



Designation: D3513 – 02 (Reapproved 2018)

Standard Test Method for Overlength Fiber Content of Manufactured Staple Fiber¹

This standard is issued under the fixed designation D3513; 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 test method covers the determination of the percent by number of overlength or multiple length fibers in a sample of manufactured cut staple. The method is applicable to fiber taken immediately after manufacturing, from the bale, or from partially processed stock.

NOTE 1—For measurement of length and length distribution of manufactured staple fibers, refer to Test Method [D5103](#).

1.2 This test method covers procedures using the Fibrosampler Model 335A (inch-pound units), the Fibrosampler Model 335B (SI units), and Fibrosampler combs Model 336.

1.2.1 The Fibrosampler Model 335A is equipped with a sample plate that has 15.8-mm ($\frac{5}{8}$ -in.) diameter sample holes and is recommended for use on blended staple taken from the fiber blender or from a carding machine.

1.2.2 The Fibrosampler Model 335B is equipped with a sample plate that has 10-mm (0.4-in.) diameter sample holes and is recommended for use on unblended staple as may be taken from the fiber cutter or from a bale of staple fiber.

1.3 The values stated in either SI units or inch-pound units are to be regarded separately as the standard. The values stated in each unit are not exact equivalents; therefore, each unit must be used independently of the other.

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

1.5 *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.*

¹ This test method is under the jurisdiction of ASTM Committee [D13](#) on Textiles and is the direct responsibility of Subcommittee [D13.58](#) on Yarns and Fibers.

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2. Referenced Documents

2.1 *ASTM Standards:*²

[D123 Terminology Relating to Textiles](#)

[D1447 Test Method for Length and Length Uniformity of Cotton Fibers by Photoelectric Measurement](#)

[D2258 Practice for Sampling Yarn for Testing](#)

[D3333 Practice for Sampling Manufactured Staple Fibers, Sliver, or Tow for Testing](#)

[D3888 Terminology for Yarn Spinning Systems](#)

[D3990 Terminology Relating to Fabric Defects](#)

[D4849 Terminology Related to Yarns and Fibers](#)

[D5103 Test Method for Length and Length Distribution of Manufactured Staple Fibers \(Single-Fiber Test\)](#)

3. Terminology

3.1 *Definitions:*

3.1.1 For definitions of textile terms used in this test method: fiber beard, staple, overlength staple fibers and multiple-length staple fibers, refer to Terminology [D4849](#).

3.1.2 For definitions of other textile terms used in this test method, refer to Terminologies [D123](#), [D3888](#), [D3990](#), and [D4849](#).

4. Summary of Test Method

4.1 Fibers are caught randomly on a comb to form a fiber beard. The probability that a given fiber length group represented in the original fiber population will appear in the test specimen is proportional to the ratio of the total length of that fiber length group to the total fiber length of the original sample. The beard is biased in the favor of long fibers.

4.2 The fiber beard is brushed out and laid on a specimen board. The density of the beard of the cut staple tapers to a line that is parallel to the base of the comb. The overlength fibers are observed to extend beyond this line and they can be identified easily.

4.3 The noticeably longer fibers are pulled from the fiber beard, verified for over- or multiple-length and counted. The

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.

result is then expressed as the percent overlength and percent multiple-length fiber in the original population.

5. Significance and Use

5.1 The existence of overlength fiber in manufactured staple can cause serious problems in the spinning of these fibers into yarn. Overlength fibers may create problems in carding, but more especially high-strength multiple cut fibers may cause cockling in spinning.

5.2 Since the overlength fibers are caused by dull or damaged cutting knives or by uneven flow of tow to the staple cutter, their existence within the fiber population is not uniform and their occurrence in the population follows a highly skewed distribution.

5.3 Manual methods of determining overlength fiber require much more operator time, and the standard deviations of the test between laboratories and operators are high. Use of the Fibrosampler method greatly reduces both operator time and standard deviation of testing.

5.4 In manufacturing it is important to know if fibers are overlength due to looping of the tow or multiple length due to damaged cutters.

