Designation: D7465/D7465M – 15 (Reapproved 2023)

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

This standard is issued under the fixed designation D7465/D7465M; 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 either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system are not necessarily exact equivalents; therefore, to ensure conformance with the standard, each system shall be used independently of the other, and values from the two systems shall not be combined.

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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

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:*[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D518 Test Method for Rubber Deterioration—Surface Cracking (Withdrawn 2007)[3]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/D4833M Test Method for Index Puncture Resistance of Geomembranes and Related Products
D5884 Test Method for Determining Tearing Strength of Internally Reinforced Geomembranes
D7004/D7004M Test Method for Grab Tensile Properties of Reinforced Geomembranes
D7635/D7635M Test Method for Measurement of Thickness of Coatings Over Fabric Reinforcement
G151 Practice for Exposing Nonmetallic Materials in Accelerated Test Devices that Use Laboratory Light Sources
G155 Practice for Operating Xenon Arc Lamp Apparatus for Exposure of Materials

## 3. Terminology

3.1 *Definitions:*

3.1.1 For definitions of other geosynthetics terms used in this specification, refer to Terminology D4439.

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

[1] This specification is under the jurisdiction of ASTM Committee D35 on Geosynthetics and is the direct responsibility of Subcommittee D35.06 on Geosynthetic Specifications.

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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.

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

## 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.

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.

**TABLE 1 Physical Requirements for EPDM Sheet**

| Property | ASTM | Nominal Sheet Thickness | Type I | Type II |
|---|---|---|---|---|
| Thickness, min, mm [in.]: | | | | |
| Sheet-overall | D412 | | 1.14 [0.045] | |
| | | | 1.52 [0.060] | |
| | D751 | | | 1.14 [0.045] |
| | | | | 1.52 [0.060] |
| Coating over scrim or fabric | D7635/D7635M | 1.14 [0.045] | . . . | 0.38 [0.015] |
| | | 1.52 [0.060] | | 0.59 [0.022] |
| Breaking Strength, min, N [lbf] | D7004/D7004M Grab Method | 1.14 [0.045] | . . . | 400 [90] |
| | | 1.52 [0.060] | | 400 [90] |
| Tensile strength, min, MPa [psi] | D412 Die C | 1.14 [0.045] | 9.0 [1305] | . . . |
| | | 1.52 [0.060] | 9.0 [1305] | |
| Puncture Resistance N [lbs] Min. | D4833/D4833M | 1.14 [0.045] | 133 [30] | 270 [60] |
| | | 1.52 [0.060] | 178 [40] | 350 [80] |
| Elongation, ultimate, min % | D412 Die C | 1.14 [0.045] | 300 | 250[A] |
| | | 1.52 [0.060] | 300 | 250[A] |
| Elongation @ fabric break, ultimate, min, % | | | | |
| Machine direction | D7004/D7004M, Grab Method, | 1.14 [0.045] | | 15 |
| | 50 mm [2 in.] per minute | 1.52 [0.060] | | 15 |
| Cross direction | jaw separation rate | 1.14 [0.045] | | 15 |
| | | 1.52 [0.060] | | 15 |
| Tensile set, max | D412 Method A, Die C | 1.14 [0.045] | 10 | . . . |
| | | 1.52 [0.060] | 10 | |
| Tear resistance, min, kN/m [lbf/in.] | D624 Die C | 1.14 [0.045] | 26.27 [150] | . . . |
| | | 1.52 [0.060] | 40.28 [230] | |
| Tearing strength, min, N [lbf] | D5884 | 1.14 [0.045] | . . . | 580 [130] |
| | | 1.52 [0.060] | | 750 [170] |
| Brittleness point, max °C [°F] | D2137 | 1.14 [0.045] | –45 [–49] | –45 [–49] |
| | | 1.52 [0.060] | –45 [–49] | –45 [–49] |
| Ozone resistance, no cracks | D1149 | 1.14 [0.045] | pass | pass |
| | | 1.52 [0.060] | pass | pass |
| Heat Aging: | D573 | | | |
| Breaking strength, min, N [lbf] | D7004/D7004M | 1.14 [0.045] | | 356 [80] |
| | | 1.52 [0.060] | | 888 [200] |
| Tensile strength, min, MPa [psi] | D412 Method A, Die C | 1.14 [0.045] | 8.3 [1205] | . . . |
| | | 1.52 [0.060] | 8.3 [1205] | |
| Elongation, ultimate, min, % | D412 Die C | 1.14 [0.045] | 200 | 200[A] |
| | | 1.52 [0.060] | 200 | 200[A] |
| Tear resistance, min, kN/m [lbf/in.] | D624 Die C | 1.14 {0.045] | 21.9 [125] | . . . |
| | | 1.52 [0.060] | 37.3 [213] | |
| Linear dimensional change, max, % | D1204 | 1.14 [0.045] | ±1 | ±1 |
| | | 1.52 [0.060] | ±1 | ±1 |
| Water absorption, max, mass, % | D471 | 1.14 [0.045] | ±8, –2 | ±8, –2[A] |
| | | 1.52 [0.060] | ±8, –2 | ±8, –2[A] |
| Laboratory Accelerated Weathering: | G151 and G155 | | | |
| Visual Inspection | D518 | 1.14 [0.045] | No cracks | No cracks |
| | | 1.52 [0.060] | No cracks | No cracks |
| PRFSE, min, % | | 1.14 [0.045] | 30 | . . . |
| | | 1.52 [0.060] | 30 | |
| Elongation, ultimate, min, % | | 1.14 [0.045] | 200 | . . . |
| | | 1.52 [0.060] | 200 | |

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