



Standard Guide for for Acceptance Testing Requirements for Geonets and Geonet Drainage Geocomposites¹

This standard is issued under the fixed designation D7273/D7273M; 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.

^{ε1} NOTE—Units information was editorially corrected in June 2013.

1. Scope

1.1 This guide covers guidelines for the acceptance testing frequency requirements for geonet and geonet drainage geocomposite materials describing types of tests, test methods, and recommended verifications.

1.2 This guide is intended to aid purchasers, installers, contractors, owners, operators, designers, and agencies in establishing a minimum level of effort for product acceptance testing and verification. This is intended to assure that the supplied geonet and/or geonet drainage geocomposite roll(s) meet accepted material specifications.

1.3 This guide offers an organized collection of information or a series of options and does not recommend a specific course of action. This guide cannot replace education or experience and should be used in conjunction with professional judgment. Not all aspects of this guide may be applicable in all circumstances. This guide is not intended to represent or replace the standard of care by which the adequacy of a given professional service must be judged, nor should this guide be applied without consideration of a project's many unique aspects. The word "Standard" in the title of this guide means only that the guide has been approved through the ASTM International consensus process.

1.4 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.

1.5 *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

- D792 Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement
- D1505 Test Method for Density of Plastics by the Density-Gradient Technique
- D1603 Test Method for Carbon Black Content in Olefin Plastics
- D4218 Test Method for Determination of Carbon Black Content in Polyethylene Compounds By the Muffle-Furnace Technique
- D4354 Practice for Sampling of Geosynthetics and Rolled Erosion Control Products(RECPs) for Testing
- D4355 Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon Arc Type Apparatus
- D4439 Terminology for Geosynthetics
- D4491 Test Methods for Water Permeability of Geotextiles by Permittivity
- D4533 Test Method for Trapezoid Tearing Strength of Geotextiles
- D4632 Test Method for Grab Breaking Load and Elongation of Geotextiles
- D4716 Test Method for Determining the (In-plane) Flow Rate per Unit Width and Hydraulic Transmissivity of a Geosynthetic Using a Constant Head
- D4751 Test Method for Determining Apparent Opening Size of a Geotextile
- D4759 Practice for Determining the Specification Conformance of Geosynthetics
- D4873 Guide for Identification, Storage, and Handling of Geosynthetic Rolls and Samples
- D5199 Test Method for Measuring the Nominal Thickness of Geosynthetics
- D5321 Test Method for Determining the Shear Strength of

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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.

Soil-Geosynthetic and Geosynthetic-Geosynthetic Interfaces by Direct Shear

D6241 Test Method for the Static Puncture Strength of Geotextiles and Geotextile-Related Products Using a 50-mm Probe

D7005 Test Method for Determining the Bond Strength (Ply Adhesion) of Geocomposites

D7179 Test Method for Determining Geonet Breaking Force

3. Terminology

3.1 *Definitions*—For definitions of terms related to geosynthetics, refer to Terminology **D4439**.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *acceptance testing, n*—testing performed on a product to determine whether or not an individual lot of the product conforms to specified requirements.

3.2.2 *agency, n—in geosynthetics*, the organization that reviews the permit application for compliance with the agency's regulation and all quality assurance documentation before and after construction.

3.2.3 *contractor, n—in geosynthetics*, the party or organization that has the responsibility for the construction of the manmade project, structure, or system.

3.2.4 *designer, n—in geosynthetics*, the person or organization that designs a manmade project, structure, or system that fulfills the owner's/operator's requirements and meets or exceeds the minimum requirements of the agency.

3.2.5 *geonet geocomposite, n*—product composed of two or more materials, at least one of which is a geonet.

3.2.6 *installer, n—in geosynthetics*, the party that installs, or facilitates installation of, any materials purchased from manufacturers or suppliers.

3.2.7 *manufacturer, n—in geosynthetics*, the group, corporation, partnership, or individual that manufactures a product.

3.2.8 *manufacturing quality control (MQC), n*—planned system of activities by the manufacturer whose purpose is to provide a level of quality that meets the needs of product requirements; also, the use of such a system.

3.2.9 *operator, n—in geosynthetics*, the person or organization that operates the manmade project, structure, or system.

3.2.10 *owner, n—in geosynthetics*, the person or organization that owns the manmade project, structure, or system.

3.2.11 *purchaser, n—in geosynthetics*, the person, company, or organization that purchases any materials or work to be performed.

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

3.3 *Abbreviations:*

3.3.1 *MD*—Machine direction.

3.3.2 *MQC, n*—Manufacturing quality control.

4. Summary of Guide

4.1 This guide suggests the types of tests, the methods of the testing, and verification requirements for acceptance testing of geonet and geonet geocomposite materials.

4.2 It should be recognized that parties, organizations, or representatives may perform additional tests at other frequencies than required in this guide. In this case, the project-specific acceptance plan will then take precedence over this guide.

