Designation: D7931/D7931M – 21a

# Standard Guide for Specifying Drainage Geocomposites[1]

This standard is issued under the fixed designation D7931/D7931M; 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 guide presents a guideline specifying a drainage geocomposite product; it specifically provides recommendations to determine the allowable flow rate of a candidate drainage geocomposite. The resulting value is then compared to a required (or design) flow rate for a product-specific and site-specific factor of safety.

1.2 This guide is intended to aid designers, purchasers, installers, contractors, owners, operators, and agencies in establishing minimum guidelines for drainage geocomposite materials. This guide is not to be used for manufacturer's quality control purposes, nor is it a construction quality assurance specification.

1.3 This guide does not address the required (or design) flow rate value, nor the subsequent factor of safety values, which are typically design specific.

1.4 The procedures recommended in this guide use ASTM test methods.

1.5 This guide is applicable to all types of drainage geocomposites regardless of their core configuration or geotextile type. It can also be used to evaluate thick, nonwoven geotextiles that provide drainage.

1.6 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 nonconformance with the standard.

1.7 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.

1.8 *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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.9 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

## 2. Referenced Documents

2.1 *ASTM Standards:*[2]

D1987 Test Method for Biological Clogging of Geotextile or Soil/Geotextile Filters

D2990 Test Methods for Tensile, Compressive, and Flexural Creep and Creep-Rupture of Plastics

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

D4439 Terminology for Geosynthetics

D4716/D4716M Test Method for Determining the (In-plane) Flow Rate per Unit Width and Hydraulic Transmissivity of a Geosynthetic Using a Constant Head

D4873/D4873M Guide for Identification, Storage, and Handling of Geosynthetic Rolls and Samples

D5321/D5321M Test Method for Determining the Shear Strength of Soil-Geosynthetic and Geosynthetic-Geosynthetic Interfaces by Direct Shear

D5322 Practice for Laboratory Immersion Procedures for Evaluating the Chemical Resistance of Geosynthetics to Liquids

D6243/D6243M Test Method for Determining the Internal and Interface Shear Strength of Geosynthetic Clay Liner

[1] This guide is under the jurisdiction of ASTM Committee D35 on Geosynthetics and is the direct responsibility of Subcommittee D35.03 on Permeability and Filtration.

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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.

by the Direct Shear Method
D6388 Practice for Tests to Evaluate the Chemical Resistance of Geonets to Liquids
D6389 Practice for Tests to Evaluate the Chemical Resistance of Geotextiles to Liquids
D6747 Guide for Selection of Techniques for Electrical Leak Location of Leaks in Geomembranes
D7001 Specification for Geocomposites for Pavement Edge Drains and Other High-Flow Applications
D7273/D7273M Guide for Acceptance Testing Requirements for Geonets and Geonet Drainage Geocomposites
D7361 Test Method for Accelerated Compressive Creep of Geosynthetic Materials Based on Time-Temperature Superposition Using the Stepped Isothermal Method
D7406 Test Method for Time-Dependent Compressive Deformation Under Constant Pressure for Geosynthetic Drainage Products
D7852 Practice for Use of an Electrically Conductive Geotextile for Leak Location Surveys

2.2 *Other Standards:*
GRI GC8 Determination of the Allowable Flow Rate of Drainage Geocomposites[3]
ISO 18228-4 Design Using Geosynthetics—Part 4: Drainage (in press)[4]

## 3. Terminology

3.1 *Definitions:*

3.1.1 For definitions of terms related to geosynthetics, refer to Terminology D4439.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *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.

3.2.2 *contractor, n*—in geosynthetics, the party or organization that has the responsibility for the construction of the man-made project, structure, or system.

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

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

3.2.5 *operator, n*—in geosynthetics, the person or organization that operates the man-made project, structure, or system.

3.2.6 *owner, n*—in geosynthetics, the person or organization that owns the man-made project, structure, or system.

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

3.2.8 $q_{100}$, *n*—initial flow rate for a drainage geocomposite as determined under simulated conditions for 100-h duration.

3.2.9 $q_{allow}$, *n*—allowable flow rate for a drainage geocomposite.

## 4. Significance and Use

4.1 This guide is intended to aid designers, purchasers, installers, contractors, owners, operators, and agencies in establishing the minimum criteria to specify drainage geocomposites. Specifically, this guide presents a methodology for determining the allowable flow rate of a candidate drainage geocomposite. The resulting value is then compared to a required (or design) flow rate for a product-specific and site-specific factor of safety.

4.2 It is recognized that there are other products that may achieve the same performance requirements but are not listed in this document. Manufacturers of such products are invited to implement this standard guide with the appropriate information.

4.3 It should be recognized that parties, organizations, or representatives may perform additional tests other than those required in this guide. In this case, the more stringent project-specific tests will then take precedence.

4.4 By simulating site-specific conditions (inclusive of site-specific liquids and temperatures except for load duration beyond 100 h, chemical/biological clogging, and geotextile intrusion), additional reduction factors need not be explicitly accounted for in certain products.

## 5. Classification

5.1 *General*—This guide covers geocomposite drainage products or structures intended for blanket subsurface drainage applications. Five distinctly different product designs are included in this guide as geocomposite drainage products:

5.2 *Biaxial Geonet Geocomposite*—A geonet consisting of an integrally connected parallel set of ribs overlying a similar set of ribs at typically opposite angles, typically heat laminated with nonwoven geotextiles on the top and bottom to form the geocomposite. Note that single-sided biaxial geonet geocomposites are available in the marketplace as well; in that particular case, only one side of the geonet will be heat laminated with a nonwoven geotextile.

5.3 *Triaxial Geonet Geocomposite*—A geonet consisting of an integrally connected parallel set of ribs, or forming an integrated web with a flow direction mainly oriented in the machine direction, typically heat laminated with nonwoven geotextiles on the top and bottom to form the geonet geocomposite. It should be noted that single-sided triaxial geonet geocomposites are available in the marketplace as well; in that particular case, only one side of the geonet will be heat laminated with a nonwoven geotextile.

5.4 *Multilinear Drainage Geocomposite*—A manufactured product composed of a series of parallel single drainage conduits regularly spaced across its width sandwiched between two or more geosynthetics.

[3] Available from Geosynthetic Institute, 475 Kedron Ave, Folsom, PA 19033, http://www.geosynthetic-institute.org.

[4] Available from International Organization for Standardization (ISO), ISO Central Secretariat, Chemin de Blandonnet 8, CP 401, 1214 Vernier, Geneva, Switzerland, https://www.iso.org.