



# Standard Practice for Sampling of Geosynthetics for Testing<sup>1</sup>

This standard is issued under the fixed designation D 4354; 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 practice covers three procedures for the sampling of geosynthetics for testing. This practice requires that instructions on taking laboratory samples and test specimens be part of every test method for geosynthetics.

1.1.1 The first procedure describes the sampling of production units for the purpose of manufacturer’s quality control (MQC) (Table 1).

1.1.2 The second procedure describes the sampling of production units for the purpose of manufacturer’s quality assurance (MQA) testing during the manufacturing process. This requires that backup statistical process control records be maintained during the manufacturing process (Table 2).

1.1.3 The third procedure describes the division of shipments of geosynthetics into lots and the determination of lot sample size for purchaser’s specification conformance testing (Table 3).

1.2 *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:*
  - D 123 Terminology Relating to Textiles<sup>2</sup>
  - D 4271 Practice for Writing Statements on Sampling in Test Methods for Textiles<sup>3</sup>
  - D 4439 Terminology for Geosynthetics<sup>4</sup>

## 3. Terminology

### 3.1 Definitions:

3.1.1 *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.

3.1.2 *lot, n*—a unit of production, or a group of other units or packages, taken for sampling or statistical examination,

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<sup>2</sup> *Annual Book of ASTM Standards*, Vol 07.01.

<sup>3</sup> *Annual Book of ASTM Standards*, Vol 07.02.

<sup>4</sup> *Annual Book of ASTM Standards*, Vol 04.09.

**TABLE 1 Number of Units to be Selected as Lot Sample—Purchaser’s Specification Conformance**

Number of Units in Lot	Number of Units Selected
1 to 2	1
3 to 8	2
9 to 27	3
28 to 64	4
65 to 125	5
126 to 216	6
217 to 343	7
344 to 512	8
513 to 729	9
730 to 1000	10
1001 or more	11

having one or more common properties and being readily separable from other similar units.

3.1.3 *quality assurance, n*—all those planned or systematic actions necessary to provide adequate confidence that a material, product, system, or service will satisfy given needs.

3.1.4 *quality control, n*—the operational techniques and the activities which sustain a quality of material, product, system, or service that will satisfy given needs; also the use of such techniques and activities.

3.1.5 *sample, n*—(1) a portion of material which is taken for testing or for record purposes. (See also *sample, lot*; *sample, laboratory*; and *specimen*.) (2) a group of specimens used, or of observations made, which provide information that can be used for making statistical inferences about the population(s) from which the specimens are drawn.

3.1.6 *sample, laboratory, n*—a portion of material taken to represent the lot sample, or the original material, and used in

**TABLE 2 Number of Units to be Selected as Lot Sample—Manufacturer’s Quality Assurance**

Number of Units in Lot	Number of Units Selected
1 to 200	1
201 to 500	2
501 to 1000	3
1001 or more	4

**TABLE 3 Number of Units to be Selected as Lot Sample—Purchaser’s Specification Conformance**

Number of Units in Lot	Number of Units Selected
1 to 200	1
201 to 500	2
501 to 1000	3
1001 or more	4

the laboratory as a source of test specimens.

3.1.7 *sample, lot, n*—one or more shipping units taken at random to represent an acceptance sampling lot and used as a source of laboratory samples.

3.1.8 *sampling unit, n*—an identifiable, discrete unit or subunit of material that could be taken as part of a sample.

3.1.8.1 *Discussion*—Fig. 1 is included to show the difference between *lot sample, laboratory sample* and *test specimen*.

3.1.9 *sampling unit, primary, n*—the sampling unit containing all the sources of variability which should be considered in acceptance testing; the sampling unit taken in first stage of selection in any procedure for sampling a lot or shipment.

3.1.9.1 *Discussion*—For textiles, the primary sampling units are generally taken as the shipping units making up a lot; such as bales of fiber, cases of yarn, rolls of fabric, or cartons of garments or other finished products. Adequate sampling for acceptance testing requires taking into account not only the variability between primary sampling units but also the variability between subunits within primary sampling units and between specimens from a single subunit in a primary sampling unit.

3.1.10 *specimen, n*—a specific portion of a material or laboratory sample upon which a test is performed or which is taken for that purpose. (Syn. *test specimen*.)

3.1.11 *test result, n*—a value obtained by applying a given test method, expressed either as a single observation or a specified combination of a number of observations.

3.1.11.1 *Discussion*—A test result is the value reported for a single subunit of the laboratory sample. For different test methods a test result might be (1) the value of a single observation (such as a measurement of a property, a count of defects, or a grading or rating) on a single specimen from a single subunit of the laboratory sample; (2) the average or some other function of the values for single observations on each of *n* specimens from a single subunit of the laboratory sample; or (3) a ratio of successes to total observations for *n* specimens from a single subunit of the laboratory sample.

3.1.12 For definitions of other textile terms used in this

practice, refer to Terminology D 123.

3.1.13 For definitions of other geosynthetic terms used in this practice, refer to Terminology D 4439.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *production unit*—as referred to in this practice, is a quantity of geosynthetic agreed upon by the purchaser and seller for the purpose of sampling.

3.2.1.1 *Discussion*—In the absence of an agreed upon quantity, 1000 m<sup>2</sup> (1200 yd<sup>2</sup>) is recommended. For example, a production run may be 6000 m<sup>2</sup>. For the purpose of sampling, if 1000 m<sup>2</sup> criteria is used, this would be 6 production units.

3.2.1.2 *Discussion*—For the purpose of this practice, the purchaser is considered to be the project owner, while the seller is the entity supplying the geosynthetic to the project owner.

