Designation: D 6918 – 03

Standard Test Method for Testing Vertical Strip Drains in the Crimped Condition[1]

This standard is issued under the fixed designation D 6918; 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 is a performance test, which measures the effect crimping, has on the ability of vertical strip drains to transmit water parallel to the plane of the drain.

1.2 This test method is applicable to all vertical strip drains.

1.3 The values stated in SI units are to be regarded as the standard.

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 4354 Practice for Sampling of Geosyntheics for Testing[2]

D 4439 Terminology for Geosynthetics[2]

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 *geosynthetics*, *n*—a planar product manufactured from polymeric materials used with soil, rock, earth, or other geotechnical engineering related material as an integral part of a man-made project, structure, or system.

3.1.3 *geotextile*, *n*—a permeable geosynthetic comprised solely of textiles.

3.1.3.1 *Discussion*—Geotextiles perform several functions in geotechnical engineering applications, including: separation, filtration, drainage, reinforcement, and protection.

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

4. Summary of Test Method

4.1 This test method describes procedures for determining the effect of a crimp forming in the vertical strip drain due the consolidation of soils around it in the field.

4.1.1 A vertical strip drain is sealed in a cover of heat shrink plastic to prevent any water from escaping out through the geotextile during the test.

4.1.2 The sealed vertical strip drain is placed in the crimping device (See Fig. 1) and water is allowed to pass through it under a constant head of water.

4.1.3 A 90° crimp is placed on the specimen, and water allowed to pass through it under a constant head in the crimped condition.

4.1.4 The flow rate of water along the plane of the uncrimped vertical strip drain is compared to the flow rate in the crimped condition.

5. Significance and Use

5.1 This test method is considered satisfactory for the acceptance of commercial shipments of vertical strip drains.

5.1.1 In case of dispute arising from differences in reported test results when using this test method for acceptance testing of commercial shipments, the purchaser and the supplier should conduct comparative tests to determine if there is any statistical bias between their laboratories. Competent statistical assistance is recommended for the investigation of bias. As a minimum, the two parties should take a group of test specimens that as homogenous as possible, and that are from a lot of material of the type in question. The test specimens should be randomly assigned in numbers to each laboratory for testing. The average results from the two laboratories should be compared using Student's t-test for unpaired data and an acceptable probability level chosen by the two parties before the start of testing. If a bias is found, either its cause must be found and corrected, or the purchaser and the supplier must agree to interpret future test results in light of the known bias.

5.2 Vertical strip drains are installed in areas where it is desired to increase the rate of soil consolidation. It has been shown that as the soil around the vertical strip drain consolidates, a crimp may form in the vertical strip drain due to the movement of the drain in the area of soil consolidation.

5.3 This test method can be used to evaluate if there is any reduction in flow rate of water through the drain due to the crimping, and what effect, if any, this crimping may have on the rate of consolidation of the soil.

[1] This test method is under the jurisdiction of ASTM Committee D35 on Geosynthetics and is the direct responsibility of Subcommittee D35.03 on Permeability and Filtration.

Current edition approved June 10, 2003. Published July 2003.

[2] *Annual Book of ASTM Standards*, Vol 04.13.

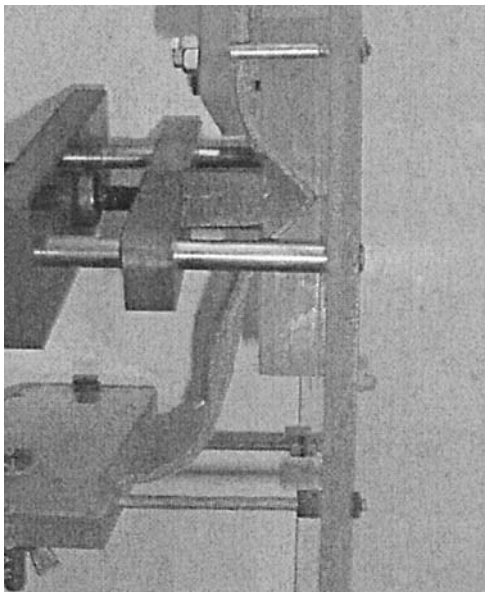

FIG. 1 Crimping Wedge

6. Apparatus

6.1 The test device must be capable of maintaining a constant head of water on the vertical strip drain being tested. The apparatus consists of a water chamber assembly, a specimen holder, and a crimping wedge, all of which are attached to a holding stand. See Fig. 2.

