Designation: D6475 – 17

Standard Test Method for Measuring Mass per Unit Area of Erosion Control Blankets[1]

This standard is issued under the fixed designation D6475; 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 can be used as an index test to determine the mass per unit area of all erosion control blankets (ECBs).

1.2 All observed and calculated values shall conform to the guidelines for significant digits and rounding established in Practice D6026.

1.2.1 The method used to specify collection, calculation, or recording of data in this test method is not directly related to the accuracy to which the data can be applied in design or other uses or both. Application of the results obtained using this test method is beyond its scope.

1.3 *Units*—The values stated in SI units are to be regarded as the standard. No other units of measurement are included in this 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:*[2]

D123 Terminology Relating to Textiles

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

D5261 Test Method for Measuring Mass per Unit Area of Geotextiles

D6026 Practice for Using Significant Digits in Geotechnical Data

E145 Specification for Gravity-Convection and Forced-Ventilation Ovens

E177 Practice for Use of the Terms Precision and Bias in ASTM Test Methods

E691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method

2.2 *Erosion Control Technology Council Standard:*[3]

Technical Guidance Manual, Terminology and Index Testing Procedures for Rolled Erosion Control Products

3. Terminology

3.1 *Definitions*—For other terminology, see Terminologies D123, D653, and D4439.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *erosion control blanket, ECB, n*—degradable material, composed primarily of processed natural organic materials, manufactured or fabricated into rolls designed to reduce soil erosion and assist in the growth, establishment, and protection of vegetation.

3.2.2 *erosion control net, ECN, n*—planar woven natural fiber or extruded geosynthetic mesh used as a component in the manufacture of ECBs.

3.2.3 *index test, n*—test procedure that may be used to establish an order for a set of specimens with respect to the property of interest.

3.2.4 *lot, n*—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.

3.2.5 *natural, adj*—describes a class of various general fibers of animal or vegetable origin.

3.2.6 *polymer, n*—chemical compound or mixture of compounds formed by polymerization and consisting essentially of repeating structural units.

3.2.7 *sample, n*—portion of material that is taken for testing or recording purposes and used in the laboratory as a source of individual specimens.

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

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[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] Available from ISO Case Postale 56, CH-1211, Geneva 20, Switzerland.

3.2.8 *temporary degradable, n*—erosion control blanket composed of biologically, photochemically, or otherwise degradable materials that temporarily reduce soil erosion and enhances the establishment of vegetation.

4. Summary of Test Method

4.1 The mass per unit area of an ECB is determined by weighing test specimens of known dimensions cut from various locations over the full width of the laboratory sample. The measured weight is then used to calculate the mass per unit area of the specimen, and these values are averaged to obtain the mean mass per unit area of the laboratory sample.

4.2 This test method requires several hours for proper drying of the specimen in an oven at high temperature.

5. Significance and Use

5.1 This test method is used to determine if the ECB meets specifications for mass per unit area. This measurement allows for a simple control of the delivered material by a comparison of the mass per unit area of the delivered material and the specified mass per unit area.

5.2 The procedure in this test method may be used for acceptance testing of commercial shipments, but caution is advised since information about between-laboratory precision is incomplete.

5.3 Testing under this standard shall conform to the requirements of Practice D3740.

6. Apparatus

6.1 *Balance,* weighing device, calibrated, capable of weighing to an accuracy of 0.1 g.

6.2 *Drying Oven,* thermostatically controlled, preferably of the forced-draft type, meeting the requirements of Specification E145 and capable of maintaining a uniform temperature of 50 ± 5°C throughout the drying chamber.

6.3 *Specimen Trays,* made of material resistant to corrosion and change in mass upon repeated heating, cooling, exposure to materials of varying pH, and cleaning big enough to hold 1000 cm^3 specimen and able to handle temperature swing from 50°C to room temperature.

6.4 *Container Handling Apparatus,* gloves, tongs, or suitable holder for moving and handling hot trays after drying.

7. Sampling

7.1 *Lot Sample*—Divide the test specimens into lots and, for the lot to be tested, take the lot samples in accordance with Practice D4354.

7.2 *Laboratory Sample*—Consider the units in the lot sample as the units in the laboratory sample. For the laboratory sample, take a full-width swatch of sufficient length along the selvage so that the requirements of 7.2.3 can be met.

