Designation: D6455 – 11 (Reapproved 2018)

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

This standard is issued under the fixed designation D6455; 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 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 (PBGMs).

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 PBGMs, 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, 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]

D36/D36M 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/D3776M Test Methods for Mass Per Unit Area (Weight) of Fabric

D4354 Practice for Sampling of Geosynthetics and Rolled Erosion Control Products (RECPs) for Testing

D4355/D4355M 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/D4833M Test Method for Index Puncture Resistance of Geomembranes and Related Products

D4873/D4873M 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/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

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

Current edition approved Feb. 1, 2018. Published February 2018. Originally approved in 1999. Last previous edition approved in 2011 as D6455 – 11. DOI: 10.1520/D6455-11R18.

[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.

D5262 Test Method for Evaluating the Unconfined Tension Creep and Creep Rupture Behavior of Geosynthetics
D5321/D5321M Test Method for Determining the Shear Strength of Soil-Geosynthetic and Geosynthetic-Geosynthetic Interfaces by Direct Shear
D5322 Practice for Laboratory Immersion Procedures for Evaluating the Chemical Resistance of Geosynthetics to Liquids
D5514/D5514M Test Method for Large-Scale Hydrostatic Puncture Testing of Geosynthetics
D5617 Test Method for Multi-Axial Tension Test for Geosynthetics
D5884/D5884M Test Method for Determining Tearing Strength of Internally Reinforced Geomembranes
D6747 Guide for Selection of Techniques for Electrical Leak Location of Leaks in Geomembranes
D7003/D7003M 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/E154M 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 geosynthetics 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 PBGMs, 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 PBGMs have been grouped in categories and are listed in tables as follows:

5.1.1 Table 1—PBGM basic properties.

TABLE 1 PBGM Basic Properties

Property	Test Method
Terminology	D4439 and D1079
Identification and Handling	D4873/D4873M
Sampling	D4354
Thickness	D5199
Mass Per Unit Area	D5261
Specific Gravity	D792
Tensile Properties	D7275
Index Puncture Resistance	D4833/D4833M
Water Vapor Transmission	E96/E96M

5.1.2 Table 2—Performance-related PBGM properties.

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	D4595 or D7003/D7003M
Multi-Axial Tensile	D5617
Granule Puncture	D5514/D5514M
Tear Strength	D5884/D5884M
Cold Bending	D5147/D5147M, Section 11
Brittleness Temperature	D746
Coefficient of Friction by Direct Shear	D5321/D5321M
Hydrostatic Resistance	D751, Procedure A
Unconfined Tension Creep Behavior	D5262
Chemical Resistance	D5322
Ultraviolet Resistance	D4355/D4355M
Oven Aging	D573
Biodegradation Resistance (in soil)	E154/E154M, Section 13

5.1.3 Table 3—Properties of PBGM components.

TABLE 3 Properties of PBGM Components

Property	Test Method
Softening Point of Bitumen (Ring-and-Ball Apparatus)	D36/D36M
Mineral Stabilizer Content of Bitumen	D7274
Mass Per Unit Area of Reinforcement	D3776/D3776M
Nominal Thickness of Reinforcement	D5199
Tensile Properties of Reinforcement by Wide-Width Strip Method	D4595

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 geomembranes; geotextiles; modified bitumen; oxidized bitumen; prefabricated bituminous; PBGMs