



Standard Practice for Sampling Cotton Fibers for Testing¹

This standard is issued under the fixed designation D 1441; 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 practice covers procedures for taking a lot sample, at the source, of cotton fibers and reducing this sample through a series of steps to provide a relatively small test specimen of loose cotton fibers, representative of the source material and suitable for the determination of a single property, or a series of fiber properties, according to established procedures.

1.2 This practice has been used extensively for commercial acceptance testing of cotton fibers as well as for arbitration testing and research.

1.3 The procedures do not cover the selection of samples for the determination of moisture. Special handling and protection of the sample from the prevailing atmosphere required for samples taken for the determination of moisture are not provided for in this practice. See Test Method D 2495.

NOTE 1—This practice is used in taking samples of cotton for testing by Test Methods D 1440, D 1442, D 1445, D 1447, D 1448, D 1464, D 2480, D 2496, and D 2812.

1.4 The values stated in SI units are to be regarded as standard. No other units of measure are included in this standard.

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:

- D 123 Terminology Relating to Textiles²
- D 1440 Test Method for Length and Length Distribution of Cotton Fibers (Array Method)²
- D 1442 Test Method for Maturity of Cotton Fibers (Sodium Hydroxide Swelling and Polarized Light Procedures)²
- D 1445 Test Method for Breaking Strength and Elongation of Cotton Fibers (Flat Bundle Method)²
- D 1447 Test Method for Length and Length Uniformity of Cotton Fibers by Fibrograph Measurement²
- D 1448 Test Method for Micronaire Reading of Cotton Fibers²

¹ This practice 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 Sept. 10, 2000. Published November 2000. Originally published as D 1441 – 52. Last previous edition D 1441 – 72 (1993)^{\epsilon}1.

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

D 1464 Test Method for Differential Dyeing Behavior of Cotton²

D 1776 Practice for Conditioning and Testing Textiles²

D 2480 Test Method for Maturity Index and Linear Density of Cotton Fibers by the Causticaire Method²

D 2495 Test Method for Moisture in Cotton by Oven-Drying²

D 2812 Test Method for Non-Lint Content of Cotton²

D 4271 Practice for Writing Statements on Sampling in Test Methods for Textiles³

3. Terminology

3.1 Definitions:

3.1.1 *laboratory sample, n*—a portion of material taken to represent the lot sample, or the original material, and used in the laboratory as a source of test specimens.

3.1.2 *lot, n*—*in acceptance sampling of cotton*, the main stock, supply or source of the fibers to be sampled.

3.1.2.1 *Discussion*—The source may consist of one or more bolls, plants, or rows in a field; one or more bales, mixes, or blends of cotton; or any consignment, shipment, or lot of cotton or cotton products of any size or weight that is considered sufficient to yield the test specimens required.

3.1.3 *lot sample, n*—*in cotton*, a relatively large sample taken in the field to represent a consignment, shipment, or lot, for use in the preparation of the laboratory samples.

3.1.4 *specimen, n*—a specific portion of a material or a laboratory sample upon which a test is performed or which is selected for that purpose. (See also test specimen.)

3.1.5 For definitions of other textile terms used in this practice, refer to Terminology D 123.

4. Summary of Practice

4.1 Sampling procedures for obtaining samples from the lot sample and for the reduction of the lot samples to the size required for fiber test specimens are presented. Steps are outlined to secure reduction of the amount of cotton fibers to be handled at various stages, so that the reduced sample continues to be representative of the lot. Provision is made for the omission of intermediate steps in the reduction of the lot sample in cases where this is desirable or necessary.

5. Significance and Use

5.1 The reliability of the results of any test method depend

³ *Annual Book of ASTM Standards*, Vol 07.02.

primarily upon how well the specimens tested represent the original source material. Much time and effort are required, and can justifiably be spent, to be sure that all the sampling operations are at random and are representative. Failure to provide a test specimen which accurately represents the material from which it is drawn will produce misleading test results regardless of the accuracy and precision of the test method.

6. Apparatus

6.1 *Mechanical Fiber Blender*,⁴ designed especially for cotton fibers (optional).

6.2 *Balance*, 100 g capacity, 0.5 g sensitivity (optional).

7. Conditioning

7.1 For samples that are not to be blended, neither conditioning nor preconditioning is required.

7.2 For samples that are to be blended, bring the lot sample from the prevailing atmosphere to moisture equilibrium with the standard atmosphere for testing textiles as directed in Practice D 1776. Preconditioning is not required.

8. Division into Lots

8.1 Unless there is information to the contrary, consider all the cotton or cotton products in a single shipment or consignment as a single lot for sampling purposes. If the shipment or consignment contains cotton or cotton products from two or more sources, consider the material from each source as a separate lot.

9. Lot Sample

9.1 *Acceptance Testing*—As a lot sample for acceptance testing, take at random the number of shipping containers as directed in an applicable material specification or other agreement between the purchaser and the supplier. In the absence of such an agreement, take ten shipping containers or 10 % of the shipping containers in the lot, whichever is the greater. Consider bales or other shipping containers to be the primary sampling units.

NOTE 2—An adequate specification or other agreement between the purchaser and the supplier requires taking into account the variability between shipping containers, between laboratory samples within a shipping container, and between test specimens within a laboratory sample to provide a sampling plan with a meaningful producer's risk, consumer's risk, acceptable quality level, and limiting quality level.

