



Standard Terminology for Cotton Fibers¹

This standard is issued under the fixed designation D7139; 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.

^{ε1} NOTE—The terms “lot” and “lot sample” were removed editorially in September 2013.

1. Scope

1.1 This standard is the compilation of all terminology developed by Subcommittee D13.11 on Cotton Fibers.

1.2 This terminology is unique to the Cotton Fibers industry. Meanings of the same terms used outside the industry can be found in other compilations or in dictionaries of general usage.

1.3 In addition to being a specialized dictionary, D7139 is also a tool for managing the Subcommittee’s terminology. This includes finding, eliminating, and preventing redundancies, that is, where two or more terms relating to the same concept are defined in different words.

1.4 Terms listed are under the jurisdiction of Subcommittee D13.11.

1.5 For definitions of other textile terms see Terminology D123.

2. Referenced Documents

2.1 ASTM Standards:²

D123 Terminology Relating to Textiles

D1440 Test Method for Length and Length Distribution of Cotton Fibers (Array Method)

D1442 Test Method for Maturity of Cotton Fibers (Sodium Hydroxide Swelling and Polarized Light Procedures)

D1445 Test Method for Breaking Strength and Elongation of Cotton Fibers (Flat Bundle Method)

D1447 Test Method for Length and Length Uniformity of Cotton Fibers by Photoelectric Measurement

D1448 Test Method for Micronaire Reading of Cotton Fibers

D1464 Practice for Differential Dyeing Behavior of Cotton

D1684 Practice for Lighting Cotton Classing Rooms for Color Grading

¹ This terminology is under the jurisdiction of ASTM Committee D13 on Textiles and is the direct responsibility of Subcommittee D13.11 on Cotton Fibers.

Current edition approved July 1, 2013. Published September 2013. Originally approved in 2005. Last previous edition approved in 2013 as D7139–09(2013). DOI: 10.1520/D7139-09R13E01.

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.

D2495 Test Method for Moisture in Cotton by Oven-Drying
D2496 Test Method for Seed Coat Fragments and Funiculi in Cotton Fiber Samples (Withdrawn 1986)³
D2812 Test Method for Non-Lint Content of Cotton
D3025 Practice for Standardizing Cotton Fiber Test Results by Use of Calibration Cotton Standards
D3990 Terminology Relating to Fabric Defects
D5332 Test Method for Fiber Length and Length Distribution of Cotton Fibers (Withdrawn 2006)³
D5426 Practices for Visual Inspection and Grading of Fabrics Used for Inflatable Restraints
D5867 Test Methods for Measurement of Physical Properties of Raw Cotton by Cotton Classification Instruments
D7642 Practice for Establishment of Calibration Cottons for Cotton Classification Instruments
D7785 Test Method for Water in Lint Cotton by Oven Evaporation Combined with Volumetric Karl Fischer Titration

3. Terminology

A-tuft, *n*—a single-pass process for aligning hook free fibers on the Fibroliner FL-101. **D5332**

amount, *n*—in cotton length testing with the Fibrograph (optical) or Length Analyzer (pneumatic), a measure of the thickness, optical or pneumatic density, of the test beard, proportional to the number of fibers present at various distances from the base of the comb(s) (Fibrograph) or the specimen clamp jaws (Length Analyzer). **D5867**

amount, *n*—in cotton length testing with the Fibrograph, a measure of the thickness, or optical density, of the test beard, proportional to the number of fibers present at various distances from the base of the comb(s). **D1447**

B-tuft, *n*—a two-pass process for aligning hooked fibers on the Fibroliner FL-101. **D5332**

blending plan, *n*—the instructions for mixing fibers during specimen preparation. **D5332**

³ The last approved version of this historical standard is referenced on www.astm.org.

