



Designation: D5514/D5514M – 18

Standard Test Method for Large-Scale Hydrostatic Puncture Testing of Geosynthetics¹

This standard is issued under the fixed designation D5514/D5514M; 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 test method evaluates the stress/time properties of geosynthetics by using hydrostatic pressure to compress the geosynthetic over synthetic or natural test bases consisting of manufactured test pyramids/cones, rocks, soil, or voids.

1.2 This test method allows the user to determine the relative failure mode or points of failure for geosynthetics, or both.

1.3 This test method offers two distinct procedures:

1.3.1 Procedure A incorporates manufactured test pyramids or cones as the base of the testing apparatus. Procedure A is intended to create comparable data between laboratories, and can be used as a guide for routine acceptance tests for various materials.

1.3.2 Procedures B and C incorporate site-specific soil or other material selected by the user as the test base of the testing apparatus. Procedures B and C are methods for geosynthetic design for a specific site.

1.4 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with the 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.* For a specific warning statement, see Section 6.

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.*

¹ This test method 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. Referenced Documents

2.1 ASTM Standards:²

D792 Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement

D1505 Test Method for Density of Plastics by the Density-Gradient Technique

D2488 Practice for Description and Identification of Soils (Visual-Manual Procedures)

D4439 Terminology for Geosynthetics

D5199 Test Method for Measuring the Nominal Thickness of Geosynthetics

D5261 Test Method for Measuring Mass per Unit Area of Geotextiles

D5994 Test Method for Measuring Core Thickness of Textured Geomembranes

E11 Specification for Woven Wire Test Sieve Cloth and Test Sieves

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 $21 \pm 2^\circ\text{C}$ [$70 \pm 4^\circ\text{F}$].

3.1.2 *critical height (ch), n*—the maximum exposed height of a cone or pyramid that will not cause a puncture failure of a geosynthetic at a specified hydrostatic pressure for a given period of time.

3.1.3 *failure, n*—in testing geosynthetics, water or air pressure in the test vessel at failure of the geosynthetic.

3.1.4 *hydrostatic pressure, n*—a state of stress in which all the principal stresses are equal (and there is no shear stress), as in a liquid at rest; induced artificially by means of a gaged pressure system; the product of the unit weight of the liquid and the difference in elevation between the given point and the free water elevation.

3.2 For definitions of other terms used in this test method, refer to Terminology D4439.

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.