

Standard Test Methods for Tuft and Yarn Length of Uncoated Floor Coverings

This standard is issued under the fixed designation D 418; 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.

These methods have been approved for use by agencies of the Department of Defense and for listing in the DoD Index of Specifications and Standards.

1. Scope

1.1 These test methods apply only to uncoated pile yarn floor covering.

1.2 Usually the tuft elements measured as directed in these test methods will each be bound at only one binding site, but the method may also be used for tuft elements bound at more than one binding site, provided that every tuft element measured is bound at the same number of sites.

1.3 *This standard does not purport to address all of the safety problems, 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 Textiles³

D 1909 Table of Commercial Moisture Regains for Textile Fibers³

E 122 Recommended Practice for Choice of Sample Size to Estimate the Average Quality of a Lot Process⁴

3. Terminology

3.1 *Definitions:*

3.1.1 *back coating, n—in textiles*, an adhesive-type substance applied to the back of a fabric for such purposes as locking pile yarn tufts into a carpet backing, bonding a secondary backing to a primary backing, or increasing fabric body or stiffness.

3.1.2 *backing, n—for pile yarn floor covering*, all materials in a pile yarn floor covering other than pile yarn.

3.1.3 *backing fabric, n—in textiles*, (1) a fabric into which pile yarn is inserted, or (2) a reinforcing layer adhered to the reverse side of a fabric.

3.1.3.1 *Discussion*—In woven and knitted pile yarn floor coverings the backing fabric is created at the same time the pile yarn is bound to the backing fabric but in tufted pile yarn floor coverings the backing fabric is made prior to the operation in which the pile yarn is fastened to the backing fabric.

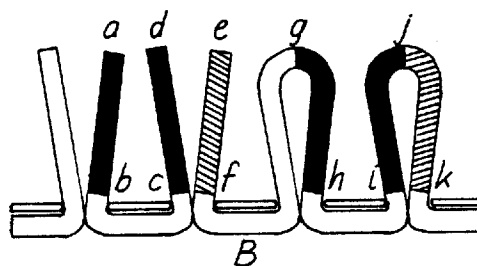
3.1.4 *binding site, n—for pile yarn floor covering*, a place at which the pile yarn is, or can be, bound to the backing fabric. See Fig. 1.

3.1.4.1 *Discussion*—In any machine-made pile yarn floor covering the binding sites occur in an orderly and repetitive array at uniform intervals in both the lengthwise and widthwise directions of the floor covering. The nature of the binding sites differs among woven, knitted and tufted floor coverings. For example, the binding site of a woven floor covering consists of one or more filling shots under which the face yarn passes, while the binding site of a tufted floor covering consists of the section of backing fabric between two adjacent needle holes in the lengthwise direction. The number of pile yarn strands that can be fastened at one binding site can vary from none to several, according to design.

3.1.5 *carpet, n—all textile floor coverings not designated as rugs.*

3.1.6 *components, n—for pile yarn floor covering*, the individual yarn or fabric elements into which a pile yarn floor covering can be dissected.

3.1.6.1 *Discussion*—The major components of uncoated pile yarn floor covering are the pile yarn and the backing fabric. For woven and knitted floor covering, the backing fabric may be further dissected into component yarns.



ad = cutpile tuft element
 gj = loop pile tuft element
 ab, cd, ef, gh, ij, jk = tuft legs
 cd, ef = cut pile tuft leg pair
 ij, jk = loop pile tuft leg pair, a loop
 B = one binding site

FIG. 1 Cross Section of Tufted Pile Yarn Floor Covering

¹ These test methods are under the jurisdiction of ASTM Committee D-13 on Textiles and are the direct responsibility of Subcommittee D13.21 on Pile Floor Coverings.

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² The technically correct term "mass" is used throughout this standard in place of "weight," the term in common usage. The buoyancy effect of the displaced air is considered negligible for the test methods in this standard, so that apparent mass and mass are the same within the limits of precision and accuracy achieved (see Section 3.4.1 of E 380).