- bound water**, *n*—the amount of water in a test specimen that is hydrogen bonded to cellulose and expressed as a percentage of the mass of the specimen. **D7785**
- calibration cotton standards**, *n*—cotton samples taken from blended bulk source on which fiber properties have been determined under the International Calibration Cotton Standards Program. **D1448, D3025, D5867**
- calibration cotton standards**, *n*—bales of cotton with established values of micronaire, length, uniformity index and breaking tenacity (strength) for the purpose of calibrating cotton classification instruments for length, uniformity index and breaking tenacity (strength). **D7642**
- candidate bale**, *n*—bale of saw ginned cotton selected for potential use as a calibration cotton standard. **D7642**
- coefficient of length variation**, *n*—a measure of fiber length distribution. **D1440, D5332**
- color grading**, *n*—the act of identifying a specimen by a color grade or color score that is specific to the color and the material graded. **D1684**
- color lamp**, *n*—*in color determination of cotton with a Color Meter*, a lamp with a specific energy output function used in conjunction with special tristimulus filters to obtain a desired response function. **D5867**
- color meter**, *n*—an instrument which measures the fiber sample color as presented in the viewing window, in terms of the tristimulus values Y and Z and transmits these values to the IC/TC for further processing. **D5867**
- color space**, *n*—*specific to this standard*, the daylight color of opaque specimens are represented by points in a space in terms of three color scales: reflectance, R_d , and the chromaticity coordinates for redness or greenness, $\pm a$, and yellowness or blueness, $\pm b$.
- comber/brusher**, *n*—an instrument which prepares the test beard of fibers for length, length uniformity, strength, and elongation measurements by combing the test specimen to remove loose or unclamped fibers and paralleling the individually clamped fibers, and by brushing the clamped fibers to remove fiber crimp and smooth the test beard of cotton. **D5867**
- control limits**, *n*—predetermined ranges based on the variability of past observations between which the instrument data for a test must fall to be considered valid. **D5867**
- cotton**, *n*—a vegetable seed fiber consisting of unicellular hairs attached to the seed of several species of the genus *Gossypium* of the family Malvaceae. **D1445**
- cotton color diagram**, *n*—a diagram showing the color ranges of standards officially established by the U.S. Department of Agriculture for the various grades of cotton in relation to scales of reflectance. R_d , on the vertical axis, and yellowness, $+ b$, on the horizontal axis. **D5867**
- cotton maturity**, *n*—the degree of fiber wall development. **D1442**
- cotton waste**, *n*—material removed from seed cotton, ginned lint, or stock in process by any cleaning or processing machinery and usually consisting of undesirable fibers or a mixture of cotton fibers with foreign matter. **D2495**
- differential dyeing behavior**, *n*—*of cotton*, the tendency of cotton fibers to absorb and retain selectively varying proportions of different dyes from a binary dye bath. **D1464**
- elevator**, *n*—a general term describing a mechanical device on the Motion Control, Inc. Fiber Information System which moves the specimen clamp while preparing the specimen or while taking a length/uniformity index or strength/elongation measurement. **D5867**
- elongation at breaking force**, *n*—*in fiber strength testing of cotton*, the elongation corresponding to the maximum force, and expressed as a percentage of the 1/8-in. (3.2-mm) gage length. **D1445, D5867**
- extra long staple cotton**, *n*—also known as Pima cotton, cotton that is of the *Gossypium barbadense* species which is characterized by longer, stronger and finer fibers compared to Upland cotton. **D7642**
- fanhead**, *n*—the process of removing one half of the bands from one end of a cotton bale to expand (swell out) the layers of the bale in order to facilitate bale sampling. **D7642**
- fanheading**, *n*—the process of removing one half of the bands from one end of a cotton bale to expand (swell out) the layers of the bale in order to facilitate bale sampling. **D7642**
- Fiberweigh**, *n*—an instrument having a capacity for weighing a 51-grain (3.30-g) specimen with a sensitivity of at least 0.2 % of the mass being weighed. **D5867**
- fibrogram**, *n*—*in testing cotton fibers for length*, the curve representing the second cumulation of the length distribution of the fibers sensed by the length measuring instrument in scanning the fiber board. **D5867**
- fibrogram**, *n*—*in cotton length testing with the Fibrograph*, the curve representing the second cumulation of the length distribution of the fibers sensed by the length measuring instrument in scanning the fiber board. **D1447**
- Fibronaire**, *n*—an instrument which determines the micronaire reading of raw cotton fibers using the “porous-plug” air flow technique. **D5867**
- foreign matter**, *n*—in cotton, non-lint material commonly referred to as waste or trash such as dust, sand, seed-coat fragments, leaves, and stems normally present in raw and partially processed cotton. **D2812, D5426**
- free water**, *n*—the amount of water in a test specimen that is hydrogen bonded to other water in cellulose and expressed as a percentage of the mass of the specimen.
- DISCUSSION—Free water in cellulose freezes. A distinction of bound water into the freezing and non-freezing kinds is not necessary. Both kinds of bound water, if present, come off the fibers since no residual water can be detected. **D7785**

