



Designation: D 5103 – 95

Standard Test Method for Length and Length Distribution of Man-Made Staple Fibers (Single-Fiber Test)¹

This standard is issued under the fixed designation D 5103; 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 average staple length and staple length distribution of both man-made and natural fibers by manually measuring single fiber lengths. This test method is also used to measure the length of fibers removed from a staple yarn, but such a measurement may not represent the fiber's staple length, as manufactured.

1.2 Because this test method requires measuring the length of only 50 fibers, it is not suitable for use in determining the number of long fibers that occur infrequently in a sample.

NOTE 1—For determination of average staple length and staple length distribution of man-made fibers by fiber-array method, refer to Test Method D 3660, and for overlength fibers, refer to Test Method D 3513.

NOTE 2—For methods covering the determination of the average length and length distribution of natural fibers, refer to the following methods: for cotton, Test Method D 1440, and Test Method D 1447, for wool, Test Method D 519, Test Method D 1234, and Test Method D 1575.

1.3 *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 Textiles²
- D 519 Test Method for Length of Fiber in Wool Top²
- D 1234 Test Method for Sampling and Testing Staple Length of Grease Wool²
- D 1440 Test Method for Length and Length Distribution of Cotton Fibers (Array Method)²
- D 1447 Test Method for Length and Length Uniformity of Cotton Fibers by Fibrograph Measurement²
- D 1575 Test Method for Fiber Length of Wool in Scoured Wool and in Card Sliver²
- D 1577 Test Methods for Linear Density of Textile Fibers²
- D 1776 Practice for Conditioning Textiles for Testing²
- D 2258 Practice for Sampling Yarn for Testing²

¹ This test method is under the jurisdiction of ASTM Committee D 13 on Textiles and is the direct responsibility of Subcommittee D13.58 on Yarn and Fiber Test Methods.

Current edition approved June 15, 1995. Published September 1995. Originally published as D 5103 – 90. Last previous edition D 5103 – 90.

² Annual Book of ASTM Standards, Vol 07.01.

D 3333 Practice for Sampling Man-Made Staple Fibers, Sliver, or Tow for Testing³

D 3513 Test Method for Overlength Fiber Content of Man-Made Staple Fiber³

D 3660 Test Method for Staple Length of Man-Made Fibers, Average and Distribution (Fiber Array Method)³

3. Terminology

3.1 Definitions:

3.1.1 *length distribution, n*—of fibers, a graphic or tabular presentation of the proportion or percentage (by number or by mass) of fibers having different lengths.

3.1.2 *velveteen, n*—a fabric in twill or plain weave made with a short closely packed filling pile in imitation of velvet.

3.1.3 For definitions of other textile terms used in this test method, see Terminology D 123.

4. Summary of Test Method

4.1 Each fiber to be tested is gripped at the tips with forceps, fully extended without stretching, and measured. The average fiber length of the measured fibers is calculated and the length distribution curve is plotted.

5. Significance and Use

5.1 This test method is used for research, development, quality control, product specifications, and may be used for acceptance testing of commercial shipments of textile fibers. However, caution is advised since information on between-laboratory precision is lacking. Comparative tests 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 comparative tests 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 which are as homogeneous as possible and which are from a lot of material of the type in question. The test specimens should be randomly assigned in equal numbers to each laboratory for testing. The average results from the two laboratories should be compared using Student's *t*-test for

³ Annual Book of ASTM Standards, Vol 07.02.