5.5 This method for testing staple fiber for overlength fiber is not recommended for acceptance testing (see 13.1).

5.5.1 In some cases the purchaser and the supplier may have to test a commercial shipment of one or more specific materials by the best available method, even though the method has not been recommended for acceptance testing of commercial shipments. If there are differences of practical significance between reported test results for two laboratories (or more), comparative test should be performed to determine if there is a statistical bias between them, using competent statistical assistance. As a minimum, use the samples for such a comparative tests that are as homogeneous as possible, drawn from the same lot of material as the samples that resulted in disparate results during initial testing and randomly assigned in equal numbers to each laboratory. The test results from the laboratories involved should be compared using a statistical test for

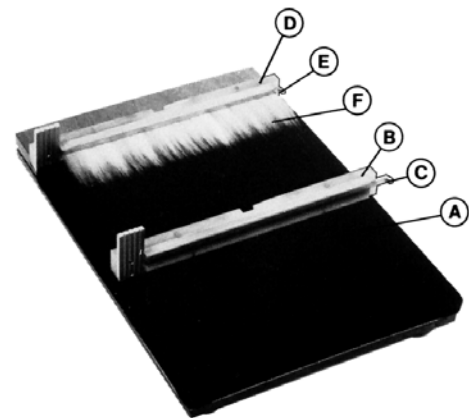


FIG. 2 Fibrosampler Combs

unpaired data, a probability level chosen prior to the testing series. If a bias is found, either its cause must be found and corrected, or future test results for that material must be adjusted in consideration of the known bias.

6. Apparatus

6.1 *Fibrosampler*,³ Model 335A or 335B (Fig. 1), equipped with the following:

6.1.1 *Combs*,³ Model 336 (Fig. 2).

6.1.2 *Spacing Gage*.

6.1.3 *Specimen Board*, board covered with short pile or plush surface on one side, for displaying the test specimen.

6.1.4 *Brush*, for brushing the test specimen.

6.1.5 *Tweezers*, for removing the long fibers from the specimen board for verification.

NOTE 2—Fibrosampler Model 192, which is used for sampling cotton, (Method D1447) has been used successfully with this method, but the above listed models and combs yield better results because long fibers are less likely to be pulled from the combs during beard preparation.

6.2 *Laboratory Carding Machine* or Opener/Blender Model 338³ is needed for use with Fibrosampler Model 335A.

6.3 *Analytical Balance*, capable of weighing the specimen to within 0.01 % of its mass.

6.4 *Scale*, graduated to the nearest 1 mm (1/16-in.).

7. Sampling

7.1 *Lot Sampling*—As a lot sample for acceptance testing, take at random the number of shipping containers directed in the applicable material specification or other agreement between the purchaser and supplier, such as an agreement to use Practice D3333 or Practice D2258. Consider shipping containers to be the primary sampling units.

NOTE 3—An adequate specification or other agreement between the purchaser or supplier requires taking into account the variability between shipping units, between packages, ends or other laboratory sampling unit

³ The sole source of supply of the apparatus known to the committee at this time is Special Instruments Laboratory, Inc., 312 W. Vine Ave., P.O. Box 1950, Knoxville, TN, 37901. If you are aware of alternative suppliers, please provide this information to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee,¹ which you may attend.

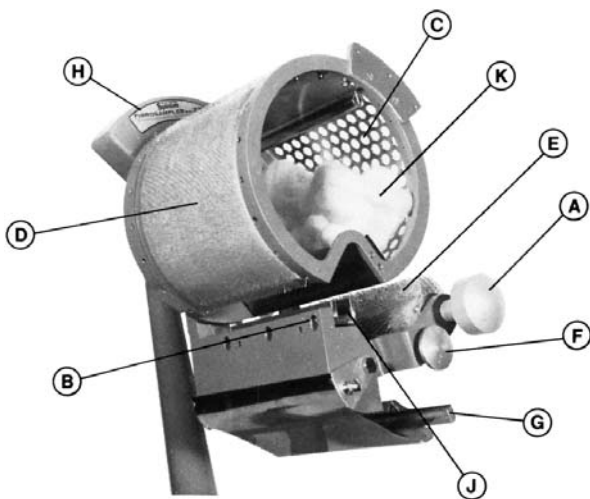


FIG. 1 Fibrosampler