Designation: D 3333 – 01

Standard Practice for Sampling Manufactured Staple Fibers, Sliver, or Tow for Testing[1]

This standard is issued under the fixed designation D 3333; 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 a procedure for the division of shipments of manufactured staple fiber, sliver (or top) or tow into lots and the sampling of such lots for testing.

NOTE 1—For sampling yarns, refer to Practice D 2258.

NOTE 2—This practice differs from BISFA[2] rules for staple fibers in the lot sampling, by the elimination of separate sampling of outer versus inner container areas, in the reduction of number of strata from 6 to 5, and by the elimination of compositing to obtain a single laboratory sample for the lot when testing properties which do not depend on as-received moisture content.

1.2 *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:* [3]

D 123 Terminology Relating to Textiles

D 2258 Practice for Sampling Yarn for Testing

D 2494 Test Method for Commercial Mass of a Shipment of Yarn or Man-Made Staple Fiber or Tow

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

3. Terminology

3.1 *Definitions:*

3.1.1 *container*, *n*—a receptacle designed to hold a material, or to give integrity to the material.

3.1.1.1 *Discussion*—for the purposes of this standard, the term container includes bales, cartons and other shipping units.

3.1.2 *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.

3.1.3 *lot*, *n—in acceptance testing*, that part of a consignment or shipment consisting of material from one production lot.

3.1.4 *lot sample*, *n*—one or more shipping units taken at random to represent an acceptance sampling lot and used as a source of laboratory samples.

3.1.5 *man-made staple fiber*, *n*—fiber of spinnable length manufactured directly or by cutting filaments.

3.1.6 *primary sampling unit*, *n*—the sampling unit containing all of the sources of variability which should be considered in acceptance testing; the sampling unit taken in the first stage of selection in any procedure for sampling a lot or shipment.

3.1.7 *sample*, *n*—(*1*) a portion of a lot of material which is taken for testing or for record purposes. (*2*) a group of specimens used, or observations made, which provide information that can be used for making statistical inferences about the population(s) from which the specimens were drawn. (See also *lot sample, laboratory sample,* and *specimen*.)

3.1.8 *sampling unit*, *n*—an identifiable, discrete unit or subunit of material that could be taken as part of a sample.

3.1.9 *shipping unit*, *n—in textiles*, any type of packaging used to facilitate the handling and shipping of fibers, yarns and fabrics.

3.1.9.1 *Discussion*—For the purposes of this practice, packaging includes bales, cartons, and other such containers.

3.1.10 *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. (Syn. *test specimen*.)

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

4. Summary of Practice

4.1 Instructions are given for dividing containers into lots, for determining the number of containers to be selected from each lot as the lot sample, and for determining the number of containers taken from the lot sample as a laboratory sample. See Practice D 4271.

[1] This practice is under the jurisdiction of ASTM Committee D13 on Textiles and is the direct responsibility of Subcommittee D13.58 on Yarn Test Methods, General.

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[2] BISFA Internationally Agreed Methods for Testing Polyamide Staple Fibers, 1974 edition, BISFA Internationally Agreed Methods for Testing Polyester Staple Fibers, 1972 edition, and BISFA Rules for Testing Regenerated Cellulose and Acetate Staple Fibers, 1970 edition, available from the Bureau International pour la Standardisation de la Rayonne et des Fibres Synthetiques.

[3] 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.

4.2 Separate laboratory samples are taken for commercial weight measurement and for other testing, for example, physical or chemical tests.

4.3 The manner of preparing laboratory sampling units for commercial weight, and the manner of collecting laboratory sampling units for other testing are based on the following:

4.3.1 Present knowledge of the systematic variation of moisture within the container, and

4.3.2 The variability of the properties for which the practice is to be used.

5. Significance and Use

5.1 Assigning a value to any property of the material in a container or in a lot, consignment, or delivery involves a measurement process that includes both sampling and testing procedures. The correctness of the value assigned depends upon the variability due to testing. Even when the variability due to testing is minimized by carefully developed procedures, correct and consistent estimates of the true value of the property are possible only when the sampling procedure avoids systematic bias, minimizes variations due to sampling, and provides a laboratory sample of adequate size.