7.2.1 The laboratory sample should be free from imperfections and characteristics not representative of the material sampled.

7.2.2 As most ECBs are constructed from several component materials, sampling of the bulk product shall be performed so as to maintain the structural integrity of the product. This is true not only for generating a test sample, but also for the generation of individual test specimens from the sample for testing. Careless handling of materials may result in loss of component fibers, yarns, netting, or stitching, or a combination thereof, and a bias of test results. Note any loss of material components observed during sample and test specimen preparation.

7.2.3 The number of test specimens shall be a minimum of five, cut in square or rectangular configuration using sharp shears, so that they are representative of the entire roll width and with a combined total minimum area of 5000 cm^2. Each test specimen shall be equal in area (not less than 1000 cm^2 in accordance with Test Method D5261). Cut each test specimen using a jig or template to ensure uniformity of size, with an accuracy of ±0.5 % of its area.

7.2.4 Cut specimens from across each third of the roll width. Do not cut specimens from the first or last 3 m of the roll length, or from within 10 cm of the edges of the roll.

7.2.5 For test specimens prepared in the field, larger than minimum-sized test specimens will be required to stay within the cutting accuracy of 0.5 %. It is recommended that field cut specimens be cut with an area not less than 1500 cm^2 , so that the integrity of the specimen will be preserved until final specimen sizes can be prepared in the testing laboratory.

7.2.6 Some products vary in physical properties in the transverse or machine direction. For that reason, it is appropriate to secure samples from across the roll width.

7.2.7 Procedures found to be successful for cutting test specimens from rolled erosion control products include the use of bags and slip supports to keep all components of degradable specimens together during the sample preparation. The method of specimen cutting should be included with the reported data.

7.2.8 If the structure of the erosion control blanket is such that the specified test specimen size is not representative of the laboratory sample, a larger size shall be agreed upon between the purchaser and the supplier.

7.2.9 All samples shall be marked with identification information, including manufacturer's name, style, or product number, unique roll number, and date sampled.

7.2.10 Most conformance testing requires the laboratory to sample the material randomly across the roll width. When this is required, a section of material representing the entire roll shall be provided. Alternately, cut panels can be used as long as they represent random locations across the width of the roll. Mark each panel for identification.

7.2.11 If samples are to be shipped or transported to the laboratory, they should be wrapped in a durable protective covering so as to prevent damage or loss or both of component materials. Provide a packing list or chain of custody to indicate where the sample came from and instructions for testing or other handling.

8. Procedure

8.1 Determine and record the mass of the clean and dry specimen tray on a calibrated balance to the nearest 0.1 g. Record this value as *Mc*.

8.2 Select representative test specimens in accordance with Section 7.

8.3 Place the specimen on the specimen tray.

8.4 To prevent mixing of specimens and yielding of incorrect results, number all trays and record the tray numbers on the laboratory data sheets.

8.5 Place the tray with the test specimen in the drying oven. Dry the specimen to a constant mass. Maintain the drying oven at 50 ± 5°C unless otherwise specified. The time required to obtain constant mass will vary depending on the type of material, size of specimen, moisture content in the as-delivered condition, and other factors. The influence of these factors generally can be established by good judgment, experience with the materials being tested, and the apparatus being used.

8.6 Since the type of materials being tested is lightweight and organic in nature, drying time required to achieve constant mass should be relatively short. Dry for a minimum of 8 h or until the change in mass after two successive periods (greater than 1 h) of drying is less than 0.1 %.

8.7 After the specimen has dried to constant mass as prescribed in 8.6, remove the tray from the oven using appropriate safety gloves or tongs. In order that the weight of the dried specimen not be affected as a result of moisture absorption, place the tray on the balance and weigh the specimen within 5 min after removal from the oven.

8.8 Determine the mass of the tray with the dried specimen to the nearest 0.1 g using the same calibrated balance as in 8.1. Record this value as *Mt*.

8.9 Repeat this procedure for each test specimen.

9. Calculation

9.1 Calculate the mass of the specimen *Ms*, in grams, as follows:

$$Ms = Mt - Mc \quad (1)$$

where:

Mt = mass of the dried specimen, g, and
Mc = mass of the specimen tray, g.

