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Standard Specification for Prefabricated Bituminous Geomembrane Used as Canal and Ditch Liner (Exposed Type)¹

This standard is issued under the fixed designation D2643/D2643M; 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 prefabricated bituminous geomembranes intended to provide a continuous, exposed lining for canals and ditches.

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 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.

1.3 *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.*

1.4 *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

[ASTM D2643/D2643M-21](https://standards.iteh.ai/catalog/standards/sist/ae75bb30-c314-43ed-a3df-a861a978a436/astm-d2643-d2643m-21)

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2.1 ASTM Standards:²

- [D1204 Test Method for Linear Dimensional Changes of Nonrigid Thermoplastic Sheeting or Film at Elevated Temperature](#)
- [D4354 Practice for Sampling of Geosynthetics and Rolled Erosion Control Products \(RECPs\) for Testing](#)
- [D4439 Terminology for Geosynthetics](#)
- [D4798/D4798M Practice for Accelerated Weathering Test Conditions and Procedures for Bituminous Materials \(Xenon-Arc Method\)](#)
- [D4833/D4833M Test Method for Index Puncture Resistance of Geomembranes and Related Products](#)
- [D5147/D5147M Test Methods for Sampling and Testing Modified Bituminous Sheet Material](#)
- [D5199 Test Method for Measuring the Nominal Thickness of Geosynthetics](#)
- [D5261 Test Method for Measuring Mass per Unit Area of Geotextiles](#)
- [D5884/D5884M Test Method for Determining Tearing Strength of Internally Reinforced Geomembranes](#)
- [D6455 Guide for the Selection of Test Methods for Prefabricated Bituminous Geomembranes \(PBGMs\)](#)
- [D7275 Test Method for Tensile Properties of Bituminous Geomembranes \(BGMs\)](#)
- [E96/E96M Test Methods for Water Vapor Transmission of Materials](#)

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. Terminology

3.1 *Definitions*—For definitions of terms related to geosynthetics, refer to Terminology [D4439](#).

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *mineral stabilizer, n*—a fine, water-insoluble inorganic material, used as a filler material in the bitumen of a prefabricated bituminous geomembrane.

3.2.2 *prefabricated bituminous geomembrane, n*—a material fabricated in a plant and consisting principally of a geotextile saturated and coated with an oxidized or an elastomeric modified bitumen blend incorporating a filler.

3.2.2 *mineral stabilizer, n*—a fine, water-insoluble inorganic material, used as a filler material in the bitumen of a prefabricated bituminous geomembrane.

3.2.3 *selvage, n*—the edge portion of a prefabricated bituminous geomembrane that is parallel to the machine direction.

4. Classifications

4.1 Prefabricated bituminous geomembranes covered by this specification shall be classified as Type I, Type II, and Type III. Distinction between those types is related to the requirements found in [Table 1](#).

4.2 Prefabricated bituminous geomembranes covered by this specification, regardless of their type indicated in 4.1, shall also be classified using the following grades, essentially governed by their minimal installation temperature:

4.2.1 *Grade 1*—For installation at ambient temperatures of 5 °C [40 °F] and above.

4.2.2 *Grade 2*—For installation at ambient temperatures of –25 °C [–13 °F] and above.

5. Materials and Manufacture

5.1 The prefabricated bituminous geomembranes shall consist of a geotextile, impregnated and coated with bitumen. They shall be packaged in the form of rolls.

5.2 The bitumen shall consist of oxidized or elastomeric modified asphalt incorporating a mineral stabilizer.

TABLE 1 Requirements for Bituminous Geomembranes Used as Exposed Lining for Canals and Ditches

