



Standard Test Method for Tuft Bind of Pile Yarn Floor Coverings¹

This standard is issued under the fixed designation D 1335; 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 reappraisal. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reappraisal.

This standard has been approved for use by agencies of the Department of Defense.

1. Scope

1.1 This test method covers the measurement of the force required to pull a tuft completely out of a pile yarn floor covering sample.

1.2 This test method is applicable to both cut and loop pile yarn floor covering.

1.3 The values stated in SI units are to be regarded as standard; the values in inch-pound units are provided as information only and are not exact equivalents. In case of referee decisions the SI units shall prevail.

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 76 Specification for Tensile Testing Machines for Textiles²
- D 123 Terminology Relating to Textiles²
- D 1776 Practice for Conditioning Textiles for Testing²
- D 2904 Practice for Interlaboratory Testing of a Textile Test Method that Produces Normally Distributed Data
- D 2906 Practice for Statements on Precision and Bias for Textiles
- D 5684 Terminology Relating to Pile Floor Coverings³

3. Terminology

3.1 Definitions:

3.1.1 *cut pile yarn floor covering, n*—a pile yarn floor covering in which the pile is composed of adjacent tuft elements which are separated or cut.

3.1.2 *loop pile yarn floor covering, n*—a pile yarn floor covering in which the pile is composed only of uncut loops.

3.1.3 *tuft bind, n*—*in pile fabrics*, the force required to pull a tuft element from the pile yarn floor covering.

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 Floor Covering.

Current edition approved May 10, 1998. Published August 1998. Originally published as D 1335 – 54. Discontinued in November 1995 and reinstated as D 1335 – 98.

² *Annual Book of ASTM Standards*, Vol 07.01.

³ *Annual Book of ASTM Standards*, Vol 07.02.

3.1.4 For definitions of pile yarn floor covering related terms, refer to Terminology D 5684. For definitions of other textile terms used in this test method refer to Terminology D 123.

4. Summary of Method

4.1 A specimen (tuft leg or loop) is mounted in a special clamping fixture of a tensile testing machine and the test sample containing the specimen is mounted on a special holder on the tensile testing machine. The force to pull the specimen free from the test sample is measured as the tuft bind.

5. Significance and Use

5.1 Test Method D 1335 for tuft bind of pile yarn floor coverings is being used for acceptance testing of commercial shipments. Comparative tests as directed in 5.1.1 may be advisable.

5.1.1 In case of a dispute arising from differences in reported test results using this test method, the purchaser and the supplier should conduct comparative tests to determine if there is a statistical bias between their laboratories. Competent statistical assistance is recommended from the investigation of bias. As a minimum, the two parties should take a group of test samples that are homogeneous as possible and are from a lot of material of the type in question. The test samples should then be randomly assigned in equal numbers to each laboratory for testing. The average results from the two laboratories should be compared using appropriate statistical analysis, and a probability level chosen by the two parties before testing 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 the known bias.

5.2 The satisfactory performance of a pile yarn floor covering depends to a considerable extent on the maintenance of its original appearance. In a cut pile yarn floor covering an inadequate tuft bind may result in complete loss of pile in areas exposed to severe wear. In a looped pile yarn floor covering with inadequate tuft bind the pile loops may be pulled out to form unsightly long loops which may be hazardous.

6. Apparatus

6.1 *Tensile Testing Machine*, Constant-rate-of-extension (CRE) type, conforming to Specification D 76, with a capacity selected such that the force required to complete the test falls

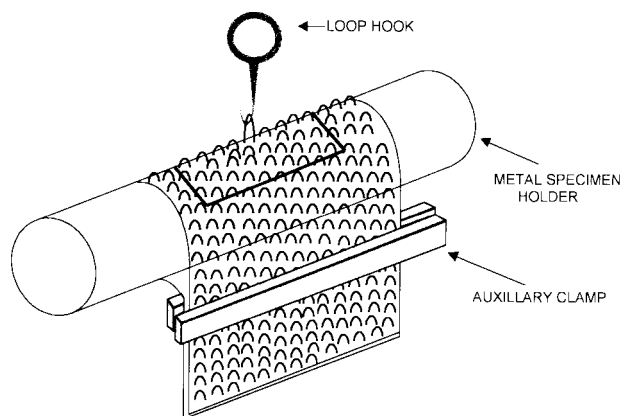


FIG. 1 Metal Specimen Holder, Cut-Away Type

within 15 to 85 % of full scale. A full scale ranging from 4.45 N to 111 N (1 lbf to 25 lbf) is generally adequate. For constant-rate-of-extension (CRE) type and constant-rate-of-traverse (CRT) type machines, the rate is 300 ± 10 mm/min (12 ± 0.5 in./min). In case of controversy the CRE type tensile testing machine shall prevail.