³ *Annual Book of ASTM Standards*, Vol 07.01.

⁴ *Annual Book of ASTM Standards*, Vol 14.02.

3.1.7 *cut pile, n*—for pile yarn floor covering, pile in which the legs of any one tuft element are not connected to the legs of any other tuft element.

3.1.8 *floor covering, n*—an essentially planar material, having a relatively small thickness in comparison to its length or width, which is laid on a floor to enhance the beauty, comfort, and utility of the floor.

3.1.8.1 *Discussion*—It is customary to distinguish between hard or resilient floor coverings and soft or textile floor coverings. Textile floor coverings are further subdivided into pile floor coverings and nonpile floor coverings such as braided rugs or flat nonwoven barb needle-punched felt. There are two types of pile floor coverings: pile yarn and pile fiber. Typical examples of pile fiber floor coverings are flocked floor covering and fork needlepunched non-woven floor covering. Textile floor coverings are also classified as carpets or rugs.

3.1.9 *lengthwise direction, n*—in textiles, the direction in a machine-made fabric parallel to the direction of movement the fabric followed in the manufacturing machine.

(*Syn. machine direction and wrapwise.*)

3.1.10 *level pile, n*—for pile yarn floor covering, pile in which all tuft legs are of substantially the same length.

3.1.11 *loop pile, n*—for pile yarn floor covering, pile in which, for each loop, a tuft leg of one element is connected to a tuft leg of another tuft element at another binding site so as to form a loop which projects above the backing fabric between the binding sites of the connected tuft elements.

3.1.12 *multilevel pile, n*—for yarn floor covering, pile in which some tuft legs are substantially longer than others.

3.1.13 *pile, n*—for pile yarn floor covering, the texture surface composed of many tuft legs bound to a backing fabric in an orderly and repetitive array.

3.1.13.1 *Discussion*—A particular floor covering may be all cut pile, or all loop pile and in either case the pile may be of essentially one pile level or multilevel. A particular floor covering may also contain both cut pile areas and loop pile areas which may be of the same pile level or different pile levels. Areas of intermingled cut and loop pile or intermingled high and low level pile may also occur.

3.1.14 *pile yarn floor covering, n*—a textile product in which yarn or yarn segments are attached intermittently to a

backing fabric so as to project above the backing fabric to form a pile; the yarn entering the backing fabric substantially perpendicular to the plane of the backing fabric.

3.1.14.1 *Discussion*—Pile yarn floor covering is distinguished from flannel, fork needlepunched, and flocked products in that the latter have a nap or pile formed of individual fibers rather than of yarn. Pile yarn upholstery fabrics are sometimes distinguishable from pile yarn floor covering only in that they have backings that are not as stiff as for pile yarn floor covering.

3.1.15 *primary backing, n*—for tufted pile yarn floor covering, the fabric through which the pile yarn is carried by needles to form tufts: the backing fabric.

3.1.16 *rug, n*—a textile floor covering of limited area which is complete in itself and is intended for use as a partial covering of a floor or another floor covering.

3.1.17 *secondary backing, n*—for pile yarn floor covering, a material adhered to the backing fabric side of a pile yarn floor covering.

3.1.17.1 *Discussion*—The secondary backing may be a textile layer, a solid plastic layer, a rubber sponge, or an elastomeric foam.

3.1.18 *stitches, n*—in tufted pile floor covering, the number of pile tufts per inch in the lengthwise direction.

3.1.19 *tuft, n*—in pile fabrics, those cut or uncut loops which are attached to the backing fabric at one binding site and which form part of the fabric face.

3.1.19.1 *Discussion*—A tuft may consist of one or more tuft elements.

3.1.20 *tuft element, n*—for pile yarn floor covering, a segment of yarn bound to a backing fabric at a binding site so that two portions (legs) of the yarn project above the backing fabric, one portion on each side of the binding site. See Fig. 1.

