Designation: D7322/D7322M – 16ε1

Standard Test Method for Determination of Rolled Erosion Control Product (RECP) Ability to Encourage Seed Germination and Plant Growth Under Bench-Scale Conditions[1]

This standard is issued under the fixed designation D7322/D7322M; 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.

ε[1] NOTE—The designation was editorially corrected to match the units of measurement statement in October 2016.

1. Scope

1.1 This test method covers guidelines, requirements, and procedures for evaluating the effect of Rolled Erosion Control Products (RECPs) on seed germination and vegetation enhancement.

1.2 This test method will evaluate the effects of RECPs on seed germination in a controlled environment.

1.3 This test method utilizes bench-scale testing procedures and shall not be interpreted as indicative of field performance.

1.4 This test method is not intended to replace full-scale simulation or field testing in acquisition of performance values that are required in the design of erosion control measures utilizing RECPs.

1.5 The values stated in either SI units or inch-pound 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 non-conformance with the standard.

1.6 *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]

D653 Terminology Relating to Soil, Rock, and Contained Fluids

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

D5268 Specification for Topsoil Used for Landscaping Purposes

D6475 Test Method for Measuring Mass Per Unit Area of Erosion Control Blankets (Withdrawn 2015)[3]

D6566 Test Method for Measuring Mass per Unit Area of Turf Reinforcement Mats

3. Terminology

3.1 For definitions of terms used in this test method, see Terminology D653.

4. Summary of Test Method

4.1 Containers containing soil are sown with seeds and then covered with an RECP. Additional containers of soil are sown with seed and left uncovered as *controls*. The light, temperature, and humidity are maintained and documented. The amount of germination and growth is measured periodically throughout the test, and the mass of vegetation is calculated at the conclusion of the test.

4.2 Each RECP under consideration as well as control containers of uncovered soil undergo testing in a controlled environment.

5. Significance and Use

5.1 This test method evaluates the effect of an RECP on seed germination and initial plant growth in a controlled environment.

5.2 The results of this test can be used to compare RECPs and other erosion control materials to determine which are the most effective at encouraging the growth of vegetation.

[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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[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.

6. Apparatus

6.1 *Germination Containers*—Plastic pots nominally 20 ± 1 cm [8 ± 0.4 in.] inside diameter made from plastic pipe section cylinders and having a height of 10 ± 1 cm [4 ± 0.4 in.]. The pots include a perforated bottom to allow drainage.

6.2 *Controlled Environmental Chamber*—Platform and surroundings capable of maintaining a constant temperature of 27 ± 2°C [81 ± 2°F], 45 ± 5 % relative humidity, and 9700 ± 1100 lux [900 ± 100 ft-candles], with a light source as outlined in A1.1.

6.3 *Photometer*—Instrument capable of measuring the illumination provided by a fluorescent light source, including both the visible and ultraviolet (UV) spectrum.

6.4 *Thermometer*—Capable of measuring temperature.

6.5 *Hygrometer*—Capable of measuring relative humidity.

7. Test Seeds

7.1 The test should be conducted on one seed mix of tall fescue (Pure Live Seed, PLS = 80 ± 5 %). Seed shall be stored in a refrigerator.

NOTE 1—The test seed listed in this test method has been successful for product comparison purposes. However, this test may be used with alternative test seeds based on user needs. If test seeds different from those listed in this procedure are used, agreement should be established between the testing laboratory and the user of the test.

7.2 Unless otherwise requested, use ASTM topsoil. ASTM topsoil shall comply with Specification D5268.

8. Sampling

8.1 Perform RECP material sampling in accordance with Practice D4354.

8.2 The laboratory RECP sample should be 1 m^2 [10 ft^2].

8.3 Cut three specimens from each RECP laboratory sample. The specimen should completely cover the soil in the germination pots.

9. Procedure

9.1 *Prepare Germination Containers:*

9.1.1 Prepare three pots for each RECP to be tested and three control pots.

9.1.2 Place the soil growing medium in each pot. The growing medium shall be topsoil conforming to Specification D5268 with an in-place moisture content and unit weight determined as follows:

9.1.2.1 Condition and place the topsoil in each pot at a moist unit weight of 13.3 ± 0.8 kN/m^3 [85 ± 5 pcf] and 35 to 40 % moisture content (approximately 60 % saturation).

9.1.2.2 Randomly select three 5 by 5 cm [2 by 2 in.] squares from each pot. Outline or mark, or both, the selected squares in each pot. Data will be periodically collected from within these squares. Alternatively, the entire pot can be used for data collection.

9.1.2.3 Sow each pot with 0.50 seeds per cm^2 [500 seeds per ft^2]. This is approximately 176 seeds per pot and 13 seeds per selected square. Distribute the seeds as uniformly as possible throughout each pot.

9.1.2.4 Press the seeds firmly against the soil surface, and apply a thin veneer of cover soil of no more than 3 mm [0.1 in.] thick over the seeds. Compress both the seed and the topsoil using a 23 kg [50 lb] circular mass having a nominal diameter equivalent to the pot inside diameter.

9.1.2.5 Add sufficient water to bring the placed and compacted topsoil to approximately 100 % saturation. (Stop as soon as free water is apparent on the surface.)

9.1.2.6 Each RECP specimen shall be weighed and measured to determine its mass per unit area in accordance with Test Method D6475 and Test Method D6566. Cover each of three pots with an RECP specimen. Three pots will be left uncovered to be controls. For RECP-covered pots, place the RECP over the pot, and hold firmly in place around the perimeter of the pot.

9.1.2.7 Place the pots in the controlled environmental chamber conditioned at 27 ± 2°C [81 ± 2°F], 45 ± 5% relative humidity, and 9700 ± 1100 lux [900 ± 100 ft-candles]. Photoperiod should be 14 h of light per day. The test will proceed for 21 days.

9.2 *Test Operation, Maintenance, and Data Collection:*

9.2.1 Check and record temperature, relative humidity, and light every day along the length and width of the chamber at locations determined as follows: divide the entire illuminated area in half one way (left to right), then divide into thirds (top to bottom) and measure in the center of each section. Make any necessary adjustments. (See Fig. 1.)

9.2.2 Record the number of germinated seeds and the length of the plants within each designated square on days 7, 14, and 21.

9.2.3 At the 7 and 14 day measurement periods, apply an additional quantity of water to each test pot equal to 12.5 mm [0.5 in.] over the area of the pot (410 mL for a 20-cm diameter pot / [14 oz for an 8-in. diameter pot]).

9.2.4 At the conclusion of the 21 days, each pot is harvested by cutting the grass at the surface of the soil within each designated 5 cm [2 in.] square measurement zone.

9.2.5 Dry the harvested seedlings in an oven at 100°C [212°F] for 24 h.

9.2.6 Make mass determinations for each pot.

NOTE 2—The test environment used in this test method procedure has been successful for product comparison purposes. However, this test may be used with alternative test environments based on user needs. If test environments different from those listed in this procedure are used, agreement should be established between the testing laboratory and the user of the test method.

10. Calculation

10.1 Find the total for each pot or the mean of the pre-identified squares in each pot of the number of germinated seeds and the average height of the plants for each measuring period. Similarly, determine the biomass after 21 days. The data for each pot should be normalized to the sample roll average index mass per unit area based on the specimen-specific mass per unit area for the pot.

10.2 Average the data from 10.1 for each set of three pots, all prepared in the same manner.