NOTE 1—The test results obtained with different types of testing machines is not always the same.

6.2 *Metal Cylindrical Sample Holder*, 150 mm (6.0 in.) long made from 40 mm (1.5 in.) outside diameter tubing with a section 50 mm (2.0 in.) long portion of the tubing cut away. See Fig. 1. The sample holder should be constructed in a manner that will permit clamping the test sample in the nonmeasuring, pulling clamp of the tensile testing machine or replacement of the nonmeasuring clamp by the sample holder.

6.3 *Tuft Clamp*, for use only with cut pile, consisting of tweezer-like clamp that can be used to grip a single tuft tightly enough to assure removal of the whole tuft from the pile yarn floor covering without slippage of the tuft in the tuft clamp. Alternatively, a hemostat⁴ can be used.

6.4 *Loop Hook*, for use only with loop pile, consisting of a hook which can be readily passed through the loop and hooked under the top of the loop. The hook should be made of wire having a diameter of at least 0.8 mm ($1/32$ in.) and should be constructed so that it can be clamped/attached to, or replace, the measuring clamp of the test machine.

7. Sampling

7.1 *Lot Sample*—As a lot sample for acceptance testing, take at random the number of rolls, or pieces, of pile yarn floor covering as directed in an applicable material specification or other agreement between the purchaser and the supplier. Consider the rolls, or pieces, of pile yarn floor covering to be the primary sampling units. In the absence of such agreement, take one roll or piece from the lot to be tested.

NOTE 2—An adequate specification or other agreement between the purchaser and supplier requires taking into account the variability between rolls or pieces of pile yarn floor covering and between specimens from a roll or pieces of pile yarn floor covering to provide a sampling plan with

⁴ Three Hemostats suitable for this purpose can be obtained from many laboratory equipment suppliers.

a meaningful producer's risk, consumer's risk, acceptable quality level, and limiting quality level.

7.2 *Laboratory Sample*—For acceptance testing, take a 1 m (1 yd) section extending the width of the pile yarn floor covering and at least 150 mm (6 in.) along the machine direction from each roll, or piece, in the lot. For rolls of pile yarn floor covering, take a sample that will exclude fabric from the outer wrap of the roll or the inner wrap around the core.

7.3 *Test Sample*—From each laboratory sampling unit, cut five test samples with the longer direction parallel to the machine direction. Consider the long direction as the direction of test. Cut each test sample 150 mm \times 200 mm (6 in. \times 8 in.). The test sample should be taken no nearer to the edge than 5 % of the pile yarn floor covering width.

7.3.1 If the pile floor covering is back coated only, exercise care in handling the sample to prevent breaking, or otherwise disturbing, the back coating.

7.4 *Test Specimens*—Test three specimens from each test sample. A specimen is a tuft leg or loop. In cases where a pile yarn floor covering contains both cut and uncut pile, test only the uncut (loop).

NOTE 3—If the uncut (loop) is satisfactory, the cut pile will be adequate.

7.5 *Test Result*—The test result is the average for the three specimens in a test sample.

8. Preparation and Verification of Apparatus

8.1 *Tensile Testing Machine*, A constant-rate-of-extension (CRE) type conforming to Specification D 76 with a constant rate-of-traverse of 300 ± 10 mm/min (12 ± 0.5 in./min) is preferred. A constant-rate-of-traverse (CRT) type tensile testing machine conforming to Specification D 76 and operated at the same speed is permitted.

8.2 If required, replace the nonmeasuring clamp of the test machine with the sample holder described in 6.2.

8.3 Replace the measuring clamp of the test machine with, or attach to the measuring clamp of the test machine, the tuft clamp described in 6.3 or the loop-hook described in 6.4 depending on which is required for the type of pile yarn floor covering under test (Note 3).

8.3.1 Because the tuft clamp or loop hook is attached to, or replaces, the usual measuring clamp of the test machine, compensate for the effect of the altered mass of the clamp to retain the previous verification of the testing machine.

9. Conditioning

9.1 Bring the test samples to moisture equilibrium for testing in the standard atmosphere for testing textiles, approaching equilibrium from the dry side, without heat. Determine that moisture equilibrium for testing has been attained as directed in Practice D 1776.

10. Procedure

10.1 *Cut Pile Yarn Floor Covering*:

10.1.1 Test the conditioned specimens in the standard atmosphere for testing textiles.

10.1.2 Mount the test sample on the sample holder and place in the stationary clamp jaws with the rows of tufts (machine