Designation: D 5251 – 05

Standard Practice for the Operation of the Tetrapod Walker Drum Tester[1]

This standard is issued under the fixed designation D 5251; 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 describes the equipment and operation of the Tetrapod Walker for testing pile floor coverings with a thickness of 20 mm (0.8 in.) or less because thicker materials impede proper operation of the tumbler.

1.2 This practice is applicable for use in testing unused pile floor covering of all types. It is not applicable for use in testing used pile floor covering.

1.3 The values stated in either acceptable SI units or in other units shall be regarded separately as the standard. The values stated in each system may not be exact equivalents; therefore, each system must be used independently of the others, without combining values in any way. In case of referee decisions, the SI units shall prevail.

1.4 *This practice 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 practice to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:* [2]

D 123 Terminology Relating to Textiles

D 1776 Practice for Conditioning Textiles for Testing

D 5684 Terminology Relating to Pile Floor Coverings

3. Terminology

3.1 For all terminology related to Pile Floor Coverings, see Terminology D 5684.

3.1.1 The following terms are relevant to this standard: carpet, finished, finished pile yarn floor covering, floor covering, lengthwise direction, pile, pile lay, pile yarn floor covering, pitch, practice, primary backing, secondary backing, textile floor covering, texture, tufted fabric.

3.2 For all other terminology related to textiles, see Terminology D 123.

4. Summary of Practice

4.1 The specimen is secured as the lining of a rotatable drum with the pile surface exposed. A four legged metal casting (tetrapod) 'walks' on the pile surface of the specimen as it is tumbled in the drum. The drum is rotated about its longitudinal axis for a specified number of revolutions.

5. Significance and Use

5.1 This equipment may be used to bring about the changes in texture on the surface of pile floor covering caused by mechanical action.

6. Apparatus, Material, and Reagent

6.1 *Tetrapod Tumbler Tester*[3]

6.1.1 *Drum*—Constructed of a rigid material and capped by a lid that is firmly secured. Each drum is equipped with two springs to hold the test specimen in place during testing. The inner dimensions of the drum are as follows:

Diameter = 205± 5 mm (8.0 ± 0.2 in.)
Height = 190 ± 5 mm (7.6 ± 0.2 in.)

6.1.2 *Tetrapod Walker*—A metal casting, tetrahedral in shape, with four legs placed equidistant from one another. For example, the outermost points correspond to the points on an equilateral tetrahedron and the large angle between any two legs is 2 rad (109.5°). Each leg shall have a replaceable plastic foot at the end. The free standing height of the tetrapod with 3 of the 4 plastic feet in one plane is 125 ± 2 mm (5 ± 0.1 in.). The total mass of the tetrapod including the feet is 1000 ± 2.5 g (2.25 ± 0.21 lb). The minimum hardness of the plastic feet supplied by the manufacturer shall be 75 ± 5 Type A durometer.

6.1.3 *Driving System*—Cradles a drum on rollers and keeps the axis of the drum level, rotates at 5.2 ± 0.2 rad/s (50 ± 2 rpm) and has a counter that can be preset to stop the drum after any number of revolutions. Drive systems that do not reverse shall have the direction of rotation shown on the drum.

6.2 *Vacuum Cleaner*, upright-type with beater bar.

6.3 *Solvent*, either ethyl alcohol (CH_3CH_2CHOH), or isopropyl alcohol, [$(CH_3)_2CHOH$] technical grade.

[1] This practice is under the jurisdiction of ASTM Committee D13 on Textiles and is the direct responsibility of Subcommittee D13.21 on Pile Floor Coverings.

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[2] 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.

[3] Suitable apparatus is available from the Wira Instrumentation, 3 Water Lane, Bradford BD1 2JL, England; Lawson Hemphill Sales, Inc., P.O. Box 6388, Spartanburg, SC; Williams Asselin, Inc., 7774 Perras Blvd., Montreal, Quebec, Canada H1E 5B2.

7. Preparation of Specimen

7.1 *Marking the Specimen*—Before cutting out the test specimen, mark on the secondary backing of each specimen the direction of the pile lay and the direction of the tetrapod" walk".

7.2 *Size of Specimen*—Cut the specimen approximately 610 by 205 mm (24.0 by 8.0 in.). The long dimension shall be parallel to the lengthwise direction of the carpet. Take no specimen within 100 mm (4 in.) of the trimmed selvage.

8. Conditioning

8.1 Bring the specimen 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.

9. Procedure

9.1 Perform this practice on a specimen prepared as described in Section 8, maintaining the Tetrapod Walker Drum Test in the standard atmosphere for testing textiles.

9.2 Ensure the inside of the drum and the feet of the tetrapod are clean, smooth and free from any contamination. Wipe the tetrapod tumbler and the inside of the drum with a clean lint free tissue and one of the recommended solvents.

9.3 Inspect the tetrapod feet for signs of wear or damage. Tumble the tetrapod with new feet on a pile surface in the drum for a minimum of 4 h prior to regular testing.

9.4 If a lengthwise lay of the pile is discernible, place the specimen in the drum with the lay of the pile and the drum rotation in the same direction.

NOTE 1—Some testers have the capability of intermittently or periodically reversing their direction of rotation. In this case the lay of the pile is not of concern.

9.5 Place the specimen in the drum with the pile yarn exposed. Ensure that the specimen lies smoothly around the internal circumference when the specimen is curved to fit the drum and that it is firmly held in place by the locating grooves.

9.6 Carefully fit one spring over the specimen at the closed end of the drum and the second spring at the open end. Place the solid part of the springs to bridge any carpet seams.

9.7 Place the tetrapod walker in the drum.

9.8 Secure the lid to the drum, and then position the drum on the rollers of the drive mechanism. Ensure that the drum is level.

9.9 Set the counter for 50 000 revolutions, and start the machine.

9.10 When the tester stops remove the specimen from the drum.

10. Report

10.1 State that the tester was operated as directed in Practice D 5251.

10.2 Report the following information:

10.2.1 The atmospheric conditions, if other than standard.

10.2.2 If the drum rotation reverses.

10.2.3 The number of revolutions.

10.2.4 Detail any deviations from this practice.

11. Keywords

11.1 appearance; carpet; floor covering; pile yarn; tetrapod