Designation: D8263/D8263M – 23

Standard Test Method for Determining the Change in Mass of Rolled Erosion Control Products When Submerged in Water[1]

This standard is issued under the fixed designation D8263/D8263M; 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 measures the change in mass of a rolled erosion control product when specimens are submerged in water for a prescribed period of time. The change in mass is reported as a percentage of the original dry mass of the specimen.

1.2 *Units*—The values stated in either SI units or inch-pound units [given in brackets] 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 SI shall not be regarded as nonconformance with this standard.

1.2.1 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; that is, the absolute system and the gravitational system. 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 (lbf) or recording density in lbm/ft^3 shall not be regarded as nonconformance with this standard.

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values shall conform to the guidelines for significant digits and rounding established in Practice D6026, unless superseded by this test method.

1.3.1 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.

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

1.5 *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

D3740 Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction

D4354 Practice for Sampling of Geosynthetics and Rolled Erosion Control Products (RECPs) for Testing

D4439 Terminology for Geosynthetics

D4753 Guide for Evaluating, Selecting, and Specifying Balances and Standard Masses for Use in Soil, Rock, and Construction Materials Testing

D6026 Practice for Using Significant Digits and Data Records in Geotechnical Data

3. Terminology

3.1 *Definitions:*

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

[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.

Current edition approved July 1, 2023. Published July 2023. DOI: 10.1520/D8263_D8263M-23

[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.

3.1.2 For definitions of other terms relating to geotextiles and geomembranes used in this test method, refer to Terminology D4439.

4. Summary of Test Method

4.1 The change in mass of an RECP is determined by measuring the mass of test specimens of known dimensions cut from equally spaced distances over the full width of the laboratory sample, submerging the specimens in water for a prescribed time period, and then measuring the mass of the specimens after removing them from the water and allowing them to drain. The calculated values are then averaged to obtain the mean change in mass of the sample.

5. Significance and Use

5.1 Rolled erosion control products are intended to protect seed beds from erosion and provide an environment that encourages seed germination. Maintaining a moist environment by gradually releasing absorbed moisture helps provide a beneficial growth environment. The ability of a product to absorb moisture is commonly specified. This test method can be used for quality control and to determine product conformance to a specification.

5.2 Change in mass of RECPs submerged in water may be used to control the quality of many RECPs. Change in mass of RECPs submerged in water has not been proven to relate to field performance for all materials.

5.3 The change in mass of RECPs submerged in water may vary considerably depending on the composition of the materials used in the product or due to inconsistency within the product. This test method enables the characterization and control of product consistency.

5.4 This test method may be used to determine the effect of different component materials and makeup of RECPs on the change in mass when submerged in water.

5.5 This test method may be used for acceptance testing of commercial shipments of RECPs. Comparative tests as directed in 5.6 may be advisable.

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

NOTE 1—The quality of the result produced by this standard is dependent on the competence of the personnel performing it, and the suitability of the equipment and facilities used. Agencies that meet the criteria of Practice D3740 are generally considered capable of competent and objective testing/sampling/inspection/etc. Users of this standard are cautioned that compliance with Practice D3740 does not in itself assure reliable results. Reliable results depend on many factors; Practice D3740 provides a means of evaluating some of those factors.

6. Apparatus

6.1 *Timing Device*—A clock, stopwatch, digital timer, or comparable device readable to 1 second or better.

6.1.1 *Balance*—Balances shall conform to the requirements of Guide D4753. The balance shall have readability without estimation of 0.01 g [0.001 oz].

6.2 *Thermometric Device*—A thermometric device capable of measuring the temperature of the water and having an accuracy of at least ±0.1°C/°F.

6.3 *Tub*—An open top container of sufficient size, shape, and integrity to hold enough test fluid to fully submerge the test specimens

6.4 *Specimen Carrier*—Flat, rectangular piece(s) of cardboard, or metal or plastic trays of sufficient size capable of fully supporting the specimen during transport.

6.5 *Open Mesh Rack*—A relatively heavy, rigid, open mesh, panel structure for underlying and overlying specimens. Wire shelving having approximately 2.5 cm [1 in.] spaced wires such as is used in closets has been successfully used.

7. Sampling and Test Specimens

7.1 *Sample by Lot*—In the absence of other guidelines, divide the product into lots and take lot samples in accordance with Practice D4354. An RECP lot sample is typically a roll.

7.2 *Laboratory Sample*—For the laboratory sample, take a full-width sample by at least 2 m [6.5 ft] in length in the machine direction so that the size and number of specimens (see 7.3 and 7.4) can be obtained. Exclude the inner and outer layers or wraps of the roll or any material containing folds, crushed areas, or other distortions not representative of the sampled lot.

7.3 *Test Specimens:*

7.3.1 Obtain the number of test specimens determined in 7.5 from the laboratory sample so that each specimen will contain different machine and cross-machine elements with no specimen taken nearer than 100 mm [4 in.] from the roll sides or ends, unless otherwise specified.

7.3.2 Cut test specimens each measuring 250 mm by 250 mm [10 in. by 10 in.]. Make sure that each specimen is at least one-tenth the width of the roll away from the selvage. DO NOT cut specimens from the first or last 3 m [10 ft] of the product roll unless discussed with and authorized by the requesting agency.

