



Designation: D4439 – 24

# Standard Terminology for Geosynthetics<sup>1</sup>

This standard is issued under the fixed designation D4439; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

## 1. Referenced Documents

### 1.1 *ASTM Standards*:<sup>2</sup>

- C125** Terminology Relating to Concrete and Concrete Aggregates
- D1987** Test Method for Biological Clogging of Geotextile, Drainage Geocomposites, or Soil/Geotextile Filters
- D4354** Practice for Sampling of Geosynthetics and Rolled Erosion Control Products (RECPs) for Testing
- D4491/D4491M** Test Methods for Water Permeability of Geotextiles by Permittivity
- D4533/D4533M** Test Method for Trapezoid Tearing Strength of Geotextiles
- D4594/D4594M** Test Method for Effects of Temperature on Stability of Geotextiles
- D4595** Test Method for Tensile Properties of Geotextiles by the Wide-Width Method
- D4632/D4632M** Test Method for Grab Breaking Load and Elongation of Geotextiles
- D4716/D4716M** Test Method for Determining the (In-plane) Flow Rate per Unit Width and Hydraulic Transmissivity of a Geosynthetic Using a Constant Head
- D4751** Test Methods for Determining Apparent Opening Size of a Geotextile
- D4759** Practice for Determining the Specification Conformance of Geosynthetics
- D4833/D4833M** Test Method for Index Puncture Resistance of Geomembranes and Related Products
- D4873/D4873M** Guide for Identification, Storage, and Handling of Geosynthetic Rolls and Samples
- D4884/D4884M** Test Method for Strength of Sewn or Bonded Seams of Geotextiles
- D4885** Test Method for Determining Performance Strength of Geomembranes by the Wide Strip Tensile Method
- D5101** Test Method for Measuring the Filtration Compatibility of Soil-Geotextile Systems

- D5141** Test Method for Determining Filtering Efficiency and Flow Rate of the Filtration Component of a Sediment Retention Device
- D5262** Test Method for Determining the Unconfined Tension Creep and Creep Rupture Behavior of Planar Geosynthetics Used for Reinforcement Purposes
- D5322** Practice for Laboratory Immersion Procedures for Evaluating the Chemical Resistance of Geosynthetics to Liquids
- D5323** Practice for Determination of 2 % Secant Modulus for Polyethylene Geomembranes
- D5397** Test Method for Evaluation of Stress Crack Resistance of Polyolefin Geomembranes Using Notched Constant Tensile Load Test
- D5494** Test Method for the Determination of Pyramid Puncture Resistance of Unprotected and Protected Geomembranes
- D5496** Practice for In-Field Immersion Testing of Geosynthetics
- D5514/D5514M** Test Method for Large-Scale Hydrostatic Puncture Testing of Geosynthetics
- D5567** Test Method for Hydraulic Conductivity Ratio (HCR) Testing of Soil/Geotextile Systems
- D5594** Test Method for Determination of the Vinyl Acetate Content of Ethylene-Vinyl Acetate (EVA) Copolymers by Fourier Transform Infrared Spectroscopy (FT-IR)
- D5617** Test Method for Multi-Axial Elongation of Geomembranes
- D5641/D5641M** Practice for Geomembrane Seam Evaluation by Vacuum Chamber
- D5747/D5747M** Practice for Tests to Evaluate the Chemical Resistance of Geomembranes to Liquids
- D5818** Practice for Exposure and Retrieval of Samples to Evaluate Installation Damage of Geosynthetics
- D5820** Practice for Pressurized Air Channel Evaluation of Dual-Seamed Geomembranes
- D5994/D5994M** Test Method for Measuring Core Thickness of Textured Geomembranes

### 1.2 *Federal Standard*:<sup>3</sup>

- Federal Standard 751a** Stitches, Seams, and Stitchings

<sup>1</sup> This terminology is under the jurisdiction of **D35** on Geosynthetics and is the direct responsibility of **D35.93** on Editorial and Terminology.

Current edition approved Feb. 1, 2024. Published March 2024. Originally approved in 1984. Last previous edition approved in 2023 as D4439 – 23b. DOI: 10.1520/D4439-24.

<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

<sup>3</sup> Available from DLA Document Services, Building 4/D, 700 Robbins Ave., Philadelphia, PA 19111-5094, <http://quicksearch.dla.mil>.

