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StandardSpecification for Ethylene Propylene Diene Terpolymer (EPDM) Sheet Used In Geomembrane Applications[1]

This standard is issued under the fixed designation D7465; 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 flexible sheet made from ethylene propylene diene terpolymer (EPDM) geomembrane intended for use in geotechnical and geoenvironmental applications. The tests and property limits used to characterize the sheet are values to ensure minimum quality for the intended use. The vulcanized rubber sheet may be non-reinforced, fabric or scrim reinforced..

1.2 In place geomembrane design criteria, such as field seaming strength, and material compatibility, among others, are factors that must be considered but are beyond the scope of this specification.

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

1.4 *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]

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D518 Test Method for Rubber Deterioration—Surface Cracking (Withdrawn 2007)[3]

D573 Test Method for Rubber—Deterioration in an Air Oven

D624 Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers

D751 Test Methods for Coated Fabrics

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

D1204 Test Method for Linear Dimensional Changes of Nonrigid Thermoplastic Sheeting or Film at Elevated Temperature

D1418 Practice for Rubber and Rubber Latices—Nomenclature

D2137 Test Methods for Rubber Property—Brittleness Point of Flexible Polymers and Coated Fabrics

D4439 Terminology for Geosynthetics

D4833 Test Method for Index Puncture Resistance of Geomembranes and Related Products

D7004 Test Method for Grab Tensile Properties of Reinforced Geomembranes

G151 Practice for Exposing Nonmetallic Materials in Accelerated Test Devices that Use Laboratory Light Sources

G155 Practice for Operating Xenon Arc Light Apparatus for Exposure of Non-Metallic Materials

3. Terminology

3.1 *Definitions:*

3.1.1 For definitions of other geosynthetic terms used in this guide, refer to Terminology D4439.

3.1.2 *EPDM, n*—terpolymer of ethylene, propylene, and diene with the residual unsaturated portion of the diene in the side chain. **D1418**

3.1.3 *composite, n*—factory laminated non-woven geotextile and EPDM.

4. Classification

4.1 Types describe the sheet construction:

4.1.1 *Type I*—Non-reinforced.

4.1.2 *Type II*—Scrim (or fabric) internally reinforced.

5. Materials and Manufacture

5.1 The sheet shall be formulated from EPDM polymers and other compounding ingredients. EPDM shall be the principal polymer used in the sheet and shall be greater than 95 % of the total polymer content.

[1] This specification is under the jurisdiction of ASTM Committee D35 on Geosynthetics and is the direct responsibility of Subcommittee D35.10 on Geomembranes.

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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.

TABLE 1 Physical Requirements for EPDM Sheet

Type	ASTM	I	II
Thickness, min, mm (in.):			
Sheet-overall	D412 Type 1	1.016 (0.040)	1.016 (0.040)
Coating over scrim or fabric	D7004 Type 11	...	0.38 (0.015)
Breaking Strength, min, N (lbf)	D7004 Grab Method	...	400 (90)
Tensile strength, min, MPa (psi)	D412 Die C	9.0 (1305)	...
Puncture Resistance N (lbs) Min.	D4833	133 (30)	270 (60)
Elongation, ultimate, min %	D412 Die C	300	250[A]
Elongation @ fabric break, ultimate,	D7004, Grab		
min, %	Method, 50 mm		
Machine direction	(2 in.) per		15
Cross direction	minute jaw separation rate		15
Tensile set, max	D412 Method A, Die C	10	...
Tear resistance, min, kN/m (lbf/in.)	D624 Die C	26.27 (150)	...
Tearing strength, min, N (lbf)	D7004, B-Tongue	...	45 (10
Brittleness point, max °C (°F)	D2137	–45 (–49)	–45 (–49)
Ozone resistance, no cracks	D1149	pass	pass
Heat aging:	D573		
Breaking strength, min, N (lbf)	D7004		356 (80)
Tensile strength, min, mPa (psi)	D412 Method A, Die C	8.3 (1205)	...
Elongation, ultimate, min, %	D412 Die C	200	200[A]
Tear resistance, min, kN/m (lbf/in)	D624 Die C	21.9 (125)	...
Linear dimensional change, maz, %	D1204	± 1	± 1
Water absorption, max, mass, %	D471	± 8, –2	± 8, –2[A]
Accelerated Weathering:	G151 and G155		
Visual inspection	D518	pass	pass
PRFSE, min, %		30	...
Elongation, ultimate, min, %		200	...

[A]Specimens to be prepared from coating rubber compound, vulcanized in a similar method to the reinforced products.

5.2 To make seams and repairs, the sheet shall be capable of being bonded watertight to itself and the supplier or fabricator shall recommend suitable methods.

6. Physical Properties and Requirements

6.1 The sheet shall conform to the physical requirements prescribed in Table 1.

6.2 The tolerance for time conditions (aging, weathering, and so forth) is ±15 min or ±1 % of the period; whichever is greater, unless otherwise specified.

6.3 Tolerances for temperature shall be ±2 °C (±4 °F).

7. Dimensions

7.1 The width and length of the sheet shall be agreed upon between the purchaser and the supplier.

7.1.1 The width and length tolerance shall be +3 %, -0 %.

7.2 The thickness tolerance shall be +15 %, -10 % of the thickness agreed upon between the purchaser and supplier, but in no case shall the thickness be less than the minimum listed in Table 1.

8. Workmanship, Finish, and Appearance

8.1 The sheet, including the full width of factory seams if present, shall be fully adhered, watertight, and visibly free of pinholes, particles of foreign matter, undispersed raw material or other manufacturing defects that might affect serviceability. If the number of irregularities in the form of pockmarks (see Note 1) appear excessive on the sheet (or portion thereof), then its rejection shall be negotiated between involved parties.

8.2 Edges of the sheets shall be straight and flat so that they may be seamed to one another without fishmouthing.

NOTE 1—Pockmarks are oblong depressions, cavities or craters on the surface of the sheet that have an approximate surface dimension of 3.2 by 1.6 mm (1/8 by 1/16 in.), and have a maximum depth approaching one half of the sheet thickness.

9. Test Methods

9.1 *Dimensions*—Test Methods D751, after permitting the sheet to relax at 23° ± 2°C (73.4° ± 4°F) for 1 hour ± 15 min.

9.2 *Thickness, Sheet Overall*—From across the full width of the unbuffed sheet, take three samples, 300 by 300 mm (1 by 1 ft). Measure the thickness of each corner. Refer to Test Method D412 for Type I sheet and Test Method D751 for Type II sheet.

9.3 *Thickness of Coating Over Scrim (Reinforcing Fabric)—Optical Method*—see Annex A1.

9.4 *Breaking Strength*—Test Methods D751, Grab Method.

9.5 *Tensile Strength*—Test Methods D412, Die C.

9.6 *Puncture Resistance*—Test Method D4833.

9.7 *Elongation, Ultimate*—Test Methods D412, Die C.

9.8 *Elongation at Fabric Break, Ultimate*—Test Method D751, Grab Method, 50 mm (2 in.) per minute jaw separation rate.

9.9 *Tensile Set*—Test Methods D412, Method A, Die C, 50 % elongation.

9.10 *Tear Resistance*—Test Method D624, Die C.

9.11 *Tearing Strength*—Test Methods D751, B-Tongue Tear.

9.12 *Brittleness Point*—Test Methods D2137.

9.13 *Ozone Resistance*—Test Method D1149, D4439. Inspect at 7× magnification on specimens exposed to 100 mPa (1