



Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon Arc Type Apparatus¹

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1. Scope

1.1 This test method covers the determination of the deterioration in tensile strength of geotextiles by exposure to xenon arc radiation, moisture, and heat.

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 Textiles²

D 1898 Practice for Sampling of Plastics³

D 4439 Terminology for Geotextiles⁴

D 5035 Test Method for Breaking Force and Elongation of Textile Fabrics (Strip Method)⁴

G 113 Terminology Relating to Natural and Artificial Weathering Tests of Nonmetallic Materials⁵

G 141 Guide for Addressing Variability in Exposure Testing on Nonmetallic Materials⁵

G 151 Practice for Exposing Nonmetallic Materials in Accelerated Test Devices That Use Laboratory Light Sources⁵

G 155 Practice for Operating Xenon Arc Light Apparatus for Exposure of Nonmetallic Materials⁵

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.

3.2.2 The definitions given in Terminology G 113 are applicable to this standard.

4. Summary of Test Method

4.1 Five specimens of a geotextile for the machine direction and for the cross machine direction are exposed in a xenon arc device for each of the following times: 0 (control specimens), for 150, 300, and 500 h. The exposure consists of 120-min cycles as follows: 90 min of light only at $65 \pm 3^\circ\text{C}$ uninsulated black panel temperature and $50 \pm 5\%$ relative humidity, followed by 30 min of light plus water spray.

4.2 After each exposure period, the specimens are subjected to a cut or ravel strip tensile test. The average breaking strength in each direction is compared with the average breaking strength in each direction of the control specimens. The percent strength retained is plotted versus exposure period to produce a degradation curve for the specimens from each direction.

5. Significance and Use

5.1 This method is intended to induce property changes associated with end use conditions, including the effects of solar radiation, moisture and heat. The exposure used is not intended to simulate the deterioration caused by localized weather phenomena such as atmospheric pollution, biological attack, and salt water exposure.

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

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 Annual Book of ASTM Standards, Vol 07.01.

³ Annual Book of ASTM Standards, Vol 08.01.

⁴ Annual Book of ASTM Standards, Vol 04.09.

⁵ Annual Book of ASTM Standards, Vol 14.04.