



Standard Test Method for Stiffness of Nonwoven Fabrics Using the Cantilever Test¹

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1. Scope

1.1 This test method covers stiffness properties of nonwoven fabrics by employing the principle of cantilever bending of the fabric under its own weight. Bending length is measured and flexural rigidity calculated.

1.2 This test method applies to most nonwoven fabrics that are treated or untreated, including those heavily sized, coated, or resin-treated.

1.3 The values stated in SI units are to be regarded as the standard. The inch-pound units given in parentheses may be approximate.

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:

D 123 Terminology Relating to Textile Materials²

D 1776 Practice for Conditioning Textiles for Testing²

D 2904 Practice for Interlaboratory Testing of a Textile Test Method That Produces Normally Distributed Data²

3. Terminology

3.1 Definitions:

3.1.1 *bending length, n* —in textiles, a measure of the interaction between fabric weight and fabric stiffness as shown by the way in which a fabric bends under its own weight.

3.1.1.1 *Discussion*—Bending length reflects the stiffness of a fabric when bent in one plane under the force of gravity and is one component of drape.

3.1.2 *cross-machine direction, CD, n* —the direction in the plane of the fabric perpendicular to the direction of manufacture.

3.1.2.1 *Discussion*—In nonwoven fabrics, the term cross-machine direction is used to refer to the direction analogous to crosswise or filling direction in a woven fabric.

3.1.3 *flexural rigidity, n* —a measure of stiffness, the couple on either end of a strip or unit width bent into unit curvature,

in the absence of any tension.

3.1.4 *machine direction, MD, n* —the direction in the plane of the fabric parallel to the direction of manufacture.

3.1.4.1 *Discussion*—In nonwoven fabrics, the term machine direction is used to refer to the direction analogous to lengthwise or warp direction in a woven fabric.

3.1.5 *nonwoven fabric, n* —a textile structure produced by bonding or interlocking of fibers, or both, accomplished by mechanical, chemical, thermal, or solvent means, or combination thereof.

3.1.6 *stiffness, n* —resistance to bending.

3.2 For definitions of other terms used in this test method, refer to Terminology D 123.

4. Summary of Test Method

4.1 A specimen is slid at a specified rate in a direction parallel to its long dimension, so that its leading edge projects from the edge of a horizontal surface. The length of the overhang is measured when the tip of the specimen is depressed under its own weight to the point where the line joining the top to the edge of the platform makes a 0.785 rad (41.5°) angle with the horizontal. The stiffer the fabric, the longer it takes to bend, thus, the higher numbers indicate a stiffer fabric.

5. Significance and Use

5.1 This test method may be used for acceptance testing of commercial shipments of nonwoven fabrics, however, caution is advised since information about between-laboratory precision is incomplete. A comparative test as directed in 5.1.1 may be advisable.

5.1.1 In case of a dispute arising from differences in reported test results when using this test method for acceptance testing of commercial shipments, the purchaser and the supplier should conduct a comparative test to determine if there is a statistical bias between their laboratories. Competent statistical assistance is recommended for the investigation of bias. As a minimum, the two parties should take a group of test specimens that are as homogeneous as possible and that are from a lot of material of the type in question. Test specimens should then be randomly assigned in equal numbers to each laboratory for testing. The average results from the two laboratories should be compared using the appropriate Student's t -test and an acceptable probability level chosen by the two parties before testing is begun. If a bias is found, either its cause must be found and corrected or the purchaser and the

¹ This test method is under the jurisdiction of ASTM Committee D-13 on Textiles and is the direct responsibility of Subcommittee D13.64 on Nonwoven Fabric.

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² *Annual Book of ASTM Standards*, Vol 07.01.