Designation: ~~D7406 – 07 (Reapproved 2012)~~ D7406 – 20

Standard Test Method for Time-Dependent ~~(Creep)~~Compressive Deformation Under Constant Pressure for Geosynthetic Drainage Products[1]

This standard is issued under the fixed designation D7406; 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 is used to determine the unconfined compressive ~~creep~~ deformation (consolidation) characteristics of drainage geotextiles, geocomposites, geonets, or any other geosynthetic associated with drainage at a constant temperature, when subjected to a constant compressive stress.

1.2 This test method is intended for use as an unconfined compressive performance ~~creep~~deformation test only. For a detailed procedure on how to establish an index test, see ~~the~~ EN ~~standard 1897.~~ISO 25619-1. For performance tests, the specimen shall be subjected to the site-specific ~~liquid and/or~~ liquid, the site-specific stress (normal and potentially ~~shear stress).~~a tangential stress on the upper and parallel loading platen), or both.

NOTE 1—Results achieved from unconfined compressive performance ~~creep~~ deformation testing may differ from testing performed under confined conditions.

1.3 Because of the changing nature of the geosynthetic ~~industry,~~industry and the wide variety of products already available, this particular test method may have to be slightly modified for unconfined compression ~~creep~~deformation testing of some ~~products..~~products.

1.4 The values given in SI units are to be considered as the standard. The values given in parentheses are for information only.

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~~ safety, health, and ~~health~~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]

A1030/A1030M Practice for Measuring Flatness Characteristics of Steel Sheet Products
D2990 Test Methods for Tensile, Compressive, and Flexural Creep and Creep-Rupture of Plastics
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
~~D5262 Test Method for Evaluating the Unconfined Tension Creep and Creep Rupture Behavior of Geosynthetics~~
D6364 Test Method for Determining Short-Term Compression Behavior of Geosynthetics

2.2 ~~*EN*~~*ISO Standard:*[3]

EN ~~1897~~ISO 25619-1 Geosynthetics—Determination of Compression Behavior—Part 1: Compressive Creep Properties

[1] This test method is under the jurisdiction of ASTM Committee D35 on Geosynthetics and is the direct responsibility of Subcommittee D35.02 on Endurance Properties.
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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] Available from International Organization for Standardization (ISO), ISO Central Secretariat, BIBC II, Chemin de Blandonnet 8, CP 401, 1214 Vernier, Geneva, Switzerland, http://www.iso.org.

3. Terminology

3.1 For definitions related to geosynthetics, see Terminology D4439.

~~3.2 For definitions related to creep, see Test Methods D2990 and D5262.~~

~~3.3 *Definitions:*~~

~~3.3.1 *compressive creep, n*—time-dependent deformation or compressive strain of a material subjected to a constant compressive stress.~~

~~3.3.2 *compressive creep rupture, n*—failure by collapse of a material subjected to a constant compressive stress.~~

4. Summary of Test Method

4.1 In this performance test method, a geosynthetic drainage product is subjected to a sustained normal and potentially ~~shear stresses.~~tangential stress. Deformations of the specimen are recorded at designated time intervals, and a graph is drawn.

4.2 The specimen may be immersed in a site-specific water or permeant, to simulate actual field conditions.

4.3 For long-term testing, it is recommended that the test be run for at least ~~1000 h. Dwell~~ 1000 h. Seating times up to ~~10000 hr~~ 10 000 h have been used, if that longer time data is required.

4.4 ~~Creep~~Deformation load (normal as well as potentially ~~shear)~~tangential) should reflect the actual field ~~conditions~~ conditions.

4.5 The test will be conducted at ~~site specific~~ site-specific temperatures.

5. Significance and Use

5.1 The performance characteristics of a drainage geosynthetic are directly related to the integrity under compressive loading. If the product is sensitive to compressive ~~creep,~~deformation, its flow capacity could be greatly reduced or even shut off completely.

5.2 The ~~creep~~deformation sensitivity of a candidate geosynthetic can be tested at field-simulated normal stress and ~~potentially shear~~potential tangential stresses.

5.3 This test method does not evaluate the effect of ~~creep~~deformation of a geotextile filter or adjacent membrane.

5.4 Compression ~~creep~~deformation, as it relates to reduction in flow capacity of a geosynthetic drainage product, is manufacturer and product specific. For example, a ~~10%~~10 % reduction in original thickness of a geonet made by ~~manufacturer~~Manufacturer A does not necessarily equal the same reduction in flow capacity as a ~~10%~~10 % reduction in thickness of the same or another type of geonet made by ~~manufacturer~~Manufacturer B.

5.5 This ~~creep~~deformation data has ~~is~~ merit directly to the end user, because it can be easily interpreted to result ~~into~~in a reduction factor for ~~creep~~compressive deformation.[4] ~~.~~The ~~Reduction~~reduction factor can then be used to derive an allowable flow ~~rate~~rate.[5] ~~.~~

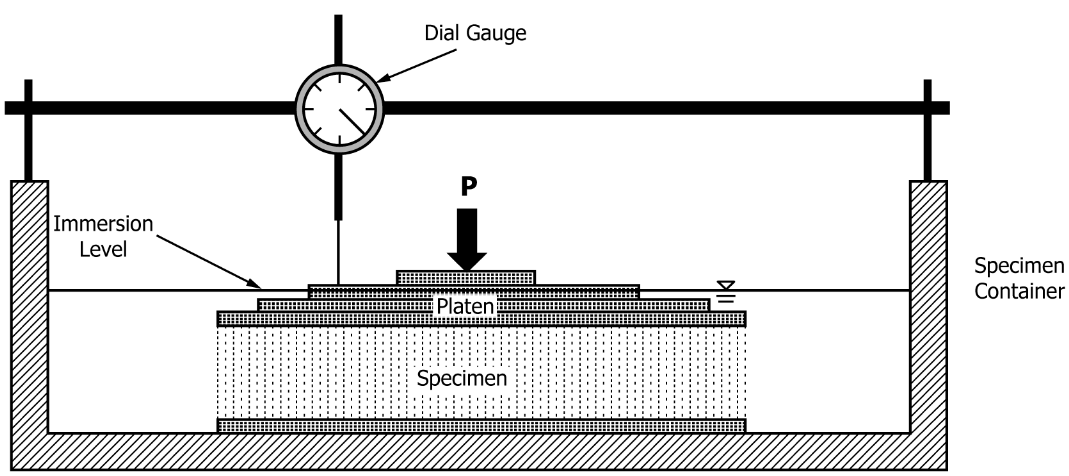

FIG. 1 ~~Creep~~Conceptual Apparatus Cross Section

[4] Giroud, J.-P., Zhao, ~~A.~~A., and Richardson, G. ~~N. (2000),~~ N., "Effect of Thickness Reduction on Geosynthetic Hydraulic Transmissivity," *Geosynthetics International*, ~~Vol.~~Vol 7, Nos. ~~4-6,~~ 4–6, 2000, pp. ~~433-452.~~433–452.

[5] GRI GC-8 ~~standard (2001),~~ standard, "Standard ~~guide~~Guide for ~~determination~~Determination of the ~~allowable flow rate~~Allowable Flow Rate of a ~~drainage geocomposite"~~Drainage Geocomposite," 2001.