3.1.20.1 *Discussion*—In loop pile floor covering, the tuft element extends from the midpoint of the loop on one side of the binding site to the midpoint of the loop on the other side of the binding site. In most pile yarn floor coverings both legs of the tuft element are immediately adjacent to the same binding site. In some pile yarn floor coverings the yarn segment extends from one leg past a number of binding sites before the second leg of the tuft element projects above the backing fabric.

3.1.21 *tuft leg, n*—for pile yarn floor covering, one of the two portions of a tuft element that project above the backing fabric on the pile side of the floor covering. See Fig. 1.

3.1.22 *wale, n*—in knitted fabrics, a column of loops in successive courses. The column is parallel with the loop axes.

3.1.23 *widthwise direction, n*—in textiles, the direction in a machine-made fabric perpendicular to the direction of movement the fabric followed in the manufacturing machine.

(Syn. *cross machine direction, weftwise, and filling wise*.)

3.2 For the definition of other textile terms used in these methods, refer to Terminology D 123.

4. Significance and Use

4.1 Test Method D 418 for the determination of tuft length and yarn length of uncoated floor coverings are useful in quality and cost control during the manufacture of pile yarn floor covering. Both appearance and performance can be affected by changes in this characteristic.

4.2 Although these test methods are useful for acceptance testing of commercial shipments as the best available methods, between-laboratory precision has not yet been determined. If there is a disagreement arising from differences in values reported by the purchaser and the supplier when using the methods of this standard for acceptance testing, the statistical bias, if any, between the laboratory of the purchaser and the laboratory of the supplier should be determined with each comparison of test results being based on adjacent test samples cut from one shipping roll of the floor covering.

5. Sampling Units and Test Specimens

5.1 Sampling Units:

5.1.1 The basic sampling unit of uncoated floor covering is a production roll.

5.2 *Lot Sample*—Take a lot sample as directed in Recommended Practice E 122 when statistical knowledge of the product variability and test method precision is available, and a decision has been made on the maximum deviation that can be tolerated between the estimate to be made from the sample and the result that would be obtained by measuring every sampling unit of the lot. Otherwise the

number of sampling units in a lot sample and the use of the test results obtained from the individual test samples shall be in accordance with the manufacturer's quality control program or with the specification agreed to by the purchaser and the supplier.

5.3 A test sample shall consist of a full width section of floor covering cut from one end of each roll in the lot sample and shall be at least 100 mm (4 in.) longer than the specimens required for the tests being conducted. Do not cut a test sample of coated floor covering from a seam end of a production roll.

5.4 A test specimen is a designated area of a test sample that may be marked on or cut from the test sample as directed in a test method. For test samples 3050 mm (120 in.) wide or wider, three test specimens are required for a test method, one at each edge no nearer to the edge than 5 % of the total floor covering width and one in the middle portion of the test sample. For test samples at least 1520 mm (60 in.) wide but less than 3050 mm, two test specimens are required for a test method, one at each edge no nearer to the edge than 5 % of the total floor covering width. For test samples less than 1520 mm wide, only one specimen, in the middle of the width, is required for a test method.

5.5 Where it is known that systematic variations in a floor covering characteristic may occur in bands 460 mm (18 in.) or more in width, as with a modular pattern device having separate controls or adjustments for each module, take test specimens from the middle of each band.

5.6 When a full width test sample is not available, take specimens as directed in 5.4 and state in the report the width available and the number of test specimens taken.

5.7 A test result is the average of the measurements made on a set of test specimens as described in 5.4, 5.5, or 5.6. In these methods, directions are given only for obtaining a test result from one test sample. The value representative of the lot being sampled will be the average of the test results for all the test samples in the lot sample.

6. Conditioning

6.1 Condition the test specimens or the test sample in the standard atmosphere for testing textiles ($21 \pm 1^\circ\text{C}$ ($70 \pm 2^\circ\text{F}$) at $65 \pm 2\%$ relative humidity) for 12 h or until the mass changes no more than 0.1 % in 2 h.