Designation: D7179 – 07 (Reapproved 2013)

Standard Test Method for Determining Geonet Breaking Force[1]

This standard is issued under the fixed designation D7179; 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 measure the breaking force of a Geonet.

1.2 This test is applicable for manufacturing quality control (MQC) and construction quality assurance (CQA) testing and is not recommended as a performance test.

1.3 The values stated in SI units are to be regarded as standard. The values given in parentheses are for information only.

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]

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

D4439 Terminology for Geosynthetics

3. Terminology

3.1 *Definitions:*

3.1.1 Definitions of terms applying to this test method appear in Terminology D4439.

3.1.2 *atmosphere for testing geosynthetics, n*—air maintained at a relative humidity between 50 to 70 % and a temperature of 21 ± 2°C (70 ± 4°F).

3.1.3 *geonet, n*—a geosynthetic consisting of integrally connected parallel sets of ribs overlying similar sets at various angles for planar drainage of liquids or gases.

3.1.4 *index test, n*—a test procedure which may contain a known bias but which may be used to establish an order for a set of specimens with respect to the property of interest.

3.1.5 *peak load, n*—maximum force recorded during a tensile test.

4. Summary of Test Method

4.1 Geonet specimens are mounted between full width grips in a load frame. Tensile load is applied longitudinally to the specimen at a constant rate of crosshead movement. The test is carried to rupture and a maximum breaking force of each specimen is recorded.

5. Significance and Use

5.1 This method evaluates tensile breaking force of geonets for the purposes of quality control and quality assurance. Testing is performed parallel to the machine direction only for that is the primary direction that geonets witnesses tensile loading. This method is an index test and is not intended for design purposes.

6. Apparatus

6.1 *Tensile Testing Machine*—Constant Rate of Extension (CRE) equipment meeting the requirements of Specification D76. The load cell shall be accurate to within ±1 % of the applied force. The drive mechanism shall be able to control the rate of extension to within ±1 % of the targeted rate.

6.2 *Grips*—One of the grips must be self aligning to compensate for uneven distribution of force across the specimen. The clamping force and the clamp surfaces shall hold the specimen firmly without causing damage. The clamps shall be capable of gripping a 100 mm (4 in.) by 25 mm (1 in.) area at a minimum.

6.3 *Recording Mechanism*—The testing machine shall be equipped with equipment capable of producing a hard copy of the force versus displacement curve. Electronic data acquisition with printer capabilities or direct recording devices is acceptable.

7. Sampling, Test Specimens, and Test Units

7.1 *Lot Sample*—For the lot sample, take rolls of geonet per the applicable project specification, or as agreed upon between purchaser and supplier. Unless otherwise specified, refer to Practice D4354.

[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.

7.2 *Laboratory Sample*—For laboratory sample, take a full-width swatch approximately 1 m (3 ft) long by roll width for each roll in the lot sample. Take a sample that will exclude material from the outer wrap of the roll or the inner wrap around the core. In the case where the sample is taken at the production site, material from the outer wrap may be used if it is undamaged.

7.3 *Test Specimens*— Prepare five specimens with the length of the specimen parallel to the machine direction (MD). Cut the specimens such that none are obtained within 150 mm (6 in.) of the roll edges.

7.4 *Specimen Size and Shape*—The specimens shall be 102 ± 2 mm (4 ± 0.08 in.) wide by 203 ± 4 mm (8 ± 0.16 in.) long (test direction). Die cut test specimens are recommended.

7.5 *Test Unit*—Test five specimens distributed evenly from across the width of each laboratory sample in the longitudinal (machine) direction only. It may be desirable to test specimens in the in the transverse (cross-machine) direction for special purposes.

NOTE 1—Depending on the application/installation of geonets, transverse (cross-machine) direction specimens can be tested at the clients request but they are not a requirement.

8. Conditioning

8.1 *Conditioning*— Specimens may be tested once they have equilibrated at standard laboratory temperature. The time required to reach temperature equilibrium may vary according to the manufacturing process, material type and material thickness. Equilibrium in this case is defined as less than a degree Celsius change in temperature in an hour and less than a gram change in mass within an hour.

8.2 *Test Conditions*— Conduct tests at the standard atmosphere for testing geosynthetics, a temperature of 21 ± 2°C (70 ± 4°F) and a relative humidity between 50 to 70 %, unless otherwise specified.

9. Procedure

9.1 Set the distance between the gripping portions of the clamps 100 mm (4 in.) apart.

9.2 Clamp a specimen so that it is centered in both sets of clamps and aligned vertically about the centroid of the tensile testing machine. This is a critical point since the breaking force is significantly altered if the specimen is not aligned.

9.3 Elongate the specimen at a test speed of 300 mm/min (12 in./min) until the specimen has ruptured. If the specimen slips in the clamps, breaks in the clamps, breaks at the edges of the clamps, or if for any reason attributable to faulty operation, the result falls markedly below the average (outliers are defined as greater than 20 % from the mean) for the set of specimens, discard the result and test an additional specimen.

9.4 Record peak load. The peak load is the geonet breaking force.

9.5 Repeat the procedure for the remaining specimens.

10. Calculation

10.1 Calculate the average and standard deviation for breaking force of the five specimens tested.

TABLE 1 Tensile Strength (in pounds)

Material	Average	Repeatability Standard Deviation	Reproducibility Standard Deviation	Repeatability Limit	Reproducibility Limit
	x	Sr	sR	r	R
Geonet "A"	291.9	8.8	23.2	24.6	64.8

11. Report

11.1 Report the following information:

11.1.1 Complete identification of the material tested,

11.1.2 The direction of testing (that is, MD),

11.1.3 The breaking force of each specimen tested in units of kN (lb),

11.1.4 Any deviation of the specified test procedure, and

11.1.5 The average and standard deviation for breaking force in units of kN (lb).

12. Precision and Bias[3]

12.1 The precision of this test method is based on an Interlaboratory study of D7179-05, Standard Test Method for Determining Geonet Breaking Force, conducted in 2006. Nine laboratories tested one material. Each "test result" was the average of five individual determinations. Each laboratory obtained three replicate test results for the material.

12.1.1 *Repeatability*— Two test results obtained within one laboratory shall be judged not equivalent if they differ by more than the "r" value for that material; "r" is the interval representing the critical difference between two test results for the same material, obtained by the same operator using the same equipment on the same day in the same laboratory. See Table 1

12.1.2 *Reproducibility*— Two test results should be judged not equivalent if they differ by more than the "R" value for that material; "R" is the interval representing the difference between two test results for the same material, obtained by different operators using different equipment in different laboratories.

12.1.3 Any judgment in accordance with these two statements would have an approximate 95% probability of being correct.

12.2 *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.

12.3 The precision statement was determined through statistical examination of 27 results, from nine laboratories, on 1 material.

12.4 This precision statement is provisional because an insufficient number of materials were involved.

13. Keywords

13.1 break; force; geonet; geosynthetic; index test; machine direction; tensile

[3] Supporting data have been filed at ASTM International Headquarters and may be obtained by requesting Research Report RR:D35-1011.