



Designation: D 5793 – 95

Standard Test Method for Binding Sites Per Unit Length or Width of Pile Yarn Floor Coverings¹

This standard is issued under the fixed designation D 5793; 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 describes the measurement of the number of binding sites per unit length or width of machine-made, woven, knitted and tufted pile yarn covering both before and after adhesive backing application.

1.2 The values stated in SI units are to be regarded as the standard for all measurements. The inch-pound values are provided for information purposes only.

1.3 Determination of the number of binding sites per unit length or width of pile yarn floor covering previously was contained within Test Methods D 418. For user convenience Subcommittee D13.21 has subdivided Test Methods D 418 into separate standards, of which this test method is one.

1.4 *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 Textiles²

D 418 Methods of Testing Pile Yarn Floor Covering Construction²

D 1909 Table of Commercial Moisture Regains for Textile Fibers²

D 5684 Terminology Relating to Pile Yarn Floor Coverings²

E 122 Practice for Choice of Sample Size to Estimate the Average Quality of a Lot Process³

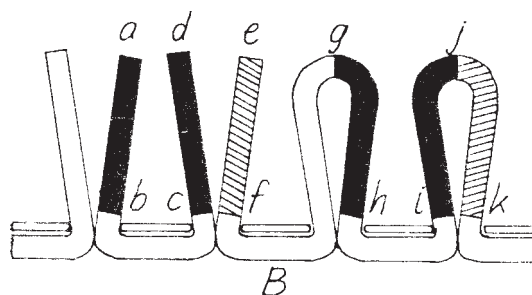
3. Terminology

3.1 Definitions:

3.1.1 *binding site, n*—for pile yarn floor covering, a location at which the pile yarn is, or can be, bound to the backing fabric.

3.1.1.1 *Discussion*—In any machine-made pile yarn floor covering, the binding sites occur in an orderly and repetitive

array at uniform intervals in both lengthwise and widthwise directions of the floor covering. Among woven, knitted and tufted floor coverings, binding sites differ. 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 one to several, according to design.



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

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

3.1.2.1 *Discussion*—The major components of uncoated pile yarn 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.

3.1.3 *tuft, n*—in pile fabrics, those cut or uncut loops which form part of the fabric face that are attached to the backing fabric at binding sites.

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

3.2 For definitions of other terms related to pile floor coverings, refer to Terminology D 5684. For the definition of other textile terms used in this test method, refer to Terminology D 123.

¹ This test method is under the jurisdiction of ASTM Committee D-13 on Textiles and is the direct responsibility of Subcommittee D13.21 on Pile Yarn Floor Coverings.

² Annual Book of ASTM Standards, Vol 07.01.

³ Annual Book of ASTM Standards, Vol 14.02.

4. Summary of Test Method

4.1 The length of pile floor covering containing 40 binding sites is measured in either the lengthwise or the widthwise direction as required and the number of binding sites per unit length is calculated.

5. Significance and Use

5.1 This test method is useful in quality and cost control during manufacture. Both appearance and performance of pile yarn floor coverings can be affected by changes in bindings sites per unit length or width.

5.2 Although this test method is useful for acceptance testing of commercial shipments as the best available method, between-laboratory precision has not yet been determined.

5.2.1 In case of a dispute from differences in reported test results when using this test method the purchaser and the supplier should conduct comparative tests to determine if there is statistical bias between their laboratories. Competent statistical assistance is recommended for the investigation of bias. As a minimum, the two parties should take a group of test specimens which are as homogeneous as possible and which are from a lot of material of the type in question. The test specimens should then be randomly assigned in equal numbers to each laboratory for testing. The average results from the two laboratories would be compared using Student's *t*-test for unpaired data and an acceptable probability level chosen by the two parties before testing is begun. If a bias is found, either its cause must be found and corrected or the purchaser and the supplier must agree to interpret future test results with consideration to known bias.

6. Apparatus

6.1 *Shear or Clipper*,⁴ capable of shearing close enough to the backing to leave a stubble of no more than 1.3 mm (0.05 in.).

6.2 *Scale or Tape*, metal, graduated in 1 mm (0.05 in.), and at least 10 % longer than the distance being measured.

6.3 *Location Markers*, two, such as straight pins.

7. Sampling Units and Test Specimens

7.1 *Sampling Units*:

7.1.1 *Uncoated Floor Covering*—The basic sampling unit of uncoated floor covering is a production roll.

