



Designation: D 2258 – 99

## Standard Practice for Sampling Yarn for Testing<sup>1</sup>

This standard is issued under the fixed designation D 2258; 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 approval. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

### 1. Scope

1.1 This practice describes a procedure for the division of shipments of yarn into test lots and the sampling of such lots for testing.

1.2 This practice is applicable to single, plied, or cabled yarns, and cords, made of any fiber or mixture of fibers, and supported on any form of package, including beams.

1.3 This practice also describes procedures for the sampling of yarn(s) removed from woven or knitted fabrics, however, when thus sampled, the yarns are usually not representative of entire shipments, as referred to in 1.1. Consequently, the resultant sampling can only be used to determine the characteristics of the yarn and is usually not used for acceptance testing. Moreover, it should be recognized that the characteristics of yarns from fabrics may be different than the characteristics of the same yarn(s), prior to being entered into the fabric manufacturing process.

1.4 The values stated in either SI units or inch-pound units are to be regarded separately as the standard. Within the text, the inch-pound units are shown in parentheses. The values stated in each system are not exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in nonconformance with this practice.

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 Textiles<sup>2</sup>

D 1578 Test Method for Breaking Strength of Skeins<sup>2</sup>

D 1907 Test Method for Yarn Number by the Skein Method<sup>2</sup>

<sup>1</sup> This practice is under the jurisdiction of ASTM Committee D-13 on Textiles and is the direct responsibility of Subcommittee D13.58 on Yarn Test Methods.

Current edition approved April 10, 1999. Published June 1999. Originally published as D 2258 – 64T. Last previous edition D 2258 – 94.

<sup>2</sup> *Annual Book of ASTM Standards*, Vol 07.01.

D 4271 Practice for Writing Statements on Sampling in Test Methods for Textiles<sup>3</sup>

### 3. Terminology

#### 3.1 Definitions:

3.1.1 *beam, n—in textiles*, a large spool containing many ends of yarns wound parallel, and used for such purposes as weaving or warp knitting.

3.1.2 *beam set, n—in textiles*, one or more beams of yarn in a single shipment to be further processed together for a specific end use.

3.1.3 *bulk sample, n—in the sampling of bulk material*, one or more portions which (1) are taken from material that does not consist of separately identifiable units and (2) can be identified after sampling as separate or composited units.

3.1.4 *case, n—in textiles*, a shipping unit, usually a carton, box, bale, or other container holding a number of yarn packages.

3.1.5 *cone, n—in textiles*, (1) a yarn holder or bobbin of conical shape used as a core for a yarn package of conical form, also called a cone core. (2) the yarn package obtained when yarn is wound upon a cone core.

3.1.6 *end, n—an individual sliver, roving, yarn, or cord.*

3.1.6.1 *Discussion*—For yarns, one of the one or more continuous, multiple parallel lengths of yarn which may be wound on a yarn package or beam. For example, two lengths of yarn wrapped parallel on a single bobbin constitute two yarn ends, likewise, one thousand lengths of yarn wrapped parallel on a single beam constitutes one thousand yarn ends.

3.1.7 *fabric package, n—a length of fabric in a form suitable for handling, storing, or shipping.*

3.1.7.1 *Discussion*—Fabric packages may be unsupported, such as when folded in cases, or supported, such as on tubes, bolts, or creels. Fabric packages are frequently referred to as rolls or pieces.

3.1.8 *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.*

<sup>3</sup> *Annual Book of ASTM Standards*, Vol 07.02.

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

3.1.10 *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. (*Syn.* bulk sample)

3.1.11 *primary sampling unit, n*—the sampling unit containing all 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.

3.1.12 *production lot, n*—that part of one manufacturer's production made from the same nominal raw material under essentially the same conditions and designed to meet the same specifications.

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

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

3.1.14.1 *Discussion*—Since there are two or more stages in most sampling schemes, the sampling units in each stage must be clearly identified to avoid confusion. The number of stages in sampling schemes is not limited, but may be as few or as many as required by the nature of the material being sampled. There are frequently three stages of sampling: (1) taking primary sampling units from a lot of material as a lot sample, (2) taking laboratory samples from each of the primary sampling units in the lot sample, and (3) taking test specimens from each of the units in the laboratory sample.

3.1.15 *sample skein, n*—skein reeled from the package or beam of the laboratory sample, and used in the laboratory as a source of specimens.

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

3.1.17 *yarn package, n*—a length or parallel lengths of yarn in a form suitable for handling, storing, or shipping.

3.1.17.1 *Discussion*—Packages may be unsupported, such as skeins or cakes, or supported having various winding patterns, such as bobbins, cops, cones, pirns, spools, or tubes. In yarns, the word package designates the smallest unit that can be separated from the shipment without cutting or unwinding the yarn, not a small group of packages. Even a small box containing a dozen spools is treated, for sampling purposes, as a case.

3.1.18 For terminology of other terms used in this practice, refer to Terminology D 123.

#### 4. Summary of Practice

4.1 Instructions are given for dividing the yarn into lots, for determining the number of cases, beams, or fabric packages to be selected from each lot as a lot sample, and for determining the number of packages, including the number of ends, representing those packages taken from the lot sample as a laboratory sample. See Practice D 4271.

#### 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 Practice D 2258 may not give the most efficient sampling plan that might be devised in special situations but 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 primary sampling units (such as cases, beams or fabric packages), between units of the laboratory sample taken from the primary sampling units of the lot sample (such as yarn packages taken from a case) and between specimens taken from units of the laboratory sample (such as lengths of yarn taken from a yarn package or a fabric swatch taken from a roll or piece). Many plans that include stratified sampling can be found in textbooks.

5.3 The smallest number of specimens required for a given variability in the average result will usually be obtained by (1) maximizing the number of shipping containers in the lot sample, (2) taking a single package end per shipping container in the laboratory sample, and (3) taking only one specimen per package. Unfortunately, this is rarely the most economical way to test a product because it normally costs most to take a shipping container as part of the lot sample, costs an intermediate amount to take a package from a shipping container as part of a laboratory sample, and costs least to take and test a specimen from a package or yarn.

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 testing specimens.

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

6.1 *Division into Lots*—Instructions on 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, put-up, 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