- ginned lint**, *n*—cotton fibers that have been separated from their seeds by ginning but not subjected to any further processing after ginning. (See **lint cotton**.) **D2495**
- hooks**, *n*—*in fiber testing*, curved or bent fiber ends caused by the carding or specimen preparation processes. **D5332**
- horseshoe**, *n*—a length of sliver folded in a manner such that the two ends can be fed simultaneously into the needle field of the Fibroliner FL-101. **D5332**
- IC/TC**, *n*—abbreviation for Intelligent Color/Trash Coordinator. **D5867**
- IDT**, *n*—abbreviation for Intelligent Data Terminal. **D5867**
- illumination**, *n*—*in lighting*, the density or flux of light on a unit area of surface. **D1684**
- immature fibers**, *n*—(1) (cotton fibers treated with sodium hydroxide solution)—fibers that either (a) have swollen and assumed a spiral form, or (b) remained flat, thinly outlined, and almost transparent. Total wall width is less than the lumen width.
(2) (cotton fibers observed under polarized light)—fibers that appear purple, indigo, or blue, turn orange or yellow-orange upon rotation to the subtractive position, and upon removal of the selenite plate show parallel extinction. (Compare **mature fibers**.) **D1442**
- invisible waste**, *n*—*in cotton testing*, weight loss due to dust, moisture, loose fibers, etc., carried away by the air stream during the test. **D2812**
- length (for cotton classification)**, *n*—an industry term for upper half mean length reported in millimeters or inches. **D7642**
- length analyzer**, *n*—an instrument which determines the upper-half-mean length and length uniformity index of a test beard of cotton. **D5867**
- length group**, *n*—all fibers, or pulls, whose lengths fall within a given length interval. **D1440**
- length interval**, *n*—a class interval of 1/8 in. (3 mm), usually designated by its midpoint length in odd-numbered sixteenths of an inch. **D1440**
- lint**, *n*—*in loose cotton*, fibers mostly of spinnable length. (See also **linters**.) **D2812**
- lint content**, *n*—that portion of a mass of cotton fiber consisting of fiber, including normal moisture content, but excluding foreign matter. **D2812**
- lint cotton**, *n*—loose cotton fibers in any form, either raw or processed, free of seeds and not bound together in yarn or fabric. (See also **ginned lint**.) **D2495**
- linters**, *n*—the short fibrous material adhering to the cotton seed after the spinnable lint has been removed by ginning and which is subsequently recovered from the seed by a process called “delinting.” **D5867**
- lumen**, *n*—*in vegetable fibers*, the central canal of the fiber. **D1442**
- mature fibers**, *n*—*cotton fibers treated with sodium hydroxide solution*—fibers that have swollen into unconvoluted and almost rod-like shapes, where total wall width is equal to or greater than the lumen width. **D1442**
- mature fibers**, *n*—*cotton fibers observed under polarized light*—fibers that appear yellow, yellow green, or green and are yellow or light yellow upon rotation to the subtractive position (through 90°) and show little or no parallel extinction on removal of the selenite plate. (Compare **immature fibers**.) **D1442**
- maturity index**, *n*—a relative indication of cotton fiber maturity.
- mean length**, *n*—*in testing of cotton fibers*, the average length of all the fibers in the test specimen based on mass-length data. **D1440, D1447**
- micronaire reading**, *n*—a relative measurement of fiber fineness derived from the porous plug air-flow method. **D1442, D1448, D 5867, D5867**
- mote**, *n*—a whole, immature cotton seed. **D2496, D 5867, D5867**
- non-lint content**, *n*—that portion of a mass of cotton fiber which is essentially foreign matter. **D2812**
- number of pieces of trash**, *n*—*in testing cotton with the Trash Meter*, a number correlated with the total number of pieces of trash on the surface of the sample of cotton over the viewing window. **D5867**
- one-percent length (L1 %N)**, *n*—*in fiber testing*, the length exceeded by 1 % of the number of fibers in a test specimen. **D5332**
- percent area**, *n*—*in testing cotton with the Trash Meter*, the ratio of total area of trash on the surface of a sample of cotton to that of the area of the viewing window, expressed in a percentage of the area of the viewing window. **D5867**
- pull**, *n*—a group of fibers grasped by the forceps at one time and drawn from the specimen in the combs. **D1440**
- ratch-setting by number (L1 % N)**, *n*—the basis for setting roll spacing in the drafting zone, namely, the length exceeded by 1 % of the number of fibers in a test specimen. **D5332**
- raw cotton**, *n*—ginned lint that has not been subjected to any textile manufacturing process. (See also **ginned lint**.) **D2495**
- R_d and +b**, *n*—*for the purpose of this test method for color*, the daylight color of opaque cotton specimens represented by points in a space as described by Hunter in terms of two color scales: reflectance, R_d, and the chromaticity coordinates for yellowness, + b. **D5867**
- reference standard**, *n*—*in cotton testing*, a homogeneous lot of cotton having a known or accepted value for one or more physical properties. **D3025**

