



Standard Practice for Determining the Number of Constrictions “*m*” of Non- Woven Geotextiles as a Complementary Filtration Property¹

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^{ε1} NOTE—A legend was added editorially to [Eq X1.4](#) in [X1.1.2.2](#) in July 2016.

1. Scope

1.1 This practice describes the procedure used along with existing test method to determine the number of constrictions *m* of mechanically bonded non-woven geotextiles, based on thickness, mass per unit area and fiber properties

1.2 The number of constrictions is a property of non-woven geotextiles, which is complementary to opening size to predict their filtration behavior. It can be used to differentiate non-woven geotextiles with similar opening sizes but different structures (thickness, weight, fiber diameter, etc.). However, more research is needed to assess its significance when comparing two products with different opening sizes.

1.3 Consideration of the number of constriction is relevant in filtration applications where piping or clogging concerns are to be controlled with a high level of confidence, that is, for filters applications in critical soils.

1.4 This standard is for design purposes only and is not intended for quality control purposes.

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

[D1577](#) Test Methods for Linear Density of Textile Fibers

[D4439](#) Terminology for Geosynthetics

[D4751](#) Test Method for Determining Apparent Opening Size of a Geotextile

¹ This practice 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.

[D5199](#) Test Method for Measuring the Nominal Thickness of Geosynthetics

[D5261](#) Test Method for Measuring Mass per Unit Area of Geotextiles

[D6767](#) Test Method for Pore Size Characteristics of Geotextiles by Capillary Flow Test

3. Terminology

3.1 *Definitions*—For definitions of terms used in this test method, refer to Terminology [D4439](#).

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *constriction*—in the non-woven geotextile, a “window” delimited by three or more fibers, through which soil particles could migrate.

3.2.2 *filtration paths*—under the forces induced by fluid flows, soil particles may travel in the geotextile filter along filtration paths. Each of these paths is composed of a sequence of constrictions of various size and shape.

3.2.3 *number of constrictions, m*—average number of constrictions for a filtration path.

3.2.4 *fiber count, T*—a measure of the linear density of the fiber expressed in tex, where 1 tex = 10⁻⁶ kg/m.

3.2.4.1 *Discussion*—The fiber count is sometime expressed in “Denier” (equivalent to the weight in grams of a theoretical 9000 meters long fiber). The value in “Tex” can be obtained from the value in Denier considering that 1 Denier = 9 Tex.

3.2.5 *opening size*—largest significant opening of a non-woven geotextile as measured using Test Method [D6767](#).

NOTE 1—Although Test Method [D4751](#) (Apparent Opening Size) is widely used to characterize geotextiles, it may often not be sufficient for advanced filtration investigations such as those requiring consideration of the number of constriction as a significant parameter. The “bubble-point” measurement technique proposed in Test Method [D6767](#) shall thus be preferred to AOS per Test Method [D4751](#).

4. Summary of Practice

4.1 The physical properties of the geotextile are evaluated according to specific procedures and the number of constriction *m* is determined based on [Eq 1](#).