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.

Designation: D7006 – 22

Standard Practice for Ultrasonic Testing of Geomembranes[1]

This standard is issued under the fixed designation D7006; 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 practice provides a summary of equipment and procedures for ultrasonic testing of geomembranes using the pulse echo method.

1.2 Ultrasonic wave propagation in solid materials is correlated to physical and mechanical properties and condition of the materials. In ultrasonic testing, two wave propagation characteristics are commonly determined: velocity (based on wave travel time measurements) and attenuation (based on wave amplitude measurements). Velocity of wave propagation is used to determine thickness, density, and elastic properties of materials. Attenuation of waves in solid materials is used to determine microstructural properties of the materials. In addition, frequency characteristics of waves are analyzed to investigate the properties of a test material. Travel time, amplitude, and frequency distribution measurements are used to assess the condition of materials to identify damage and defects in solid materials. Ultrasonic measurements are used to determine the nature of materials/media in contact with a test specimen as well. Measurements are conducted in the time-domain (time versus amplitude) or frequency-domain (frequency versus amplitude).

1.3 Measurements of one or more ultrasonic wave transmission characteristics are made based on the requirements of the specific testing program.

1.4 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.5 *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.*

1.6 *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]

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

D4437 Practice for Nondestructive Testing (NDT) for Determining the Integrity of Seams Used in Joining Flexible Polymeric Sheet Geomembranes

D4545 Practice for Determining the Integrity of Factory Seams Used in Joining Manufactured Flexible Sheet Geomembranes (Withdrawn 2008)[3]

D4883 Test Method for Density of Polyethylene by the Ultrasound Technique

E1316 Terminology for Nondestructive Examinations

3. Terminology

3.1 *Definitions:*

3.1.1 *atmosphere for testing geomembranes, n*—air maintained at a relative humidity of 50 to 70 % and a temperature of 21 ± 1 °C.

3.1.2 *geomembrane, n*—an essentially impermeable geosynthetic composed of one or more synthetic sheets.

3.1.3 For definitions of terms related to ultrasonic testing, refer to Terminology E1316.

4. Summary of Practice

4.1 Mechanical waves are introduced to a geomembrane from a surface of the material using an ultrasonic transducer. Transmission characteristics of the waves in the geomembrane are determined. The measured characteristics are used to evaluate certain properties and condition of geomembranes.

[1] This practice 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.

[3] The last approved version of this historical standard is referenced on www.astm.org.

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