



Standard Test Method for Measuring Mass per Unit Area of Geotextiles¹

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1. Scope

1.1 This test method covers and can be used as an index to the determination of mass per unit area of all geotextiles.

1.2 The values stated in SI units or other units shall be regarded separately as standard. The values stated in parentheses are provided for information only.

1.3 *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](#)

[D1776 Practice for Conditioning and Testing Textiles](#)

[D4354 Practice for Sampling of Geosynthetics for Testing](#)

[D4439 Terminology for Geosynthetics](#)

2.2 *ISO Standard:*³

[ISO 9864:1990 Geotextiles -- Determination of mass per unit area](#)

3. Terminology

3.1 *Definitions:*

3.1.1 *atmosphere for testing geotextiles, n*—air maintained at a relative humidity of $65 \pm 5\%$ and temperature of $21 \pm 2^\circ\text{C}$ ($70 \pm 4^\circ\text{F}$).

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

¹ This test method is under the jurisdiction of ASTM Committee D35 on Geosynthetics and is the direct responsibility of Subcommittee D35.01 on Mechanical Properties.

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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 International Organization for Standardization (ISO), 1, ch. de la Voie-Creuse, Case postale 56, CH-1211, Geneva 20, Switzerland, <http://www.iso.ch>.

3.1.3 *geotextile, n*—any permeable textile used with foundation, soil, rock, earth, or any other geotechnical-engineering-related material as an integral part of a man-made project, structure, or system.

3.1.3.1 *Discussion*—Current textile manufacturing techniques produce: nonwoven fabrics, knitted fabrics, and woven fabrics.

3.2 For definitions of other textile terms used in this test method, refer to Terminology [D123](#).

3.3 For definitions of other terms relating to geotextiles used in this test method, refer to Terminology [D4439](#).

4. Summary of Test Method

4.1 The mass per unit area of a geotextile is determined by weighing test specimens of known dimensions, cut from various locations over the full width of the laboratory sample. The calculated values are then averaged to obtain the mean mass per unit area of the laboratory sample.

5. Significance and Use

5.1 This test method is used to determine if the geotextile material meets specifications for mass per unit area. This test method can be used for quality control to determine specimen conformance. 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. Comparative tests in accordance with [5.2.1](#) are advisable.

5.2.1 In case of a dispute arising from differences in reported test results when using the procedures in this test method for acceptance testing of commercial shipments, the purchaser and the manufacturer should conduct comparative tests to determine if there is a 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 are as homogeneous as possible and which are from a lot of material of the type in question. The test specimen should then be randomly assigned in equal numbers to each laboratory for testing. The average

results from the two laboratories should be compared using the appropriate student's *t*-test and an acceptable probability level chosen by the two parties before testing is begun. If a bias is found, either its cause must be found and corrected or the purchaser and the manufacturer must agree to interpret future test results in light of the known bias.

6. Apparatus

6.1 *Balance*, calibrated, capable of weighing to 5000 g, with an accuracy of 0.01 g.

7. Sampling

7.1 *Lot Sample*—Divide the test specimens into lots, and for the lot to be tested, take the lot sample 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 salvage so that the requirements of Section **7.3** can be met.

7.2.1 The laboratory sample should be free from imperfections or other areas not representative of the material sampled.

7.3 The number of test specimens shall be a minimum of five, cut such that they are representative of the entire roll width and with a combined total minimum area of 100 000 mm² (155 in.²). Each test specimen shall be equal in area (not less than 10 000 mm² (15.5 in.²), as described in ISO 9864:1990). Cut each test specimen with an accuracy of ±0.5 % of its area.

NOTE 1—For test specimens prepared in the field, larger than minimum-sized test specimens will be required to stay within the cutting accuracy (0.5 %). Field experience has shown that a test specimen with an area not less than 90 000 mm² (139.5 in.²) will be necessary to achieve the required accuracy.

7.3.1 Cut the test specimens at least one tenth the width of the geotextile from any selvage, unless otherwise specified.

7.3.2 If the structure of the geotextile 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.

8. Conditioning

8.1 Bring the test specimens to moisture equilibrium in the atmosphere for testing geotextiles. Equilibrium is considered to have been reached when the increase in mass of the test specimen in successive weighings, made at intervals of not less than 2 h, does not exceed ±0.1 % of the mass of the test specimen. In general practice, the industry approaches equilibrium from the “as-received” side.

NOTE 2—It is recognized that in practice geotextile materials frequently are not weighed to determine when moisture equilibrium has been reached. While such a procedure cannot be accepted in cases of dispute, it may be sufficient in routine testing to expose the material to the standard atmosphere for testing for a reasonable period of time before the specimens are tested. A time of at least 24 h has been found acceptable in most cases. However, certain fibers may exhibit slow moisture equilibration rates from the “as-received” wet side. When this is known, a preconditioning cycle, in accordance with Practice **D1776**, may be agreed upon between the contractual parties.

9. Procedure

9.1 Test the conditioned test specimens in the standard atmosphere for testing geotextiles.

9.2 Weigh each of the conditioned specimens separately on a calibrated balance to the nearest 0.01 g.

10. Calculation

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

$$m = Ms \times 1\,000\,000/A \quad (1)$$

where:

m = mass per unit area rounded to the nearest 0.1 g/m²,
Ms = mass of the specimen, g, and
A = area of the specimen, mm².

10.2 Repeat this procedure for each test specimen.

10.3 Calculate the average and standard deviation of the mass per unit area results for the test specimens.

11. Report

11.1 Report the following information on mass per unit area of geotextiles:

11.1.1 Type of geotextile tested, sampling method used, the test specimen size, shape, and the number of test specimens tested,

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

11.1.3 A statement of any departures from the suggested testing procedures so that the results can be evaluated and used.

12. Precision and Bias

12.1 *Precision*—The precision of this test method is being established.

12.2 *Bias*—This test method has no bias because the value of mass per unit area can only be defined in terms of a test method.

13. Keywords

13.1 geotextile; mass per unit area; weight

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