



Designation: D7407 – 07 (Reapproved 2024)

Standard Guide for Determining the Transmission of Gases Through Geomembranes¹

This standard is issued under the fixed designation D7407; 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 is used as a discussion of the relevancy of several methods to obtain the vapor transmission of geomembranes.

1.2 This guide discusses applicable test methods, test materials, and conditions.

1.3 The guide assumes the material being measured exhibits Fickian behavior.

1.4 This guide does not purport to critique barrier system permeability.

1.5 The guide does not address transmission through seams.

1.6 *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.*

1.7 *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

D1434 Test Method for Determining Gas Permeability Characteristics of Plastic Film and Sheeting

D3985 Test Method for Oxygen Gas Transmission Rate Through Plastic Film and Sheeting Using a Coulometric Sensor

D4439 Terminology for Geosynthetics

E96/E96M Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials

F1249 Test Method for Water Vapor Transmission Rate Through Plastic Film and Sheeting Using a Modulated Infrared Sensor

F1769 Test Method for Measurement of Diffusivity, Solubility, and Permeability of Organic Vapor Barriers Using a Flame Ionization Detector (Withdrawn 2004)³

F1927 Test Method for Determination of Oxygen Gas Transmission Rate, Permeability and Permeance at Controlled Relative Humidity Through Barrier Materials Using a Coulometric Detector

3. Terminology

3.1 *Definitions:*

3.1.1 Definitions of terms applying to this guide appear in Terminology **D4439**.

3.1.2 *atmosphere for testing geosynthetics, n*—air maintained at a relative humidity between 50 to 70 % and a temperature of $21 \pm 2^\circ\text{C}$ ($70 \pm 4^\circ\text{F}$).

4. Summary of Guide

4.1 This guide gives commentary as to the relevancy of several methods to obtain Fickian diffusion through a geomembrane. The tests evaluate gas and vapor transfer through semi-permeable and permeable geomembranes. The data is important for design of containment systems.

5. **D1434** Test Method for Determining Gas Permeability Characteristics of Plastic Film and Sheeting

5.1 This test method covers the estimation of the steady-state rate of transmission of a gas through plastics in the form of film, sheeting, laminates, and plastic-coated papers or fabrics. This test method provides for the determination of (1) gas transmission rate (GTR), (2) permeance, and, in the case of homogeneous materials, (3) permeability.

5.2 Two procedures are provided: M, Manometric and V, Volumetric.

¹ This guide 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 www.astm.org/contact. 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.