7.1.2 *Coated Floor Covering*—The basic sampling unit of coated floor covering is a shipping roll. The number of shipping rolls obtained from each production roll ranges from one to over ten.

7.2 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 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.

7.3 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.

7.4 *Test Specimens*:

7.4.1 The test specimens shall be large enough to include 44 binding sites in each direction.

7.4.2 This test method may be nondestructive since the measurements may be made on the test specimens without cutting the test specimens from the test sample.

7.4.3 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 the test method. For test samples 3000 mm (118 in.) wide or wider, three test specimens are required, 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 1500 mm (60 in.) wide but less 3000 mm (118 in.), take two test specimens, one at each edge no nearer to the edge than 5 % of the total floor covering width. For test samples less than 1500 mm wide (60 in.), take one specimen, from the middle.

7.4.4 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 modular pattern device having separate controls or adjustments for each module, take test specimens from the middle of each band.

7.4.5 When a full width test sample is not available, take a specimen as directed in 7.4.3 and state in the report the width available and the number of test specimens taken.

7.5 A test result is the average of the measurements made on a set of test specimens as described in 7.4.3, 7.4.4, or 7.4.5. 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.

8. Conditioning

8.1 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.

8.2 If the fiber in any layer of the backing has a commercial regain of over 5 %, the specimen shall be conditioned before measuring. Commercial moisture regains for textile fibers are listed in D 1909.

9. Procedure

9.1 If the binding sites are visible from the back, place the test specimen face down on a flat surface; otherwise, place the test specimen back down and shear the pile close to the backing to reveal the binding sites. Select a line of binding sites in the direction to be counted.

9.1.1 Handle uncoated floor covering to avoid distorting the test specimen dimensions. Do not measure the number of

⁴ Sunbeam Model 510 with EA-1 SUR bottom blade, or equivalent.

binding sites of coated floor covering after treating with reagents and removing the secondary backing.

9.2 Select a distinguishing feature found at each binding site.

NOTE 1—It is not necessary to precisely define the boundaries of a binding site; only to use the same distinguishing feature in every binding site being counted in a particular specimen. For tufted floor covering, a distinguishing feature is the needle hole separating two adjacent binding sites. For woven floor covering it may be a filling yarn appearing once on the back for every binding site.

9.3 Locate the zero point at this distinguishing feature of one binding site with a marker.

9.4 Count 40 complete binding sites from this marker and insert another marker at the distinguishing feature of the 40th site.

NOTE 2—Some pile yarn floor coverings exhibit non-straight line binding sites; therefore counting is facilitated by counting on the back side of the specimen.

9.5 Measure the length, L , between the marked binding sites with the graduated scale or tape, reading to the nearest 1 mm (0.05 in.).

9.6 Make one measurement on each of the test specimens or specimen areas.

10. Calculation

10.1 For each measurement calculate the number of binding sites per unit length (or width) to the nearest 0.1 sites/length (width) using Eq 1.

$$N = 40/L \quad (1)$$

where:

N = number of binding sites per unit length (or width) of floor covering, and

L = length measured as directed in 10.5, mm (in.).

11. Report

11.1 State the test sample was tested as directed in Test Method D 5793, for determining number of binding sites per unit length or width of pile yarn floor covering. Describe the material or product sampled and the method of sampling used.

11.1.1 Report the average number of binding sites per unit length or width of pile yarn floor covering as agreed between the purchaser and the seller. In the absence of such agreement report the number of binding sites per unit length (width).

12. Precision and Bias

12.1 *Precision*—The precision of the procedure in Test Method D 5793 for determining the number of binding sites per unit length or width is being established.

12.2 *Bias*—The procedure in Test Method D 5793 for determining the number of binding sites per unit length or width has no known bias and may be used as a referee method.

13. Keywords

13.1 binding sites; carpet; construction; floor covering; pile yarn

APPENDIX

(Nonmandatory Information)

X1. DESCRIPTION OF BINDING SITE TYPES

X1.1 The following are popular trade terms used to describe binding sites.

Table X1—Binding Site Types

Method of Manufacture	Binding Site Nomenclature
Woven	dents (width)
	pitch (width)
	wires (length)—for Wilton and velvet weaves
	rows (length)—for Axminster weaves
Tufted	gauge, or gauge (width)
	needles (width)
	stitch (length)
Knitted	wales (width)
	courses (length)

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