9.2 *Other Testing*—Select the lot sample to meet the requirements of the particular experimental design or purpose of the fiber tests desired. Select the lot sample source material in such a manner that it will be as uniform as practicable, on the basis of available information. If the lot sample is nonhomogeneous, divide it into rational subgroups; for example, individual bales in a commercial shipment, on the basis of available information.

9.2.1 Take a sufficient number of samples to represent the source material adequately. The number of subsamples to be taken will be determined by the size and homogeneity of the lot sample, and the required precision of the results.

⁴ Fiber Blender available from Custom Scientific, or its equivalent, has been found satisfactory for this method.

9.2.2 Take portions of cotton or cotton products from different parts of the source material carefully and at random to provide a composite lot sample of sufficient size. Approximately 100 g (4 oz) is sufficient for most purposes.

10. Laboratory Sample

10.1 *Acceptance Testing*—As a laboratory sample for acceptance testing, proceed as follows:

10.1.1 For bales, take a 100 g (4 oz) subsample of cotton from each of two opposite sides of each bale in the lot sample and combine the two subsamples into a single laboratory sample weighing 200 g (8 oz).

10.1.2 For sliver, begin with the first material from the lead end of the package that has a clean, uniform appearance, and take a length weighing at least 100 g (4 oz), as the laboratory sample. If the shipping containers in the lot sample contain multiple packages, take a laboratory sample from one package drawn at random for each container.

10.1.3 For yarn on packages, take one package at random from each case in the lot sample, remove enough traverses of yarn to obtain a surface free of visible damage or soil, and take a length weighing at least 100 g (4 oz) as the laboratory sample from that case.

10.1.4 For yarn on beams, sample as agreed upon by the purchaser and the supplier.

10.1.5 For cotton products, take from each shipping container in the lot sample subsamples at random from three places in the shipping container and combine them into a laboratory sample weighing at least 100 g (4 oz).

10.2 *Other Testing*—From each unit in the lot sample, take a single laboratory sample containing at least 100 g (4 oz).

11. Specimens

11.1 After preparing the laboratory samples as directed in Sections 12-14, take specimens as directed in Section 15.

PREPARING LABORATORY SAMPLES

12. General Handling Techniques

12.1 After the laboratory samples have been taken as directed in Section 10, spread the material into a thin layer or manipulate it in such a way that fibers may be taken from all its parts.

12.1.1 When the lot sample consists of samples cut from bales (see Note 5), avoid the inclusion of any cut fibers in the laboratory sample. Cut fiber can be avoided by pulling off and discarding the cut portions or by being careful not to take subsamples from the cut edges.

12.1.2 When the lot sample consists of cotton products such as yarns or fabrics, untwist, unravel, or otherwise prepare the portions to be taken for the laboratory sample so that loose fibers may be obtained.

13. Blended Method (Preferred)

13.1 Take 25 to 30 small pinches of loose fibers at random throughout the lot sample weighing approximately 10 g (Note 3). Blend the composite laboratory sample by preparing either a hand sliver or a mechanically blended sliver as follows:

13.1.1 *Hand Sliver*—With a drawing or drafting action of the fingers, pull each of the tufts or pinches into a long uniform

strand. Lay the strands parallel to each other and compress the whole mass gently to form one large composite sliver. Discard the ends of the sliver as there is a possibility of bias existing in this portion.

13.1.2 *Mechanically Blended Sliver*—Slightly draw or draft the pinches to form a bat or sliver about 300 mm (12 in.) long to be fed into the mechanical fiber blender. Use any mechanical blender designed for cotton fibers that will produce a substantially homogeneous sample without breakage, or damaging the fibers to the extent that the accuracy of the test methods would be affected (Note 4).

NOTE 3—A laboratory sample weighing 10 g will provide sufficient material for all of the usual fiber tests. When a smaller amount is sufficient for the tests, the size of the pinches may be reduced accordingly. The number of pinches may be reduced when the bulk lot sample is sufficiently homogeneous for a smaller number to preserve representativeness.

NOTE 4—Most mechanical blending procedures require that the sample be passed through the blender three times to ensure adequate mixing.

14. Unblended Method (Alternative)

14.1 Divide the whole or representative portions of the lot sample into subsamples on the basis of available information. From each subsample take test specimens for one or more observations of each property to be tested as required (Note 5).

NOTE 5—This method is especially adapted to commercial practice where the subsample consists of classer's samples cut from bales of cotton. Subsamples are taken in such a manner as to ensure that fibers from each layer in the classer's sample, representing each side of the bale, are included.

15. Test Specimens

15.1 Take from each laboratory sample the number of specimens specified in the applicable test method(s). When directed in the test method, use the laboratory sample as the test specimen.

16. Report

16.1 If a report on the sampling procedure used is required, state that the material was sampled as directed in ASTM Practice D 1441, and specify how the samples were drawn, whether or not they were blended, and the number of pieces (pinches) taken from the larger sample to make the laboratory sample and the number of specimens taken. Report the identification of the lot or shipment sampled, and note the lot number, or bale number.

17. Keywords

17.1 cotton; fibers; sampling

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