Property	Standard	Type I	Type II	Type III
Thickness, min	D5199	3.3 mm [0.130 in.]	3.8 mm [0.150 in.]	4.5 mm [0.175 in.]
Mass per Unit Area, min	D5261	3.5 kg/m ² [0.72 lb/ft ²]	4.0 kg/m ² [0.82 lb/ft ²]	5.0 kg/m ² [1.02 lb/ft ²]
Tensile Strength at break, machine and cross-machine directions, min	D7275	8 kN/m [45.7 lbf/in.]	12 kN/m [68.5 lbf/in.]	16 kN/m [91.4 lbf/in.]
Elongation at break, machine and cross-machine directions, min	D7275	50 %	50 %	50 %
Tear Strength, machine and cross-machine directions, min	D5884	500 N [112 lbf]	550 N [124 lbf]	600 N [135 lbf]
Tear Strength, machine and cross-machine directions, min	D5884/D5884M	500 N [112 lbf]	550 N [124 lbf]	600 N [135 lbf]
Index Puncture Resistance, min	D4833/D4833M	350 N [79 lbf]	450 N [101 lbf]	550 N [124 lbf]
Low-Temperature Flexibility before weathering, machine and cross-machine directions	D5147/D5147M Section 11		Grade 1 must pass 5 °C [40 °F] Grade 2 must pass –25 °C [–13 °F]	
Low-Temperature Flexibility after weathering, machine and cross-machine directions	D5147/D5147M Section 11		Grade 1 must pass 15 °C [59 °F] Grade 2 must pass –15 °C [–5 °F]	
Dimensional Stability, machine and cross-machine directions, max	D1204		0.5 %	
Water Vapor Permeance	E96/E96M , Method B		5.7 ng/Pa·s·m ² [0.1 perm]	



5.3 Both faces of the prefabricated bituminous geomembranes shall be covered with a material that will prevent the rolls from sticking together during storage and shipment.

6. Physical Properties and Requirements

6.1 The prefabricated bituminous geomembranes shall conform to the requirements prescribed in [Table 1](#). Testing shall be accomplished in accordance with the test methods indicated in the table.

NOTE 1—Although prefabricated bituminous geomembranes are manufactured in a plant, they have no factory seams. Consequently, factory seam testing is not applicable to prefabricated bituminous geomembranes.

6.2 *Low-Temperature Flexibility*—The prefabricated bituminous geomembranes shall pass the low-temperature flexibility test, when measured according to Test Methods [D5147/D5147M](#), Section 11. Testing shall be accomplished in both machine and cross-machine directions:

6.2.1 At 5 °C [40 °F] for Grade 1.

6.2.2 At –25 °C [–13 °F] for Grade 2.

6.3 *Low-Temperature Flexibility After Accelerated Weathering*—The low-temperature flexibility test described in [6.2](#) shall also be accomplished, in both machine and cross-machine directions, after an exposure of 2000 h as per Practice [D4798/D4798M](#), [eyeCycle A-1](#). Test specimens shall be cut to the size prescribed in Test Methods [D5147/D5147M](#) prior to exposure: 25 ± 2 mm [1.00 ± 0.05 in.] wide by 150 ± 2 mm [6.00 ± 0.05 in.] long. If two or more specimens are mounted on a single specimen holder of the Xenon-Arc weathering chamber, all tested specimens shall have their full width and at least 100 mm [5[4 in.] in length exposed. The prefabricated bituminous geomembranes shall pass the low-temperature flexibility test after accelerated weathering:

6.3.1 At 15 °C [59 °F] for Grade 1.

6.3.2 At –15 °C [5 °F] for Grade 2.

6.4 For a complete list of test methods applicable to prefabricated bituminous geomembranes, refer to Guide [D6455](#).

7. Workmanship, Finish, and Appearance

7.1 Both faces of the prefabricated bituminous geomembranes shall be uniform in finish. The bitumen shall be uniform over the entire area and up to the edges of the sheet. The material or treatment to prevent sticking shall be applied uniformly, except for the selvage area.

7.2 There shall be no voids in the bitumen or unsaturated spots in the geotextile.

7.3 The prefabricated bituminous geomembranes shall be free of visible defects such as holes, ragged or untrue edges, breaks, cracks, protuberances, and indentations.

8. Sampling and Test Methods

8.1 For conformance evaluation, sampling shall be conducted according to Practice [D4354](#).

9. Packaging and Package Marking

9.1 Unless otherwise agreed upon between the supplier and purchaser, each roll shall be covered with a wrapping material for protection from damage due to shipment, water, sunlight, or contaminants while being stored or handled.

9.2 Each roll shall also include at least one label identifying the manufacturer, style and/or commercial designation, unique roll identification (such as roll number), length and width of the roll, as well as a statement regarding conformance to the appropriate type and grade of this standard specification.