7.4 Number and then determine and record the mass of clean and dry specimen carriers, $M_{c\text{-}ambient}$, to the nearest 0.1 g [0.004 oz]. As most RECPs are constructed from numerous components, take care to keep the components of the specimen together throughout the specimen preparation, conditioning, and measurement procedures. This can be accomplished by keeping the specimen on the designated carrier throughout the preparation/conditioning/weighing process.

7.5 *Number of Specimens*—Unless otherwise agreed upon, as when provided in an applicable material specification, take the number of test specimens per laboratory sample as follows:

7.5.1 *Reliable Estimate of the Coefficient of Variation, v*—When there is a reliable estimate of *v* based upon extensive part records for similar materials tested in the user's laboratory as directed in this test method, calculate the required number of specimens as follows so that the user may expect at the 95 % probability level that the test result is not more than 5.0 % of the average above or below the average of the sample:

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

where:

n = number of test specimens (rounded upward to a whole number),
v = reliable estimate of the coefficient of variation of the individual observations on similar materials in the user's laboratory under conditions of single-operator position, %,
t = the value of student's t for one-sided limits, a 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.

7.5.2 *No Reliable Estimate of the Coefficient of Variation, v*—When there is no reliable estimate of v for the user's laboratory, measurements shall be made on a minimum of five (5) specimens per laboratory sample.

NOTE 2— In the event of a dispute as described in 5.6, application of 7.5.2 is recommended

8. Conditioning

8.1 Bring the specimens to moisture equilibrium in an atmosphere maintained at 21 ± 2°C [70 ± 4°F] with a relative humidity of 60 ± 10 %. Moisture equilibrium is considered to have been reached when the change in mass of the specimen in successive mass determinations made and recorded at intervals of not less than 2 hours, does not exceed ±0.1 % of the mass of the specimen.

8.2 In lieu of moisture equilibrium measurements, the specimens shall condition for no less than 24 hours.

9. Procedure

9.1 Determine and record laboratory temperature and relative humidity during testing to the nearest 0.1°C/°F and 1 % relative humidity, respectively. Take care to handle the specimens in such a way as to avoid loss of material throughout testing.

NOTE 3—RECP specimens are often comprised of loose fibers held on or between light-weight plastic nettings by intermittent stitching and packaged as rolls. Carriers assist in the careful handling and transport of specimens preventing loss of fibers.

9.2 After at least 24 hours of conditioning (see Section 8), determine the mass of the specimen and the carrier. Determine the mass of the carrier with the specimen to the nearest 0.1 g [0.004 oz] and record this value as the total mass in ambient conditions, or $M_{t\text{-}ambient}$. Slide the individual specimens off of their carriers onto an open mesh rack and cover with an additional open mesh rack to prevent floatation and submerge in a tub of water at room temperature for 24 ± 0.25 hours. Water as used in this standard shall be tap water.

NOTE 4—It is important to both support the specimen during transport and to prevent flotation when submerged with minimal water blockage.

9.3 Remove the rack with the specimens from the water and allow specimens to drain while laying on a very slight incline for 10 ± 0.1 min.

9.4 Number and then determine and record the mass of additional clean and dry specimen carriers to the nearest 0.1 g [0.004 oz]. Record this value as carrier mass, or M_c.

9.5 Transfer each specimen to a carrier to facilitate the measurement of mass. Determine the mass of the carrier with the specimen to the nearest 0.1 g [0.004 oz] and record this value as the total mass submerged/drained, or M_t.

10. Calculation or Interpretation of Results

10.1 Calculate the ambient mass of each specimen using the following equation:

$$M_{s-ambient} = M_{t-ambient} - M_{c-ambient} \quad (2)$$

where:

$M_{s\text{-}ambient}$ = mass of specimen in ambient conditions, g [oz],
$M_{t\text{-}ambient}$ = total mass (of specimen + specimen carrier) in ambient conditions, g [oz], and
$M_{c\text{-}ambient}$ = mass of specimen carrier in ambient conditions, g [oz].

10.2 Calculate the mass of each specimen as follows:

$$M_s = M_t - M_c \quad (3)$$

where:

M_s = mass of submerged/drained specimen, g [oz],
M_t = total mass of submerged/drained (specimen + specimen carrier), g [oz], and
M_c = mass of specimen carrier, g [oz].

10.3 Calculate the percent change in mass as follows:

$$\%\ \text{Change in Mass} = [(M_s - M_{s-ambient})/M_{s-ambient}] \times 100 \quad (4)$$

10.4 Calculate the average and standard deviation of the specimens.

11. Report: Test Data Sheet(s)/Form(s)

11.1 The methodology used to specify how data are recorded on the test data sheet(s)/form(s), as given below, is covered in 1.3 and in Practice D6026.

11.2 Record as a minimum the following general information (data):

11.2.1 Identification of the material being tested.

11.2.2 Test date and the initials of the person(s) who performed the test.

11.3 Record as a minimum the following test specimen data:

11.3.1 Mass of specimen in ambient conditions,

11.3.2 Total mass (of specimen + specimen carrier) in ambient conditions,

11.3.3 Mass of specimen carrier in ambient conditions,

11.3.4 Mass of submerged/drained specimen,