9.2 Calculate the mass per unit area of each of the specimens as follows:

$$m = Ms \times 10\ \ 000/A \quad (2)$$

where:

m = mass per unit area, rounded to the nearest 0.1 g/m^2, and
A = area of the specimen, cm^2.

9.3 Calculate the average and standard deviation of the mass per unit area results for the samples tested.

10. Report

10.1 Report the following information:

10.1.1 Type of ECB tested, sampling method used, the test specimen size, shape, and the number of test specimens tested,

10.1.2 The average mass per unit area and standard deviation to three significant figures, and

10.1.3 Report the mass of lost components in the final report.

10.2 *Examples of Significant Digits*—See Table 1.

10.3 A statement of any departures from the testing procedures so that the results can be evaluated.

11. Precision and Bias

11.1 The precision of this test method is based on an interlaboratory study (ILS) of this test method conducted in 2013. Eight laboratories participated in this study. Each of the laboratories reported three replicate test results for a single type of double net blanket. One laboratory also reported four replicates for an additional five products to determine repeatability better. Every "test result" reported represents an individual determination. Except for the ultimate use of data from only seven laboratories, Practice E691 was followed for the design and analysis of the data; the details are given in ASTM Research Report No. D18-1023.[4]

11.1.1 *Repeatability (r)*—The difference between repetitive results obtained by the same operator in a given laboratory applying the same test method with the same apparatus under constant operating conditions on identical test material within short intervals of time would, in the long run, in the normal and correct operation of the test method, exceed the following values only in 1 case in 20.

11.1.1.1 Repeatability can be interpreted as the maximum difference between two results obtained under repeatability conditions that is accepted as plausible because of random causes under normal and correct operation of the test method.

11.1.1.2 Repeatability limits are listed in Table 2.

11.1.2 *Reproducibility (R)*—The difference between two single and independent results obtained by different operators applying the same test method in different laboratories using different apparatus on identical test material would, in the long run, in the normal and correct operation of the test method, exceed the following values only in 1 case in 20.

11.1.2.1 Reproducibility can be interpreted as the maximum difference between two results obtained under reproducibility conditions that is accepted as plausible because of random causes under normal and correct operation of the test method.

11.1.2.2 Reproducibility limits are listed in Table 2.

11.1.3 The above terms (repeatability limit and reproducibility limit) are used as specified in Practice E177.

11.1.4 Any judgment in accordance with 11.1.1 and 11.1.2 will have an approximate 95 % probability of being correct. The precision statistics obtained in this ILS shall not be treated as exact mathematical quantities that are applicable to all

[4] Supporting data have been filed at ASTM International Headquarters and may be obtained by requesting Research Report RR:D18-1023. Contact ASTM Customer Service at service@astm.org.

TABLE 1 Example of Significant Digits

Number as Written	Number of Significant Digits	Implied Range
341	3	340.5 to 341.5
34.1	3	34.05 to 34.15
0.00341	3	0.003405 to 0.003415
3410	4	3409.5 to 3410.5
341 EE7	3	340.5 EE7 to 341.5 EE7
3.41 EE-2	3	3.405 EE-2 to 3.415 EE-2

TABLE 2 Mass per Unit Area (g/m^2)

Material	Average[A]	Repeatability Standard Deviation Sr	Reproducibility Standard Deviation SR	Repeatability Limit r	Reproducibility Limit R
Double net blanket	340.34	34.04	42.09	95.32	117.84
Product A	252.48	23.50	N/A	65.79	N/A
Product B	300.88	28.74	N/A	80.46	N/A
Product C	189.65	21.56	N/A	60.36	N/A
Product D	310.08	16.72	N/A	46.82	N/A
Product E	200.13	27.11	N/A	75.91	N/A

[A]The average of the laboratories' calculated averages.

circumstances and uses. The limited number of materials tested may lead to times when differences greater than predicted by the ILS results will arise, sometimes with considerably greater or smaller frequency than the 95 % probability limit would imply.

11.2 *Bias*—At the time of the study, there was no accepted reference material suitable for determining the bias for this test method; therefore, no statement on bias is being made.

11.3 The precision statement was determined through statistical examination of 41 results, from 7 laboratories, on 6 materials.

12. Keywords

12.1 ECB; erosion control blanket; mass per unit area; weight