance with Test Methods D412.

19.2.4 Bursting Strength of the sheeting shall be in accordance with Diaphragm Burst Test Methods D751.

19.2.5 Low Temperature Resistance of the sheeting shall be determined using Test Method D2136. Exposure time shall be 4 h at -40°C (-40°F) before performing the test.

19.2.6 Tear resistance of the sheeting shall be performed in accordance with Procedure B, Tongue Tear Test Methods D751.

19.2.7 The resistance to accelerated heat aging of the sheeting shall be performed in accordance with Test Methods D751 oven method. After being subjected to a temperature of 70 ± 1°C (158 ± 2°F) in circulating air for 7 days, the tensile strength of the specimen in both warp and filling directions shall not be less that 50 % of the original.

19.2.8 The flame resistance of the sheeting for Type II shall be performed in accordance with Federal Safety Standard MVSS 302 (horizontal test) and shall be self-extinguishing (S.E.). Sheeting shall also meet the requirements of UL 214 small scale (vertical test).

19.2.9 The shore hardness A test of the coating shall be performed in accordance with Test Method D2240.

19.2.10 The puncture resistance test shall be performed in accordance with Specification D1048.

19.2.11 Perform the drape stiffness and flex stiffness tests in a manner similar to the method specified in Test Methods D1388. Use Option A, Cantilever Test, of Test Methods D1388 as the test method. Drape stiffness is a measure of how a material will bend under its own weight, and is referred to as "Bending Length" in Test Methods D1388. Flex stiffness measures how stiff a material will feel when flexed, and is called "Flexure Rigidity" in Test Methods D1388.

19.2.11.1 Perform the test with one of two sizes of specimen. A 25 by 300 mm (1 by 12 in.) rectangular die cut specimen may be used for the majority of stiffness tests on the sheeting. A 25 by 150 mm (1 by 6 in.) rectangular specimen may be used for testing those sheeting materials that flex relatively easily. Use of the longer specimen may be required to maintain the more flexible materials in a flat position on the horizontal platform of the test device.

19.2.11.2 Test five specimens from each sample lot. Perform the stiffness test at a temperature of 23 ± 2°C (73 ± 4°F) and also at a temperature of –10 ± 2°C (14 ± 4°F). Condition the specimen and the test device for at least 4 h at each of these temperatures prior to the performance of the test.

19.2.11.3 **Warning**—Take care to ensure that the temperature of the specimen is maintained within the prescribed tolerances during the performance of the test.

20. Precision and Bias

20.1 No statement is made about either the precision or the bias of the test methods in the standard for measuring the dielectric strength since the results merely state whether there is conformance to the criteria for success specified in the procedure.