6.2 *Container*, for collecting the water as it flows through the vertical strip drain.

6.3 *Stopwatch or Electronic Timing Device*, connected to the collection container, for timing the flow of water through the vertical strip drain.

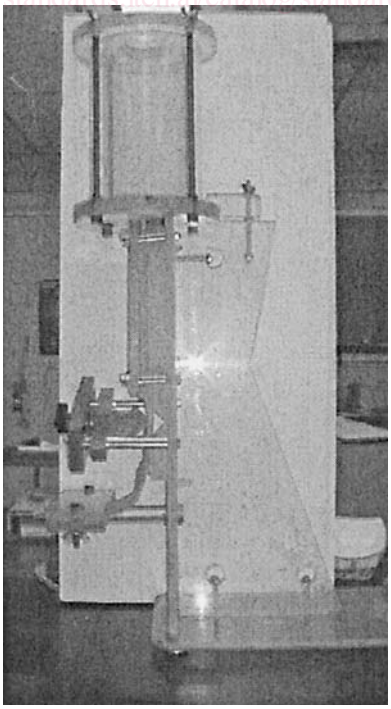

FIG. 2 Complete Crimp Test Apparatus

6.4 *Blow Dryer*, used for applying heat to the heat shrink-wrap that is placed around the test specimen prior to testing.

7. Materials

7.1 *Heat Shrink Plastic Wrap*—The heat shrink plastic wrap, of the type used in homes for sealing windows from wind drafts, is used to seal the vertical strip drain so that water does not flow out through the geotextile wrap on the core. The water is to flow in a parallel plan to the fabric, along the core material of the drain.

7.2 *Bathtub Caulk*—the caulk is used to seal the test specimen into the water chamber assembly as directed in 12.2.

8. Hazards

8.1 There are no known hazards either with the materials, or in performing this test.

9. Sampling, Test Specimens, and Test Units

9.1 *Division into Lots and Lot Samples*—Divide the material into lots and take a lot sample as directed in Practice D 4354. Rolls of prefabricated vertical strip drains are the primary sampling unit.

9.2 *Laboratory Sample*—Remove the outer wrap of drain material from the roll to avoid sampling and testing any material, which may have been damaged during storage. Take for the laboratory sample a 1830 mm (6 ft) length of the drain material.

9.3 *Test Specimens*—From the laboratory sample taken from each lot, cut test specimens as directed in 10. Each test specimen shall be 610 mm (2 ft) long.

10. Number of Specimens

10.1 Unless otherwise agreed upon, as when provided in an applicable material specification, take a number of test specimens per laboratory sample such that the user may expect the 95 % probability level that the test result is no more than 5 % above the average for each laboratory sample.

10.1.1 *Reliable Estimate of v*—When there is a reliable estimate of *v* based upon extensive test records for similar materials in the user's laboratory as directed in the method, calculate the required number of specimens using Eq 1 as follows:

$$n = (tv / A)^2 \quad (1)$$

where:

- n = number of test specimens, rounded upward to a whole number,
- v = reliable estimate of coefficient of variation of individual observations on similar materials in the user's laboratory under single operator precision, %.
- t = the value of Student's t for I = one sided limits, at 95 % probability level, and the degrees of freedom associated with the estimate of v, and
- A = 5.0 % of the average, the value of the allowable variation.

10.1.2 *No Reliable Estimate of v*—When there is no reliable estimate of *v* for the user's laboratory, Eq 1 should not be used directly. Instead, specify the fixed number of three specimens for testing.