



Designation: D8297/D8297M – 23

Standard Test Method for Determination of Erosion Control Products (ECP) Performance in Protecting Slopes from Sequential Rainfall- Induced Erosion Using a Tilted Bed Slope¹

This standard is issued under the fixed designation D8297/D8297M; 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 used to evaluate the ability of erosion control products (ECP) to protect slopes from rainfall-induced erosion using an adjustable tilting bed slope. The standard slopes range from 2:1 to 4:1 (H:V) having a target rainfall intensity of 3.5 in./h [90 mm/h].

1.2 There are three main elements the ECPs must have the ability to perform: 1. Absorb the impact force of raindrops, thereby reducing soil particle loosening and detachment through “splash” mechanisms; 2. Slow runoff and encourage infiltration, thereby reducing soil particle displacement and transport through “overland flow” mechanisms; and 3. Trap soil particles beneath the ECP. When comparing data from different ECPs under consideration, it is important to keep the test conditions the same for the ECPs being evaluated, for example, the rainfall intensity rate and the slope.

1.3 The results of this test method can be used to evaluate performance and acceptability, and can be used to compare the effectiveness of different ECPs. This method provides a comparative evaluation of an ECP to baseline bare soil conditions under controlled and documented conditions. This test method can provide information about a product that is under consideration for a specific application where no performance information currently exists.

1.4 This test method covers the use of three different soil types, ECP installation: sprayed, rolled, or dry applied, and a runoff collection procedure. This test is typically performed indoors, but may be performed outside as long as certain requirements are met. Partially enclosed facilities are acceptable providing the environmental conditions are met.

1.5 *Units*—The values stated in either inch-pound units or SI units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore,

each system shall be used independently of the other. Combining values from the two systems may result in nonconformance with the standard. Reporting of test results in units other than inch-pound shall not be regarded as nonconformance with this standard.

1.5.1 The gravitational system of inch-pound units is used when dealing with inch-pound units. In the system, the pound (lbf) represents a unit of force (weight), while the units for mass is slugs. The slug unit is not given, unless dynamic ($F = ma$) calculations are involved.

1.5.2 It is common practice in the engineering/construction profession to concurrently use pounds to represent both a unit of mass (lbm) and of force (lbf). This practice implicitly combines two separate systems of units; the absolute and the gravitational systems. It is scientifically undesirable to combine the use of two separate sets of inch-pound units within a single standard. As stated, this standard includes the gravitational system of inch-pound units and does not use/present the slug unit of mass. However, the use of balances and scales recording pounds of mass (lbm) or recording density in lbm/ft³ shall not be regarded as nonconformance with this standard.

1.5.3 Calculations are done using only one set of units; either gravitational inch-pound or SI. Other units are permissible provided appropriate conversion factors are used to maintain consistency of units throughout the calculations, and similar significant digits or resolution, or both are maintained.

1.6 All observed and calculated values shall conform to the guidelines for significant digits and rounding established in Practice D6026, unless superseded by this test method.

1.6.1 The procedures used to specify how data are collected/recorded and calculated in the standard are regarded as the industry standard. In addition, they are representative of the significant digits that generally should be retained. The procedures used do not consider material variation, purpose for obtaining the data, special purpose studies, or any considerations for the user's objectives; and it is common practice to increase or reduce significant digits of reported data to be commensurate with these considerations. It is beyond the scope of these test methods to consider significant digits used in analysis methods for engineering data.

¹ This test method is under the jurisdiction of ASTM Committee D18 on Soil and Rock and is the direct responsibility of Subcommittee D18.25 on Erosion and Sediment Control Technology.

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*A Summary of Changes section appears at the end of this standard



1.7 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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.

1.8 This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.

2. Referenced Documents

2.1 ASTM Standards:²

- D653 Terminology Relating to Soil, Rock, and Contained Fluids
- D698 Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³))
- D2216 Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
- D2434 Test Methods for Measurement of Hydraulic Conductivity of Coarse-Grained Soils
- D2487 Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)
- D3740 Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction
- D4318 Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
- D4753 Guide for Evaluating, Selecting, and Specifying Balances and Standard Masses for Use in Soil, Rock, and Construction Materials Testing
- D5084 Test Methods for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter
- D6026 Practice for Using Significant Digits and Data Records in Geotechnical Data
- D6475 Test Method for Measuring Mass per Unit Area of Erosion Control Blankets
- D6525/D6525M Test Method for Measuring Nominal Thickness of Rolled Erosion Control Products (Withdrawn 2014)³
- D6567 Test Method for Measuring the Light Penetration of a Rolled Erosion Control Product (RECP)
- D6818 Test Method for Tensile Properties of Rolled Erosion Control Products
- D6913/D6913M Test Methods for Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis
- D6938 Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

- D7367 Test Method for Determining Water Holding Capacity of Fiber Mulches for Hydraulic Planting
- D7928 Test Method for Particle-Size Distribution (Gradation) of Fine-Grained Soils Using the Sedimentation (Hydrometer) Analysis
- D7937 Test Method for In-situ Determination of Turbidity Above 1 Turbidity Unit (TU) in Surface Water
- D8199 Test Method for Determining the Specific Strength of Hydraulically Applied Fiber Matrix Products for Erosion Control
- E11 Specification for Woven Wire Test Sieve Cloth and Test Sieves

2.2 Other Standards:

Soil Science Division Staff, 2017. Soil Survey Manual. C. Ditzler, K. Scheffe, and H.C. Monger (eds.). USDA Handbook 18. Government Printing Office, Washington, DC⁴

3. Terminology

3.1 Definitions:

3.1.1 For definitions of common technical terms used in this standard, refer to Terminology D653.

3.1.2 *erosion control product (ECP)*, *n*—in erosion control, a temporary degradable or long term, non-degradable material designed to reduce soil erosion and assist in the growth, establishment, and protection of vegetation.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *runoff*, *n*—in erosion control, sediment and water collected from the ECP covered test plots during testing.

4. Summary of Test Method

4.1 Before testing, the rainfall simulator system is calibrated for each type of rainfall intensity/slope combination intended for use. Once the rainfall simulator is calibrated, bare soil slope tests are conducted on test plots to determine the baseline soil loss, turbidity and sediment values. Three test plots are prepared and the ECP is applied by spraying, rolling, or dry application according to the manufacturer's recommended rate of application corresponding to the slope of the prepared test plots. After the ECP has been installed and cured (if needed) the rainfall simulator is started and runs for 30 minutes per day for a total of 3 days with a total time of 90 minutes. The total amount of runoff is collected at the end of each 30 minute period and a turbidity sample is taken every 15 minutes during testing using the collection procedure. Specimens are taken from the collected runoff and are analyzed for soil loss, turbidity and sediment concentrations.

5. Significance and Use

5.1 This test method utilizes large-scale testing equipment and procedures established at a variety of testing laboratories over the last 30 years.

5.2 This method is useful in evaluating ECPs and their installation to reduce soil loss and sediment concentrations

² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

³ The last approved version of this historical standard is referenced on www.astm.org.

⁴ The referenced Soil Survey Manual can be found by visiting the USDA website, www.nrcs.usda.gov, or call NRCS Customer Service at 888- 526-3227.