5.2 This practice may not give the most efficient sampling plan that might be devised in special situations but it does present a general procedure that gives satisfactory precision with an economical amount of sampling and one which does not require elaborate statistical computation based on previous knowledge of the amount of variation between lot samples, between laboratory samples, and between test specimens.

5.3 The smallest number of specimens required for a given variability in the average result will usually be obtained by (1) minimizing the number of shipping units in the lot sample, (2) taking one of the shipping units in the laboratory sample, and (3) taking the prescribed specimen(s) from the selected laboratory sample shipping unit. (See 7.3 and 7.4.)

5.4 To minimize the cost of sampling a lot of material, it is necessary to agree on the required variance for the reported average for a lot of material:

5.4.1 Estimate the variance due to lot samples, the variance due to laboratory samples, and the variance due to test specimens.

5.4.2 Calculate the total variance for the average test results for several combinations of the number of lot samples, the number of laboratory samples per lot sample, and the number of test specimens per laboratory sample.

5.4.3 Calculate the cost of performing each of the sampling schemes considered in 5.4.2.

5.4.4 Select the sampling scheme that (1) has the required precision, and (2) is most economical to perform.

6. Apparatus (for Moisture Related Properties)

6.1 *Sample Containers*, tared to the nearest 0.1 g, formed of impermeable materials, such as glass, polyethylene, or metal, and capable of being rapidly closed and sealed air-tight. The sample containers shall be of a size to contain approximately 250 g of compressed fiber.

6.1.1 If the air space above the compressed fiber is no more than 2 % of the container volume, a rigid container may be used.

6.1.2 Flexible polyethylene bags or vessels, constructed with a wall thickness of at least 0.13 mm (0.005 in.), and capable of being sealed air-tight, have been found satisfactory, provided they are compressed prior to sealing to remove as much free air as possible.

6.2 *Laboratory Weighing Device*, capable of weighing the material to a precision of ±0.1 %.

6.3 *Bale-Weighing Device*, capable of weighing the entire container to a precision of ±0.1 %.

7. Procedure

7.1 *Division into Lots*—Instructions for the division of product into lots is best given in the appropriate specification. In the absence of such instructions, sample and test as a separate lot any portion of a shipment or order that differs from other portions in specifications, or physical characteristics, or that is billed or designated by the supplier as a separate lot. If portions of a larger order are shipped on different dates, from plants or warehouses, or in more than one carload or truckload; treat each shipment as a separate lot. If the containers in a shipment do not have consecutive numbers, divide the shipment into groups of containers having consecutive numbers and treat each group as a separate lot if it is separated from the adjacent group by as many as ten container numbers.

7.2 *Lot Sample*—As a lot sample for acceptance testing, unless otherwise agreed upon, as when specified in an applicable material specification, take containers which have been designated by drawing numbers from a recepticle in which the numbers have been thoroughly mixed or by use of a table of random numbers. As applicable, consider containers to be the primary sampling unit. Take the number of containers specified in Table 1.

7.3 *Laboratory Samples for Moisture Related Properties*—For acceptance testing, unless otherwise agreed upon, as when specified in an applicable material specification, proceed as directed in 7.3.1, 7.3.2, or 7.3.3. Samples for measurement of moisture related properties cannot be used for measurement of other properties.

7.3.1 *Staple Fiber*—Immediately upon opening each container in the lot sample, prepare two laboratory samples as follows:

7.3.1.1 Quickly strip off fiber down to each of the layers illustrated in Fig. 1. As each layer is exposed, quickly collect an approximately 50-g hand sample in each hand, by picking up small groups of fibers at points randomly distributed over the entire surface of the layer. Immediately put one of the hand samples in one of the two tared laboratory sample containers for the bale and the other hand sample in the second container. Promptly close the containers. After all the layers have been

TABLE 1 Number of Containers[A]

In Lot	In Lot Sample
1 to 3	all
4 to 24	4
25 to 50	5
More than 50	10 % of the containers, but no more than 10

[A] Table 1 is an empirical practice found by experience to be satisfactory for the lot sample from homogeneous lots of man-made staple fiber.