## 2. Terminology

**absorption**, *n*—the process by which a liquid is drawn into and tends to fill permeable pores in a porous solid body, also, the increase in mass of a porous solid body resulting from penetration of a liquid into its permeable pores. **C125**

**aerobic**, *n*—a condition in which a measurable volume of air is present in the incubation chamber or system. **D1987**

**anaerobic**, *n*—a condition in which no measurable volume of air is present in the incubation chamber or system. **D1987**

**apparent opening size (AOS)**,  $O_{95}$ , *n*—for a geotextile, a property which indicates the approximate largest particle that would effectively pass through the geotextile. **D4751**

**atmosphere for testing geosynthetics**, *n*—air maintained at a relative humidity between 50 to 70 % and a temperature of  $21 \pm 2^\circ\text{C}$  ( $70 \pm 4^\circ\text{F}$ ). **D4439, D4751, D5494**

**back flushing**, *n*—a process by which liquid is forced in the reverse direction to the flow direction. **D1987**

**barrier**—the ability of a geosynthetic to prevent or reduce flow, mass transfer, or both.

DISCUSSION—The boundaries for the function are usually defined by a single or multiple engineering or regulatory thresholds.

**basis weight**—deprecated term (do not use in the sense of mass per unit area). **D4439**

**bend**, *vt*—in *mechanics*, to force an object from its natural or manufactured shape into a curve or into increased curvature. **D4439**

**biocide**, *n*—a chemical used to kill bacteria and other microorganisms. **D1987**

**bituminous geosynthetic barrier (GBR-B)**, *n*—factory-produced structure of geosynthetic materials in the form of a sheet in which the barrier function is fulfilled by bitumen.

**blinding**, *n*—for *geotextiles*, the condition where soil particles block the surface openings of the fabric, thereby reducing the hydraulic conductivity of the system. **D4439**

**breaking force**, (*F*), *J*, *n*—the force at failure. **D4885**

**breaking load**, *n*—the maximum force applied to a specimen in a tensile test carried to rupture. **D4632/D4632M**

**breaking toughness**, *T*, ( $FL^{-1}$ ),  $Jm^{-2}$ , *n*—for *geotextiles*, the actual work-to-break per unit surface area of material. **D4595, D4885**

**chemical resistance**, *n*—the ability to resist chemical attack. **D5322**

**clogging**, *n*—for *geotextiles*, the condition where soil particles move into and are retained in the openings of the fabric, thereby reducing the hydraulic conductivity. **D4439**

**clogging potential**, *n*—in *geotextiles*, the tendency for a given geotextile to decrease permeability due to soil particles that have either lodged in the geotextile openings or have built up a restrictive layer on the surface of the geotextile. **D5101**

**compressed thickness** (*t*, (*L*), mm), *n*—thickness under a specified stress applied normal to the material. **D4439**

**constant-rate-of-load tensile testing machine (CRL)**, *n*—a testing machine in which the rate of increase of the load being applied to the specimen is uniform with time after the first 3 s. **D4439**

**corresponding force**, *n*—synonym for force at specified elongation. **D4885**

**coupon**, *n*—a portion of a material or laboratory sample from which multiple specimens can be taken for testing. **D5747/D5747M**

**creep**, *n*—the time-dependent increase in accumulative strain in a material resulting from an applied constant force. **D5262**

**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. **D5514/D5514M**

**cross-machine direction**, *n*—the direction in the plane of the fabric perpendicular to the direction of manufacture. **D4632/D4632M**

**density** ( $\rho$ , ( $ML^{-3}$ ),  $kg/m^3$ ), *n*—mass per unit volume. **D4439**

**design load**—the load at which the geosynthetic is required to operate in order to perform its intended function. **D5262**

**drainage**, *n*—the ability of a geosynthetic to collect and transport fluids along its plane.

**elastic limit**, *n*—in *mechanics*, the stress intensity at which stress and deformation of a material subjected to an increasing force cease to be proportional; the limit of stress within which a material will return to its original size and shape when the force is removed, and hence, not a permanent set. **D4885**

**elongation at break**, *n*—the elongation corresponding to the breaking load, that is, the maximum load. **D4632/D4632M**

**failure**, *n*—an arbitrary point beyond which a material ceases to be functionally capable of its intended use. **D4885, D5262**

**failure**, *n*—in *testing geosynthetics*, water or air pressure in the test vessel at failure of the geosynthetic. **D5514/D5514M**

**field testing**, *n*—testing performed in the field under actual conditions of temperature and exposure to the fluids for which the immersion testing is being performed. **D5496**

**fill**—deprecated term, see **filling**.

**filling**, *n*—yarn running from selvage to selvage at right angles to the warp in a woven fabric. **D4439**

**flexible polypropylene**, *n*—a material having a 2 % secant modulus of less than 300 MPa (40 000 psi) as determined by Practice **D5323**, produced by polymerization of propylene with or without other alpha olefin monomers.

**force at specific elongation**, FASE, *n*—the force associated with a specific elongation on the force-elongation curve. **D4439**