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Standard Guide for the Selection of Test Methods for Prefabricated Bituminous Geomembranes (PBGM)[1]

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1. Scope

1.1 This guide provides recommendations for the selection of appropriate test methods for prefabricated bituminous sheet used in geomembrane applications to provide consistency in data reporting.

1.2 This guide includes test methods for all types of prefabricated bituminous geomembranes (PBGM).

1.3 This guide is intended to aid all personnel involved in the selection, manufacture, or evaluation of prefabricated bituminous geomembranes. Field-related evaluation of PBGM, including but not limited to seam testing, is beyond the scope of this guide.

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]

D36 Test Method for Softening Point of Bitumen (Ring-and-Ball Apparatus)
D471 Test Method for Rubber Property—Effect of Liquids
D573 Test Method for Rubber—Deterioration in an Air Oven
D696 Test Method for Coefficient of Linear Thermal Expansion of Plastics Between −30°C and 30°C with a Vitreous Silica Dilatometer
D746 Test Method for Brittleness Temperature of Plastics and Elastomers by Impact
D751 Test Methods for Coated Fabrics
D792 Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement
D1079 Terminology Relating to Roofing and Waterproofing
D1204 Test Method for Linear Dimensional Changes of Nonrigid Thermoplastic Sheeting or Film at Elevated Temperature
D1434 Test Method for Determining Gas Permeability Characteristics of Plastic Film and Sheeting
D3776 Test Methods for Mass Per Unit Area (Weight) of Fabric
D4354 Practice for Sampling of Geosynthetics for Testing
D4355 Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon Arc Type Apparatus
D4439 Terminology for Geosynthetics
D4595 Test Method for Tensile Properties of Geotextiles by the Wide-Width Strip Method
D4833 Test Method for Index Puncture Resistance of Geomembranes and Related Products
D4873 Guide for Identification, Storage, and Handling of Geosynthetic Rolls and Samples
D4885 Test Method for Determining Performance Strength of Geomembranes by the Wide Strip Tensile Method
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
D5262 Test Method for Evaluating the Unconfined Tension Creep and Creep Rupture Behavior of Geosynthetics
D5321 Test Method for Determining the Coefficient of Soil and Geosynthetic or Geosynthetic and Geosynthetic Friction by the Direct Shear Method
D5322 Practice for Laboratory Immersion Procedures for Evaluating the Chemical Resistance of Geosynthetics to Liquids
D5514 Test Method for Large Scale Hydrostatic Puncture Testing of Geosynthetics
D5617 Test Method for Multi-Axial Tension Test for Geosynthetics
D5884 Test Method for Determining Tearing Strength of Internally Reinforced Geomembranes

[1] This guide is under the jurisdiction of ASTM Committee D35 on Geosynthetics and is the direct responsibility of 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.

D6747 Guide for Selection of Techniques for Electrical Detection of Leaks in Geomembranes
D7003 Test Method for Strip Tensile Properties of Reinforced Geomembranes
D7274 Test Method for Mineral Stabilizer Content of Prefabricated Bituminous Geomembranes (BGM)
D7275 Test Method for Tensile Properties of Bituminous Geomembranes (BGM)
E96/E96M Test Methods for Water Vapor Transmission of Materials
E154 Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover

3. Terminology

3.1 *Definitions:*

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

3.1.2 For definitions of terms related to bituminous materials, refer to Terminology D1079.

3.1.3 *prefabricated bituminous geomembrane (PBGM), n*—a material fabricated in a plant and consisting principally of a synthetic fabric, saturated and coated with an oxidized or a polymer-modified bitumen compound incorporating a mineral stabilizer.

4. Significance and Use

4.1 To properly evaluate PBGM, tests must be performed according to specific test methods and procedures. Failure to follow this practice can result in data not representative of the material's characteristics and performance.

5. Test Methods

5.1 Recommended test methods for PBGM have been grouped in categories and are listed in tables as follows:

5.1.1 Table 1—PBGM Basic Properties.

5.1.2 Table 2—Performance-Related PBGM Properties.

5.1.3 Table 3—Properties of PBGM Components.

NOTE 1—The term "Basic" is used in this guide to identify a limiting number of properties that users will specify to characterize a PGBM.

6. Keywords

6.1 geomembrane; geotextile; modified bitumen; oxidized bitumen; prefabricated bituminous; PBGM

TABLE 1 PBGM Basic Properties

Property	Test Method
Terminology	D4439 and D1079
Identification and Handling	D4873
Sampling	D4354
Thickness	D5199
Mass per Unit Area	D5261
Specific Gravity	D792
Tensile Properties	D7275
Index Puncture Resistance	D4833
Water Vapor Transmission	E96/E96M

TABLE 2 Performance-Related PBGM Properties

Property	Test Method
Coefficient of Linear Expansion	D696
Dimensional Stability at High Temperature	D1204
Water Absorption	D471
Gas Permeability	D1434
Tensile Properties, Wide-Width Strip Method	D4885
Tensile Properties, Strip Method	D4595or D7003
Multi-Axial Tensile	D5617
Granule Puncture	D5514
Tear Strength	D5884
Cold Bending	Section 11
Brittleness Temperature	D746
Coefficient of Friction by Direct Shear	D5321
Hydrostatic Resistance	D751 Procedure A
Unconfined Tension Creep Behavior	D5262
Chemical Resistance	D5322
Ultraviolet Resistance	D4355
Oven Aging	D573
Biodegradation Resistance (in soil)	E154 Section 13

TABLE 3 Properties of PBGM Components

Property	Test Method
Softening Point of Bitumen (Ring-and-Ball Apparatus)	D36
Mineral Stabilizer Content of Bitumen	D7274
Mass Per Unit Area of Reinforcement	D3776
Nominal Thickness of Reinforcement	D5199
Tensile Properties of Reinforcement by Wide-Width Strip Method	D4595