- ringer cotton**, *n*—bale of saw ginned cotton with established values referenced to the benchmark cottons for the purpose of assuring consistency in the establishment of calibration cotton standards between value settings. **D7642**
- roller ginned cotton**, *n*—lint cotton extracted from the cottonseed by frictional forces between a rotating roller and a fixed knife. **D7642**
- saw ginned cotton**, *n*—lint cotton extracted from the cottonseed by pulling forces between a set of rotating saws and a set of fixed ribs. **D7642**
- seed coat fragment**, *n*—*in cotton*, a portion of a cotton seed, usually black or dark brown in color, broken from a mature or immature seed, and to which fibers and linters may or may not be attached. **D2496, D5867**
- seed cotton**, *n*—cotton, as harvested and before ginning, consisting of seeds with the fibers attached and usually including measurable amounts of foreign matter. **D2495**
- short-fiber content (SFC)**, *n*—that percentage of fibers (by number or by weight) in a test specimen, that is shorter than 12.7 mm (0.5 in.) in length. **D5332**
- span length**, *n*—*Fibrograph*, the distance spanned by a specified percentage of the fibers in the test beard, taking the amount reading at the starting point of the scanning as 100 %. **D1447**
- specimen clamp**, *n*—the device which is used to transport the fiber test beard of cotton through the gathering, combing, brushing, length, length uniformity, strength, and elongation measurement operations. **D5867**
- specimen loader**, *n*—an instrument which obtains the test specimen by lowering an open specimen clamp onto the surface of the raw cotton samples, closing the jaws of the specimen clamp and ascending with a portion of the fibers retained in the jaws awaiting the combing and brushing procedure. **D5867**
- status switches**, *n*—switches located on the mainframe electronic chassis in the console used to set the number of specimens tested on each laboratory sample and turn off instruments not being used in operating the system. **D5867**
- stock in process**, *n*—*in textiles*, staple fibers at any stage of manufacture between the opening of the bale and the completion of the spinning process. **D2495**
- strength (for cotton classification)**, *n*—an industry term for breaking tenacity reported in grams per tex. **D7642**
- strength analyzer**, *n*—an instrument which determines tensile strength and elongation at breaking load for a test beard of cotton. **D5867**
- test beard**, *n*—*in length testing of cotton*, the portion of the test specimen that has been combed and brushed into a “beard” which protrudes from the outside of the comb(s) or the clamp(s). **D1447, D5867, D5332**
- test specimen**, *n*—(*Fibrograph*), the cotton fibers placed randomly on a Fibrograph comb(s) for fiber length measurements. **D1447**
- test specimen**, *n*—*in lint cotton water tests with the volumetric Karl Fischer (KF) titration*, the cotton fibers placed in a KF specimen container before it is sealed. **D7785**
- test specimen**, *n*—*in cotton length tests with the Length Analyzer*, the cotton fibers protruding randomly from the base of a Motion Control Inc. specimen clamp for fiber length measurement before being combed or brushed. **D5867**
- test specimen**, *n*—*in cotton maturity tests*, the series of slides observed by one technician as one half of the test. **D1442**
- trash**, *n*—*in cotton*, undeveloped seed, motes, small bits of seed coat, or particles of leaf appearing as specks. **D3990**
- trash**, *n*—*in testing cotton with the Trash Meter*, foreign matter having a distinct difference, as seen by a video camera, between light and dark color from that of cotton. **D5867**
- Trash Meter**, *n*—an instrument which optically measures the amount of trash on the surface of a raw cotton sample as presented to the viewing window. **D5867**
- tristimulus filters**, *n*—*in cotton fiber color testing with the Color Meter*, optical filters used in conjunction with specific color lamps to obtain a response function approximating the tristimulus functions of the CIE Standard Observer for Source C. **D5867**
- uniformity index**, *n*—*in fiber length testing of cotton*, the ratio between the mean length and the upper-half-mean length expressed as a percentage of the upper-half-mean length. **D5867**
- uniformity index**, *n*—*in cotton length testing with the Fibrograph*, the ratio between two span lengths expressed as a percentage of the longer length. **D1447**
- uniformity ratio**, *n*—*in cotton length testing with the Fibrograph*, the ratio between two span lengths expressed as a percentage of the longer length.
DISCUSSION—Various span lengths and measures of length uniformity may be calculated from the results of the measured points, but the 2.5 and 50 % span lengths and the 50/2.5 uniformity ratio are usually used. **D1447**
- universal micronaire calibration cotton standards**, *n*—cottons produced by USDA and designated as Au (high micronaire) or Gu (low micronaire) with established values for micronaire for the purpose of calibrating and verifying cotton classification instruments for micronaire. **D7642**
- upper-half-mean length**, *n*—*in fiber length testing of cotton*, the mean length by number, of the longer one half of the fibers by weight. **D1447, D5867**
- upper quartile length**, *n*—*in testing of cotton fibers*, that length which is exceeded by 25 % of the fibers, by weight, in the test specimen. **D1440, D5332**

