



Designation: D4439 – 15

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

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### 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 or Soil/Geotextile Filters
- D4354 Practice for Sampling of Geosynthetics and Rolled Erosion Control Products (RECPs) for Testing
- D4439 Terminology for Geosynthetics
- D4491 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 Strip 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 Method 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 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 Compat-

- ibility 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 Evaluating the Unconfined Tension Creep and Creep Rupture Behavior of Geosynthetics
- 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 Tension Test for Geosynthetics
- D5641 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.

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<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  $21 \pm 2^\circ\text{C}$  ( $70^\circ \pm 4^\circ\text{F}$ ). **D4439, D4751, D5494**
- back flushing**, *n*—a process by which liquid is forced in the reverse direction to the flow direction. **D1987**
- 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**
- 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**
- 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**
- force-elongation curve**, *n*—in a *tensile test*, a graphical representation of the relationship between the magnitude of an externally applied force and the change in length of the specimen in the direction of the applied force. (*Synonym* for stress-strain curve.) **D4885**
- geocomposite**, *n*—a product composed of two or more materials, at least one of which is a geosynthetic.

- geofoam**, *n*—block or planar rigid cellular foamed polymeric material used in geotechnical engineering applications.
- geogrid**, *n*—a geosynthetic formed by a regular network of integrally connected elements with apertures greater than 6.35 mm (1/4 in.) to allow interlocking with surrounding soil, rock, earth, and other surrounding materials to function primarily as reinforcement. **D5262**
- geomembrane**, *n*—an essentially impermeable geosynthetic composed of one or more synthetic sheets. **D4439, D4873, D4885, D5994/D5994M, D5820**
- geonet**, *n*—a geosynthetic consisting of integrally connected parallel sets of ribs overlying similar sets at various angles for planar drainage of liquids or gases. **D4439**
- geostrip**—polymeric material in the form of a strip of width not more than 200 mm (7.87 in.), used in contact with soil or other materials in geotechnical and civil engineering applications, or both.
- geosynthetic**, *n*—a planar product manufactured from polymeric material used with soil, rock, earth, or other geotechnical engineering related material as an integral part of a man-made project, structure, or system. **D4354, D4759, D4873, D5617, D5818**
- geosynthetic barrier**—low-permeability geosynthetic material, used in geotechnical and civil engineering applications with the purpose of reducing or preventing the flow of fluid through the construction.
- geosynthetic clay liner**, *n*—a manufactured hydraulic barrier consisting of clay bonded to a layer or layers of geosynthetic materials.
- geotechnical engineering**, *n*—the engineering application of geotechnics. **D4439, D4595**
- geotechnics**, *n*—the application of scientific methods and engineering principles to the acquisition, interpretation, and use of knowledge of materials of the earth's crust to the solution of engineering problems. **D4439, D4491, D4595, D4716/D4716M, D4751**
- geotextile**, *n*—a permeable geosynthetic comprised solely of textiles.  
DISCUSSION—Geotextiles perform several functions in geotechnical engineering applications, including: separation; filtration; drainage; reinforcement; and protection. **D1987, D4439, D5594**
- grab test**, *n*—in fabric testing, a tension test in which only a part of the width of the specimen is gripped in the clamps. **D4632/D4632M**
- gradient ratio**, *n*—in geotextiles, the ratio of the hydraulic gradient through a soil-geotextile system to the hydraulic gradient through the soil alone. **D5101**
- gravity flow**, *n*—flow in a direction parallel to the plane of a geotextile or related product driven predominately by a difference in elevation between the inlet and outflow points of a specimen. **D4716/D4716M**
- head**, *n*—pressure at a point in a liquid, expressed in terms of the vertical distance of the point below the surface of the liquid. **D4716/D4716M**
- hydraulic conductivity** (*k*), *n*—the rate of discharge of water under laminar flow conditions through a unit cross-sectional area of a porous medium under a unit hydraulic gradient and standard temperature conditions (20°C). **D5567**
- hydraulic conductivity ratio** (HCR), *n*—the ratio of the hydraulic conductivity of the soil/geotextile system,  $k_{sg}$ , at any time during the test, to the initial hydraulic conductivity,  $k_{sg0}$ , measured at the beginning of the test (NEW).
- hydraulic gradient**, *i*, *s* (*D*)—the loss of hydraulic head per unit distance of flow, dH/dL. **D5101**
- hydraulic transmissivity**,  $\theta$  ( $L^2 T^{-1}$ ), *n*—for a geotextile or related product, the volumetric flow rate of water per unit width of specimen per unit gradient in a direction parallel to the plane of the specimen. **D4716/D4716M**
- 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. **D5514/D5514M**
- index test**, *n*—a test procedure which may contain a known bias but which may be used to establish an order for a set of specimens with respect to the property of interest. **D4833/D4833M, D4885**
- inflection point**, *n*—the first point of the force-elongation curve at which the second derivative equals zero. **D4885**
- initial tensile modulus**,  $J_p$  ( $FL^{-1}$ ),  $Nm^{-1}$ , *n*—for geosynthetics, the ratio of the change in force per unit width to the change in elongation of the initial portion of a force-elongation curve. **D4885**
- in-plane flow**, *n*—fluid flow confined to a direction parallel to the plane of a geotextile or related product. **D4716/D4716M**
- integral**, *adj*—in geosynthetics, forming a necessary part of the whole; constituent. **D4439**
- laboratory sample**, *n*—a portion of material taken to represent the lot sample, or the original material, and used in the laboratory as a source of test specimens. **D4354**
- laminar flow**, *n*—flow in which the head loss is proportional to the first power of the velocity. **D4716/D4716M**
- linear density**, *n*—mass per unit length; the quotient obtained by dividing the mass of a fiber or yarn by its length.
- lot**, *n*—a unit of production, or a group of other units or packages, taken for sampling or statistical examination, having one or more common properties and being readily separable from other similar units. **D4354**
- lot sample**, *n*—one or more shipping units taken at random to represent an acceptance sampling lot and used as a source of laboratory samples. **D4354**