5. Procedure

5.1 The geocomposite components are typically tested during MQC (Practice **D4354**) and typically documented by means of a letter of certification or summarized MQC test data or both. These actual tested values (MQC test data) should be verified to be in conformance with the accepted material specifications. This can be done by reviewing the MQC test data, or by additional quality assurance testing, or both, and purchaser's specification conformance testing. Purchaser's specification acceptance/conformance testing should be done directly after arrival of the product on site, and definitely before product installation. Properties of the individual geocomposite components (geonet and geotextile) are likely to change during the lamination process. If the properties of the finished geocomposite's component to be controlled are those measured before lamination, it might be necessary to sample the individual components in the plant, before lamination. If the tests are conducted on the components delaminated from the geocomposite, those test results will not reflect what is intended to be controlled.

5.2 Supplied geonet/geonet geocomposite rolls should be observed on site to identify any damage to the rolls or wrapping. In case of any damage, Guide **D4873** should be followed. Any damage should be noted and reported.

5.3 Before storing or unrolling geonet/geonet geocomposite rolls, or both, the individual roll identification should be verified and compared with the packing list. Irregularities should be noted and reported.

5.4 If sampling of geonet/geonet geocomposite material is necessary, for example, for testing purposes, Guide **D4354** should be followed.

5.5 The recommended acceptance tests and test methods for geonets are given in **Table 1** and for geonet geocomposite materials are given in **Table 2**. The tests are performed on the geonets and geotextiles before lamination except for geocomposite transmissivity and geocomposite ply adhesion and should be compared with the accepted material specifications. Irregularities should be noted and reported.

5.6 All test results should be reported as average roll values (not the value for a single specimen tested) in accordance to the ASTM procedures listed in **Table 1** and **Table 2**, and ultimately compared to the specified values (manufacturing and or project specification) to be acceptable. The pass or fail of the conformance test results shall be determined according to Practice **D4759**. Geonet and or geonet geocomposite rolls failing the accepted material specifications need to be rejected. The

TABLE 1 Types of Acceptance Test and Methods for Geonets (SI Units)^{A,B}

Test Designation, Reporting Units	Test Method (ASTM)	Frequency of Acceptance Testing	Reported Average Test Values Compared to: ^C
Geonet			
Density, kg/m ³ ^D	D1505 or D792	project specified	Specified Value
Carbon black content, % ^D	D4218 or D1603	project specified	Specified Value
Peak tensile strength (MD), N/mm	D7179	project specified	Specified Value
Thickness, mm	D5199	project specified	Specified Value
Transmissivity (MD), m ² /s	D4716	project specified	Specified Value

^A Frequencies may change on the size or sensitivity of the project. On small projects tests may be replaced by a letter of certification. Example for project (size 50 000 m² [500 000 ft²]) specific acceptance testing:

Density of the geonet	=	Every 10 000 m ² [100 000 ft ²]
Carbon black content of the geonet	=	Every 10 000 m ² [100 000 ft ²]
Peak tensile strength of the geonet in MD	=	Every 10 000 m ² [100 000 ft ²]
Thickness of the geonet	=	Every 10 000 m ² [100 000 ft ²]
Transmissivity of the geonet	=	Every 50 000 m ² [500 000 ft ²]

^B Additional acceptance tests may be required depending on the application. For example, in applications in which shear strength is critical, direct shear tests (Test Method D5321) may be needed.

^C This column proposes a pass/fail criterion for the measured average roll value. All measured average roll values (not the value for a single specimen tested) should be reported in accordance of the ASTM procedure listed above, measured at a frequency greater than or equal as what is listed above, and ultimately compared to the specified value (manufacturing and or project specification) to be acceptable or conforming. If the measured average roll value is below the specified value, that particular roll will be catalogued as “failed”, or non-conforming. Note that most individual ASTM standards describe within the standard procedure as of how to address “failed” or non-conforming measured values. Typically checking all setup and boundary conditions would be done first in a retest of the initially “failed” sample. If the average of both tests confirm that the geonet is non-conforming, then the geonet rolls failing the accepted material specification value need to be rejected. The sequence of non-conforming rolls in the lot shall be bounded/delineated by passing rolls (“blocking tests”). The pass/fail criterion is thus a threshold methodology, a measured average roll value greater or equal as the “specified value” means a passing or conforming result for that particular test method.

^DThe correct test method should be agreed on prior testing.

sequence of non-conforming rolls in the lot shall be bounded/delineated by passing rolls (“blocking tests”).