4. Summary of Practice

4.1 Instructions are given within this practice for dividing shipments or consignments of geosynthetics into lots and for the determination of the number of production units in a lot sample.

4.2 The number or method for determination of the number of specimens to be tested from the laboratory sample is contained in the specific geosynthetic property test method.

5. Significance and Use

5.1 This practice provides a means by which samples of geosynthetics may be selected to provide a statistically valid sample for the selection of test specimens without previous knowledge of the variability that may exist between production units.

5.2 The principles stated in Practice D 4271, and the illustrative text in that practice can be used by test method authors in preparing sampling statements.

5.3 This practice gives three procedures for sampling: one for manufacturer’s quality control (MQC), one for manufacturer’s quality assurance (MQA) testing, and a third for purchaser’s specification conformance testing. For this reason, test methods containing a section on sampling that requires the use of this practice should contain a statement in the section on reporting similar to the following: “Report which procedure from Practice D 4354 was used for sampling: Procedure A for Manufacturer’s Quality Control (MQC), Procedure B for Manufacturer’s Quality Assurance (MQA) Testing, or Procedure C for Purchaser’s Specification Conformance Testing.

5.4 Manufacturer’s Quality Assurance is done internally to ensure the manufacturer of the MQC program. When it is required to provide certification to a purchaser as to quality assurance, the MQA testing is to be done by an external MQA testing facility.

6. Procedure A—Sampling for Manufacturer’s Quality Control (MQC) Testing

6.1 *Division into Lots*—Consider as a separate lot any portion of a production that represents the planned production quantity that the producer is testing, that differs from other portions in specifications, style, or physical characteristics. If portions that are billed or designated as separate lots are shipped from different production plants, treat each separately shipped portion as a separate lot. When sampling is required

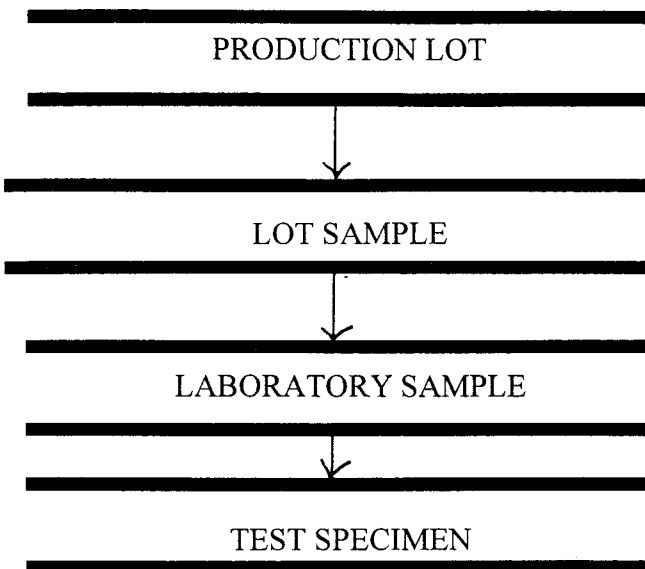


FIG. 1 Sampling Unit

during manufacturing, consider a lot to be the planned production quantity.

#### 6.2 *Determination of Lot Sample Size:*

6.2.1 Use Table 1 to determine the lot sample size for quality control testing.

6.2.2 When time intensive tests, such as ultraviolet degradation, are used do not test more than two units from a single lot. Maintain information on the number of such tests per lot and supply the information to the purchaser upon request.

6.2.3 If sampling is required during manufacture, select the units for the lot sample at uniformly spaced time intervals throughout the production period.

6.2.4 For properties that are evaluated as attributes, the units in the lot sample serve as both laboratory samples and test specimens.

### 7. Procedure B—Sampling for Manufacturer’s Quality Assurance (MQA) Testing

7.1 *Division into Lots*—Consider as a separate lot any portion of a production that represents the planned production quantity that the producer is testing, that differs from other portions in specifications, style, or physical characteristics. If portions that are billed or designated as separate lots are shipped from different production plants, treat each separately shipped portion as a separate lot. When sampling is required during manufacturing, consider a lot to be the planned production quantity.

7.2 *Determination of Lot Sample Size*—Use Table 2 to determine the lot sample size for quality assurance testing.

7.2.1 When time intensive tests, such as ultraviolet degradation, are used do not test more than two units from a single lot. Maintain information on the number of such tests per lot and supply the information to the purchaser upon request.

### 8. Procedure C—Sampling for Purchaser’s Specification Conformance Testing

NOTE 1—The conformance testing is done by the purchaser or designated person/organization. It is usually done as the geosynthetics are brought to the project site and justify the payment of the billing.

8.1 *Division into Lots*—Consider as a separate lot any portion of a shipment that the user is testing that differs from other portions in specifications, style, or physical characteristics. If portions that are billed or designated as separate lots are shipped from different production plants, treat each separately shipped portion as a separate lot. When sampling is required during manufacturing, consider a lot to be the planned production quantity.

#### 8.2 *Determination of Lot Sample Size:*

8.2.1 Take for the lot sample, production units, as directed in an applicable material specification, or as agreed upon by the purchaser and the seller. Consider the applicable units of production to be the primary sampling units.

8.2.2 In the absence of a material specification or other agreement use Table 3 to determine the lot sample size for specification conformance testing.

8.2.3 If the specification requires sampling during manufacture, select the units for the lot sample at uniformly spaced time intervals throughout the production period.

8.2.4 For properties that are evaluated as attributes, the units in the lot sample serve as both laboratory samples and test specimens.

### 9. Keywords

9.1 geosynthetic; quality assurance; quality control; sampling; specification conformance; testing

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