Designation: D 4355 – 99

Standard Test Method for Deterioration of Geotextiles from Exposure to Ultraviolet Light and Water (Xenon-Arc Type Apparatus)[1]

This standard is issued under the fixed designation D 4355; 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 covers the determination of the deterioration in tensile strength of geotextiles by exposure to ultraviolet light and water.

1.2 The light and water exposure apparatus employs a xenon-arc light source.

1.3 *This standard does not purport to address all of the safety problems, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*

D 123 Terminology Relating to Textiles[2]

D 1682 Test Methods for Breaking Load and Elongation of Textile Fabric[3]

D 1898 Practice for Sampling of Plastics[4]

D 4439 Terminology for Geotextiles[5]

G 113 Terminology Relating to Natural and Artificial Weathering Tests of Nonmetallic Materials[6]

G 151 Practice for Exposing Nonmetallic Materials in Accelerated Test Devices That Use Laboratory Light Sources[6]

G 155 Practice for Operating Xenon Arc Light Apparatus for Exposure of Nonmetallic Materials[6]

3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 *geotextile*—any permeable textile material used with foundation, soil, rock, earth, or any other geotechnical engineering related material that is an integral part of a man-made product, structure, or system.

3.2 *Definitions:*

3.2.1 For definitions of other textile terms used in this test method, refer to Terminology D 123, for geotextile terms refer to Terminology D 4439.

4. Summary of Test Method

4.1 Specimens of geotextiles for the machine and cross directions are exposed for 0, 150, 300, and 500 h of ultraviolet exposure in a xenon-arc device. The exposure consists of 120-min cycles as follows: 90 min of light only, followed by 30 min of water spray and light.

4.2 There are five specimens tested for each total exposure time for each direction. Following the exposure time the specimens are subjected to a cut or ravel strip tensile test. Comparing these results to the test results for five unexposed specimens indicates the deterioration which has taken place due to ultraviolet exposure.

5. Significance and Use

5.1 This procedure tests geotextiles under a standard set of conditions of humidity and temperature for three exposure times, plus unexposed specimens. This test method will enable the user to develop a degradation curve for the geotextile being tested.

5.2 The relation between time to failure in an exposure conducted in accordance with this test method, and service life in a specific outdoor environment requires determination of an acceleration factor as defined in Terminology G 113. The acceleration factor is material-dependent and is only valid if it is based on data from a sufficient number of separate exterior and laboratory-accelerated exposures so that the results used to relate times to failure in each exposure can be analyzed using statistical methods.

NOTE 1—An example of a statistical analysis using multiple laboratory and exterior exposures to calculate an acceleration factor is described by J. A. Simms.[7] See Practice G 151 for more information and additional cautions about the use of acceleration factors.

5.2.1 The deterioration curve obtained from the results of this test method enables the user to determine the tendency of a geotextile to deteriorate when exposed to ultraviolet light and water.

[1] This test method is under the jurisdiction of ASTM Committee D-35 on Geosynthetics and is the direct responsibility of Subcommittee D35.02 on Endurance Properties.

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[2] *Annual Book of ASTM Standards*, Vol 07.01.

[3] Discontinued 1992; see 1991 Annual Book of ASTM Standards, Vol 07.01. Replaced by Test Methods D 5034 and D 5035.

[4] *Annual Book of ASTM Standards*, Vol 08.01.

[5] *Annual Book of ASTM Standards*, Vol 04.09.

[6] *Annual Book of ASTM Standards*, Vol 14.04.

[7] Simms, J.A., *The Journal of Coatings Technology*, Vol 50, 1987, pp. 45-53.