6. Report

6.1 All activities on product acceptance should be recorded on a suitable data sheet. Recorded activities may take the form of notes, charts, sketches, photographs, or a combination of these. Report the following information:

6.1.1 Manufacturer’s letter of certification or MQC data or both;

6.1.2 Description or title of product acceptance activity or both,

6.1.3 Location, date, and time of acceptance activity;

6.1.4 Procedure used for acceptance activity;

6.1.5 Geonet/geonet geocomposite roll and lot numbers, brand names, and other product specific information;

6.1.6 Results of acceptance activity;

6.1.7 Company of involved personnel;

6.1.8 Signature and printed name of acceptance inspector;

6.1.9 Summarized test results of acceptance activities;

6.1.10 Irregularities discovered during acceptance activities; and

6.1.11 Roll number of rejected geonet/geonet geocomposite rolls.

7. Keywords

7.1 acceptance; geonet; geonet geocomposite; geosynthetics; geotextile; testing; verification

TABLE 2 Types of Acceptance Test and Methods for Geonet Composites (SI Units)^{A,B}

Test Designation, Reporting Units	Test Method (ASTM)	Frequency of Acceptance Testing	Report Average Value Compared to: ^C
Geonet (before lamination)			
Density, kg/m ³ ^D	D1505 or D792	project specific	Specified Value
Carbon black content, % ^D	D4218 or D1603	project specific	Specified Value
Peak tensile strength (MD), N/mm	D7179	project specific	Specified Value
Thickness, mm	D5199	project specific	Specified Value
Geotextile (before lamination)			
Grab strength, N	D4632	project specific	Specified Value
Tear strength, N	D4533	project specific	Specified Value
Static Puncture strength, N	D6241	project specific	Specified Value
Permittivity, s ⁻¹	D4491	project specific	Specified Value
AOS, mm	D4751	project specific	Specified Value ^E
UV stability, % ret (500 h)	D4355	project specific	Specified Value
Geonet Composite (after lamination)			
Transmissivity (MD), m ² /s	D4716	project specific	Specified Value
Ply Adhesion, ^F N/m	D7005	project specific	Specified Value

^A Frequencies may change on the size or sensitivity of the project. On small projects tests may be replaced by a letter of certification. Example for project (size 50 000 m² [500 000 ft²]) specific acceptance testing:

Density of the geonet = Every 10 000 m² [100 000 ft²]
Carbon black content of the geonet = Every 10 000 m² [100 000 ft²]
Peak tensile strength of the geonet in MD = Every 10 000 m² [100 000 ft²]
Thickness of the geonet = Every 10 000 m² [100 000 ft²]

Grab strength of the geotextile = Every 10 000 m² [100 000 ft²]
Tear strength of the geotextile = Every 10 000 m² [100 000 ft²]
Static puncture strength of the geotextile = Every 10 000 m² [100 000 ft²]
Permittivity of the geotextile = Every 50 000 m² [500 000 ft²]
AOS of the geotextile = Every 50 000 m² [500 000 ft²]

Transmissivity of the geonet composite = Every 50 000 m² [500 000 ft²]
Ply adhesion of the geonet composite = Every 10 000 m² [100 000 ft²]

^B Additional acceptance tests may be required depending on the application. For example, in applications in which shear strength is critical, direct shear tests (Test Method D5321) may be needed.

^C This column proposes a pass/fail criterion for the measured average roll value. All measured average roll values (not the value for a single specimen tested) should be reported in accordance of the ASTM procedure listed above, measured at a frequency greater than or equal as what is listed above, and ultimately compared to the specified value (manufacturing and or project specification) to be acceptable or conforming. If the measured average roll value is below the specified value, that particular roll will be catalogued as “failed”, or non-conforming. Note that most individual ASTM standards describe within the standard procedure as of how to address “failed” or non-conforming measured values. Typically a retest checking all setup and boundary conditions would be done first on the initially “failed” sample. If the average of both tests confirm that the geonet composite is non-conforming, then the geonet composite rolls failing the accepted material specification value need to be rejected. The sequence of non-conforming rolls in the lot shall be bounded/delineated by passing rolls (“blocking tests”). The pass/fail criterion is thus a threshold methodology, a measured average roll value greater or equal as the “specified value” means a passing or conforming result for that particular test method (note that for AOS per Test Method D4751—if reported in SI Units (AOS = O₉₅ in millimeters)—that would be a measured average roll value lesser or equal as the “specified value”).

^D The correct test method should be agreed on prior to testing.

^E AOS is reported per Test Method D4751 as the apparent opening size (AOS = O₉₅) in millimeters. Thus the “lowest” measured average roll value could lead to confusion, as soil particles need to be typically retained by the geotextile, smaller apparent opening sizes are actually what is wanted. Hence a “highest” average roll value would be more appropriate for SI Units. Unfortunately, if requested, the AOS can be reported in US standard sieve; for that the “lowest” average roll value for the US standard sieve is appropriate given the inverse relationship with the AOS expressed in millimeters.

^F Report the average of five equally spaced machine direction tests across the roll width of the single-sided geocomposite. Both sides should be tested for the double-sided geocomposite.

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