USDA benchmark reference cotton standard (benchmark cotton), *n*—bale of cotton maintained by USDA that serves as a reference for establishing calibration cotton standards, designated as short weak/long strong reference standards. **D7642**

value setting, *n*—the event of establishing values on candidate bales for use as calibration cotton standards using multiple laboratories and multiple instruments. **D7642**

value setting group, *n*—the group of cottons consisting of candidate bales, benchmark cottons and ringer cottons used in a value setting. **D7642**

value setting subgroup, *n*—the subdivided samples taken from the value setting group used for multiple laboratory testing in a value setting. **D7642**

visible waste, *n*—*in cotton testing*, foreign matter deposited in the waste boxes of the machine during the test. **D2812**

water content, *n*—the specific measure of the total amount of water (free plus bound) in a test specimen expressed as a percentage of the mass of the moist material.

DISCUSSION—Moisture content is not a specific measure of water in a test specimen. It is the amount of lost volatiles (both aqueous and non-aqueous) by standard oven-drying test methods and expressed as a percentage of the moist material. (See also Significance and Use, Appendix X2, and Terminology **D123**.) **D7785**

water regain, *n*—the specific measure of the total amount of water (free plus bound) in a test specimen expressed as a percentage of the mass of the water-free material. **D7785**

working cotton standard, *n*—a reference standard developed primarily for use within a specific laboratory. **D3025**

4. Keywords

4.1 cotton; fibers; terminology

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