Designation: D3333 – 07 (Reapproved 2012)

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

This standard is issued under the fixed designation D3333; 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 D2258.

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]

D123 Terminology Relating to Textiles

D2258 Practice for Sampling Yarn for Testing

D4271 Practice for Writing Statements on Sampling in Test Methods for Textiles (Withdrawn 2009)[4]

D4849 Terminology Related to Yarns and Fibers

3. Terminology

3.1 For all terminology relating to D13.58, Yarns and Fibers, refer to Terminology D4849.

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

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 D4271.

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)

[1] This practice is under the jurisdiction of ASTM Committee D13 on Textiles and is the direct responsibility of Subcommittee D13.58 on Yarns and Fibers.

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

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 sampled, the laboratory sample in each container should consist of about 250 g of fiber. It is essential to minimize fiber exposure to the ambient atmosphere during each step of the preparation of the laboratory samples.

7.3.2 *Silver (or Top)*—When sampling packages of sliver (or top) in a container, take one package at random from each container, giving each package in the container an equal chance of being selected.

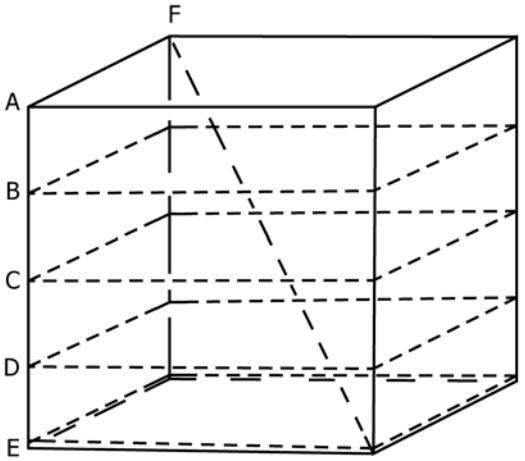
7.3.2.1 For each package to be tested, immediately upon removal of wrapping material from the package, pull two approximately 30-g samples and place one of them in one of two tared sample containers and the other in the second container. Close the containers immediately. Remove approximately half of the sliver (or top) from the package. Quickly pull two approximately 60-g samples from the middle. Place these samples in the containers with the samples from the top of the package, closing the containers immediately. Remove sliver (or top) to within one to three layers from the bottom. Quickly pull two more approximately 30-g samples and place them in the containers with the other samples. Each combined sample should weigh 100 ± 25 g.

7.3.3 *Tow*—If tow is wrapped on a support, treat it as sliver (or top) except cut the samples required. If tow is piddled, cut two approximately 60-g samples from the top layer. Place them in separate tared sample containers and close the containers immediately. Remove tow to about the middle of the layers and cut three approximately 40-g segments from areas indicated in Fig. 2. Place the segments in one of the sample containers and

TABLE 1 Number of Containers[A]

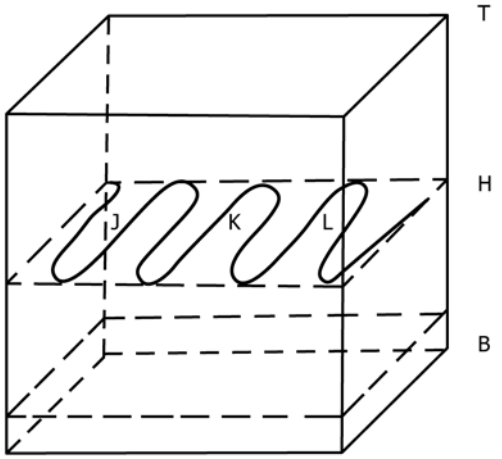
In Lot	In Lot Sample
1 to 3	all
4 to 24	4
25 to 50	5
More than 50	10 % of the containers, but no more than 10

[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.



NOTE 1—A is the top surface immediately upon exposure; B is the surface exposed on removal of the first quarter, C is the surface at the middle of the bale; D is the surface exposed on removal of three fourths of the fiber, and E is the surface 2 to 3 cm above the bottom of the bale, F is the diagonal through the center of the bale.

FIG. 1 Diagram for Staple Fiber Sampling



T—Top layer
H—Middle layer
J—Area halfway from center to edge
K—Center
L—Area halfway from center to edge
B—Layer just above the bottom

FIG. 2 Diagram for Tow Sampling

immediately close the container. Remove a layer and cut three more segments from the same general areas. Place these segments in the other container, closing the container immediately. Remove the remainder of the tow to within one to three layers of the bottom. Cut two approximately 60-g segments and place one in each of the containers, closing the containers immediately. Each combined sample should weigh 240 ± 40 g.

7.4 *Laboratory Samples for Other Properties*—For an acceptance testing laboratory sample, unless otherwise agreed upon, as when specified in an applicable material specification, when testing for such properties as linear density, tensile properties, length, extractable matter, fiber blend, etc. that are not dependent on as-received moisture content, proceed as directed in 7.4.1, 7.4.2, or 7.4.3. Use separate laboratory samples for measurement of moisture related properties.

7.4.1 *Staple Fiber*—As each layer indicated in Fig. 1 is exposed, but after any samples for moisture tests have been taken, take 50-g samples from each layer approximately at a point on a diagonal (Fig. 1) through the center of the container. Place each sample in a separate sample container labeled with the complete sample identification. Sample containers need not be tared and there is no need for speed in collecting the sample.

7.4.2 *Sliver (or Top)*—When sampling packages of sliver (or top) in a container for the laboratory sample, take one package at random from each container, giving each package in the container an equal chance of being selected.

7.4.2.1 From each selected package, take a length of material from the lead end that is compatible with requirements of the test under consideration and has a clean, uniform appearance.

7.4.3 *Tow*—From each laboratory sample unit, take a length of material from the leading end that is compatible with requirements of the test under consideration and has a clean, uniform appearance.

7.5 *Test Specimens*—For each unit in the laboratory sample, test the number of specimens that is specified in the applicable test method.

8. Keywords

8.1 sampling; textile fiber; textile strand