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

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

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

2. Referenced Documents

2.1 *ASTM Standards:*²

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

D4354 Practice for Sampling of Geosynthetics for Testing

D4439 Terminology for Geosynthetics

D4798 Practice for Accelerated Weathering Test Conditions and Procedures for Bituminous Materials (Xenon-Arc Method)

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

D5147 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 Test Method for Determining Tearing Strength of

Internally Reinforced Geomembranes

D6455 Guide for the Selection of Test Methods for Prefabricated Bituminous Geomembranes (PBGM)

D7275 Test Method for Tensile Properties of Bituminous Geomembranes (BGM)

E96/E96M Test Methods for Water Vapor Transmission of Materials

3. Terminology

3.1 *Definitions*— For definitions of terms related to geosynthetics, refer to Terminology D4439.

3.2 *Definitions:*

3.2.1 *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.

3.3 *Definitions of Terms Specific to This Standard:*

3.3.1 *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 section 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.

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.

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)
Index Puncture Resistance, min	D4833	350 N (79 lbf)	450 N (101 lbf)	550 N (124 lbf)
Low Temperature Flexibility before weathering, machine and cross-machine directions	D5147 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 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)		

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

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 Method **D5147**, 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 hours as per test method **D4798**, cycle A. Test specimens shall be cut to the size prescribed in Test Method **D5147** 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 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 **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.

10. Keywords

10.1 bitumen; canals; ditches; exposed lining; geomembrane; geotextile; prefabricated bituminous geomembrane; PBGM