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Standard Test Method for Moisture in Cotton by Oven-Drying[1]

This standard is issued under the fixed designation D2495; 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 amount of moisture in cotton by oven-drying and is applicable to raw cotton, cotton stock in process, and cotton waste.

1.2 This test method may also, by agreement, be used for determining moisture in blends of cotton with other fibers.

1.3 This test method offers alternative procedures for weighing the dried specimens, one procedure using an oven balance (9.3) and the other using a desiccator (9.4).

NOTE 1—For other methods of determination of moisture in textile materials refer to Test Method D2654, which includes two options based on drying in an oven, and one option based on distillation with an immiscible solvent: Methods D885, Test Method D1576, Test Method D2462.

1.4 The values stated in SI units are to be regarded as the standard. No other units 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:*[2]

D123 Terminology Relating to Textiles

D885 Test Methods for Tire Cords, Tire Cord Fabrics, and Industrial Filament Yarns Made from Manufactured Organic-Base Fibers

D1441 Practice for Sampling Cotton Fibers for Testing

D1576 Test Method for Moisture in Wool by Oven-Drying

D2462 Test Method for Moisture in Wool by Distillation With Toluene

D2654 Test Method for Moisture in Textiles (Withdrawn 1998)[3]

D7139 Terminology for Cotton Fibers

3. Terminology

3.1 For all terminology relating to D13.11, Cotton Fibers, refer to Terminology D7139.

3.1.1 The following terms are relevant to this standard: cotton waste, ginned lint (cotton), lint cotton, moisture content, moisture-free, moisture regain, oven-dry, percentage point, raw cotton, seed cotton, stock in process.

3.2 For all other terminology related to textiles, refer to Terminology D123.

4. Summary of Test Method

4.1 Specimens are weighed, dried in an oven, and re-weighed. The difference between the original mass and the oven-dry mass is calculated in percent, either as moisture content or moisture regain.

5. Significance and Use

5.1 This test method for testing the moisture content of cotton can be used for acceptance testing of commercial shipments of lint cotton provided the between-laboratory bias is known.

5.1.1 If there are differences or practical significance between reported test results for two laboratories, or more, comparative test should be performed to determine if there is a statistical bias, using competent statistical assistance. As a minimum, use test samples as homogeneous as possible, drawn from the material from which the disparate test results are obtained, and assigned randomly in equal numbers to each laboratory for testing. Other materials with established test values may be used for this purpose. Compare the test results from the two laboratories using a statistical test for unpaired data at 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 must be adjusted in consideration of the known bias.

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

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[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.

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

5.2 Information on the moisture content of cotton is desirable since the physical properties of cotton are significantly affected by its moisture content. High moisture content increases flexibility, toughness, elongation, and tensile strength. Too high a moisture content causes difficulty in processing due to the tendency of the stock to "lap-up" on drafting rolls. Low moisture, on the other hand, facilitates cleaning but increases the brittleness of the fiber and results in fiber breakage during ginning, cleaning, and mill processing. Low moisture also increases fly waste and may cause manufacturing difficulties due to static electricity.

5.3 Variations in the amount of moisture present affect the mass and hence the market value of a lot of material sold at a definite price per unit mass. Knowledge of the moisture content or regain can be accordingly an important financial consideration.

5.4 Moisture content variation affects lap, sliver, and roving linear density which in turn controls yarn number variation.

5.5 The mass of the oven-dry specimen used in this method is the mass observed after the specimen has been dried in an oven supplied with ambient air. The observed mass is accordingly subject to minor variations as discussed in 3.6.1. These variations, however, are believed to be without significance in commercial transactions.

6. Apparatus

6.1 *Oven,* thermostatically controlled at a temperature of 105 ± 2°C (220 ± 4°F) with fan-forced ventilation and preferably equipped with a balance that permits weighing the specimens without opening the oven. The air entering the oven must come from the standard atmosphere for testing textiles.

6.2 *Balance(s),* of sufficient capacity to weigh the specimens in the containers that will be used and having a sensitivity of 0.01 g.

NOTE 2—Although all the weighing can be done on the oven balance, it is more convenient and the work can be completed more quickly if a separate balance is available for weighing the specimens before drying. Otherwise, the oven must be allowed to cool to room temperature before a new set of specimens can be weighed.

6.3 *Weighing Containers,* to be used when the specimens are weighed in the oven (see 9.1.1 and 9.2).

6.3.1 The weighing containers may be perforated metal baskets or shallow pans, of a size to fit the particular oven in which they are used. For specimens containing particles of foreign matter that are easily shaken out, use baskets made of or lined with wire screening fine enough to hold the trash, or line the lower part of the basket with metal foil, but this technique may prolong the drying period required.

6.3.2 *Weighing Bottles or Weighing Cans,* with tight-fitting covers, for use with the desiccator procedure (9.1.2 and 9.4). To expedite drying, the diameter of each container should be greater than its height.

6.4 *Desiccator,* large enough to hold as many weighing containers as will be dried at one time. (For the desiccator procedure only, see 9.1.2 and 9.4.)

6.5 *Desiccant*—Calcium chloride is satisfactory, provided that it is redried or replaced as required for effective desiccation. Any other effective, noncaustic desiccant may be used. (For the desiccator procedure only, see 9.1.2 and 9.4.)

6.6 *Sample Containers*—Metal cans, glass jars, or plastic containers of approximately 1-L (1-qt) capacity with airtight covers are recommended for use when sampling cotton outside the laboratory.

NOTE 3—For very dry material, that must be weighed in the containers, lightweight containers are desirable. For damp cotton, which would rust tin-plated cans, the containers should be made of rustproof material (such as aluminum, glass, or plastic).

7. Sampling and Test Specimens

7.1 *Primary Sampling Unit*—Consider bales or other shipping containers to be the primary sampling unit.

7.2 *Laboratory Sample Unit*—As a laboratory sample unit for acceptance testing, take at random from the primary sampling units as directed in Practice D1441.

7.3 Since the purpose of this test method is to determine the moisture content of the cotton in the shipping containers in the lot sample, the laboratory sampling units are taken directly from the shipping container and placed directly into the sample container. Therefore, for this test method, laboratory sampling units will be used as specimens and the terms "laboratory sampling unit," "sample," and "specimen" can be used interchangeably.

7.4 *Sample Size:*

7.4.1 The recommended minimum size for a specimen of lint cotton or waste containing at least 50 % lint cotton is 5 g.

7.4.2 The recommended minimum size for a specimen of waste containing less than 50 % lint cotton is 10 g.

7.4.3 It is anticipated that only one specimen will be tested from each sample container. However, a 1-L (1-qt) container will hold ample material for testing more than one specimen. The container should be well filled with the material being sampled to minimize changes in moisture content caused by confined ambient air.

7.4.4 In identifying containers or specimens, do not use any material of variable moisture content. For example, do not place identifying tags or slips of paper inside the sample containers and do not paste labels on the outside if the specimens are to be weighed in the containers. Identify containers by etching, stamping, or by scratching numbers on them, or by marking with crayon, ink, or paint.

7.5 *Sample Collection:*

7.5.1 When sampling lint cotton as it passes through (*1*) lint cleaners or condensers in the ginnery, (*2*) opening and cleaning machinery in the mill, or (*3*) mechanical or pneumatic conveyors between machines, take the specimen as the material flows past the sampling location. Place it in the sample container without delay, and immediately close the container with a tightly fitting cover.

7.5.2 Sliver and roving are usually in approximate moisture equilibrium with the air in the mill. Take short sections from a number of strands as directed in 7.5.1 and place enough of them in the container so that the total mass is as specified in