



# Standard Guide for Selection of Test Methods for Prefabricated Vertical Drains (PVD)<sup>1</sup>

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## 1. Scope

1.1 This guide provides recommendations for the selection of appropriate test methods for prefabricated vertical geocomposite drains (sometimes referred to as Wick Drains) used in geotechnical engineering applications to provide consistency in data reporting.

1.2 This guide includes test methods for all types of prefabricated geocomposite drains manufactured in a plant and consisting of a polymeric core structure with a synthetic fabric (geotextile) jacket for filtration.

1.3 This guide is intended to aid all personnel involved in the selection, manufacture, installation, or evaluation of prefabricated vertical drains.

1.4 *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 and health practices and determine the applicability of regulatory limitations prior to use.*

## 2. Referenced Documents

### 2.1 ASTM Standards:

- D 3786 Test Method for Hydraulic Bursting Strength of Textile Fabrics—Diaphragm Bursting Tester Method (Mullen Burst)<sup>2</sup>
- D 4354 Practice for Sampling of Geosynthetics for Testing<sup>3</sup>
- D 4439 Terminology for Geotextiles<sup>3</sup>
- D 4491 Test Method for Water Permeability of Geotextiles by Permittivity<sup>3</sup>
- D 4533 Test Method for Trapezoid Tearing Strength of Geotextiles<sup>3</sup>
- D 4632 Test Method for Grab Breaking Load and Elongation of Geotextiles<sup>3</sup>
- D 4716 Test Method for Determining the (In-Plane) Flow Rate per Unit Width and Hydraulic Transmissivity of a Geosynthetic Using Constant Head<sup>3</sup>

- D 4751 Test Method for Determining Apparent Opening Size of a Geotextile<sup>3</sup>
- D 4759 Practice for Determining Specification Conformance of Geosynthetics<sup>3</sup>
- D 4873 Guide for Identification, Storage and Handling of Geosynthetic Rolls<sup>3</sup>
- D 4884 Test Method for Strength of Sewn or Thermally Bonded Seams of Geotextiles<sup>3</sup>
- D 4886 Test Method for Abrasion Resistance of Geotextiles (Sand Paper / Sliding Block Method)<sup>3</sup>
- D 5101 Test Method for Measuring the Soil-Geotextile System Clogging Potential by the Gradient Ratio<sup>3</sup>
- D 5199 Test Method for Measuring Nominal Thickness of Geotextiles and Geomembranes<sup>3</sup>
- D 5261 Test Method for Measuring Mass per Unit Area of Geotextiles<sup>3</sup>
- D 5321 Test Method for Determining the Coefficient of Soil and Geosynthetic or Geosynthetic and Friction by Direct Shear Method<sup>3</sup>
- D 5322 Practice for Immersion Procedures for Evaluating the Chemical Resistance of Geosynthetics to Liquids<sup>3</sup>
- D 5493 Test Method for Permittivity of Geotextiles Under Load<sup>3</sup>
- D 5496 Practice for In Field Immersion Testing of Geosynthetics<sup>3</sup>
- D 5567 Test Method for Hydraulic Conductivity Ratio (HCR) Testing of Soil/Geotextile Systems<sup>3</sup>
- D 5818 Practice for Obtaining Samples of Geosynthetics from a Test Section for Assessment of Installation Damage<sup>3</sup>
- D 5819 Guide for Selecting Test Methods for Experimental Evaluation of Geosynthetic Durability<sup>2</sup>
- D 6241 Test Method for the Static Puncture Strength of Geotextiles and Geotextile-related Products Using a 50-mm Probe<sup>3</sup>
- D 6364 Test Method for Determining the Short-Term Compression Behavior of Geosynthetics<sup>3</sup>
- D 6389 Practice for Tests to Evaluate the Chemical Resistance of Geotextiles to Liquids<sup>3</sup>

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<sup>2</sup> *Annual Book of ASTM Standards*, Vol 07.02.

<sup>3</sup> *Annual Book of ASTM Standards*, Vol 04.13.

## 3. Terminology

### 3.1 Definitions:

3.1.1 *geocomposite, n*—a product composed of two or more materials, at least one of which is a geosynthetic.

3.1.2 *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 manmade project, structure, or system.

3.1.3 *geotechnical engineering, n*—the engineering application of geotechnics.

3.1.4 *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.

3.1.5 *geotextiles, n*—any permeable textile material used in foundation, soil, rock, earth, or any other geotechnical engineering related material, as an integral part of a manmade project, structure, or system.

3.1.6 *vertical strip drain, n*—a geocomposite consisting of a geotextile cover and drainage core installed vertically into soil to provide drainage for accelerating consolidation of soils.

3.1.6.1 *Discussion*—Also known as band drain, wick drain, or prefabricated vertical drain (PVD).

#### 4. Significance and Use

4.1 To properly evaluate prefabricated vertical drains, tests must be performed according to specific test methods and procedures. Failure to follow this practice can result in data not representative of the product’s characteristics and performance.

#### 5. Test Methods

5.1 Recommended test methods for prefabricated vertical drains have been grouped into 2 categories and are listed in tables as follows:

##### 5.1.1 Table 1—Prefabricated Vertical Drains Index Properties

Characteristic	ASTM Standard
PVD (Geocomposite)	
Weight	Test Method D 5261
Grab	Test Method D 4632
Thickness	Test Method D 5199
Discharge Capacity (Transmissivity)	Test Method D 4716
Compression	Test Method D 6364
Seam Strength	Test Method D 4884
Geotextile (Filter)	
Permittivity	Test Method D 4491
Permeability	Test Method D 4491
Apparent Opening Size	Test Method D 4751
Abrasion	Test Method D 4886
Static Puncture	Test Method D 6241
Trap Tear	Test Method D 4533
Mullen Burst	Test Method D 3786

##### 5.1.2 Table 2—Prefabricated Vertical Drains Performance Properties.

Characteristic	ASTM Standard
PVD (Geocomposite)	
Discharge Capacity (Transmissivity)	Test Method D 4716
Chemical Resistance	Practice D 5322 / Practice D 6389
Durability	Guide D 5819
Geotextile (Filter)	
Permittivity Under Load	Test Method D 5493
Clogging Potential by Gradient Ratio	Test Method D 5101
Hydraulic Conductivity Ratio	Test Method D 5567

#### 6. Keywords

6.1 geocomposite; geosynthetic; geotextile; permittivity; prefabricated vertical drain; transmissivity

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