Designation: D 5252 – 98a (Reapproved 2003)

Standard Practice for the Operation of the Hexapod Tumble Drum Tester[1]

This standard is issued under the fixed designation D 5252; 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 hexapod tumble drum tester for testing pile floor covering to produce changes in appearance and color due to changes in surface structure by mechanical action tester.

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 yarn floor coverings.

1.3 This practice may be used by mutual agreement between the purchaser and supplier to set purchasing specifications.

1.4 The values stated in either SI 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 in each system must be used independently of the other. Combining values from the two systems may result in nonconformance with this practice. In case of referee decisions, the SI units shall prevail.

1.5 *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:*

D 123 Terminology Relating to Textiles[2]

D 418 Methods of Testing Pile Yarn Floor Covering Construction[2]

D 1776 Practice for Conditioning Textiles for Testing[2]

D 5684 Terminology Relating to Pile Floor Covering[3]

3. Terminology

3.1 *Definitions*—For definitions of pile yarn floor covering related terms used in this practice, refer to Terminology D 5684. For definitions of other textile terms used in this practice, refer to Terminology D 123.

4. Summary of Practice

4.1 The specimen is secured to a backing sheet that is mounted inside the rotatable drum with the pile surface exposed. A metal hexapod, with six polyurethane studs, rolls randomly on the pile surface inside the rotating drum for a specified number of revolutions.

5. Significance and Use

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

6. Apparatus, Materials, and Reagent

6.1 *Hexapod Tumble Tester*

6.1.1 *Drum*—Constructed of polyvinyl chloride (PVC) and capped by a lid that is secured by a metal plate and wing nut. The drum base and lid have a locating groove to hold the specimen backing sheet flat to the inner wall of the drum. The drum dimensions are:

Internal Diameter	305 ± 1 mm	(12 ± 0.01 in.)
Wall Thickness	8 mm approx.	(0.3 in. approx.)
Internal Depth	200 ± 1 mm	(7.9 ± 0.01 in.)

6.1.2 *Driving System*, which cradles the drum on rollers and keeps the axis of the drum level, and rotates at 3.6 ± 0.2 rad/s (35 ± 2 rpm). The driving direction reverses every 15 min with approximately one-minute stationery time intervals.

6.1.3 *Hexapod Tumbler*—Compromised of a mild steel 50 ± 1 mm (1.97 ± 0.04 in.) cube with 25-mm (1-in.) thick plates welded to each side. The outside corners are welded such that when the studs are fitted and the hexapod placed on a flat surface, no metal touches the flat surface. A replaceable stud[4] is screwed centrally in each face. Tumbler parameters are:

Diameter of Stud	40 ± 1 mm	(1.6 ± 0.04 in.)
Height of Stud	15 ± 1 mm	(0.6 ± 0.04 in.)
Edge of Radius Stud	15± 1 mm	(0.6 ± 0.04 in.)
Steel Backing for Polyurethane		
Stud Hardness	80 ± 10 Type A Durometer	
Stud Thickness	3 ± 0.25 mm	(0.12 ± 0.01 in.)

Total mass of hexapod tumbler with six studs is 3.8 ± 0.1 kg. (8.4 ± 0.2 lb).

6.2 *Specimen Backing Sheet*, polyethylene approx. 950 × 215 × 2 mm (approx. 375 × 8.5 × 0.08 in.).

[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.

Current edition approved April 10, 1998. Published September 1998. Originally published as D 5252 – 92. Last previous edition D 5252 – 98.

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

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

6.3 *Tape*, double-sided adhesive, 50 mm (2.0 in.) width.

6.4 *Vacuum Cleaner*—An upright type vacuum cleaner, with a rotating brush and beater bar, unless this type of apparatus is not recommended by the manufacturer of the pile floor covering under test, in which case the appropriate recommended device should be used.

6.5 *Cleaning Frame*, a rectangular frame approx. 1000 × 300 mm (40 × 12 in.) with a central rectangular aperture approx. 940 × 200 mm (37 × 8 in) to receive the test specimen, of material similar construction to the test specimen and mounted on a rigid backing sheet.

6.6 *Solvent*—Use only ethyl alcohol, or isopropylalcohol, technical grade.

7. Preparation of Specimen

7.1 *Marking Specimen*—Before cutting out the test specimen, mark on the backing the direction of manufacture with the head of the arrow pointing in the same direction as the lay of the pile.

7.2 *Size of Specimen*—Cut the specimen approx. 940 × 200 mm (37 × 8 in.) with the long dimension parallel to the lengthwise direction of the pile yarn floor covering. Take no specimen within 100 mm (4.0 in.) of the trimmed selvedge. Alternatively, up to four smaller specimens of similar thickness may be tested together, although if this is done, the effect of fiber or finish must be considered. If this is the case, cut the specimen to allow for a 5-mm (0.2-in.) gap between each specimen, and ensure that the pile lay is in the same direction.

7.3 *Cleaning of Specimen*—Prior to testing, vacuum the specimen to remove any loose tufts or fibers.

7.4 *Specimen Attachment*—Attach the double-sided adhesive tape along each side and across the end of the specimen backing sheet leaving 5 mm (0.2 in.) clear at each edge, pressing down firmly to ensure adhesion. If testing multiple specimens, attach an additional strip tape at each cross junction. Mount the specimen pile surface uppermost, allowing a 5 mm (0.2 in.) gap at the end and between 5 to 10 mm (0.2 to 0.4 in.) between specimens to allow space for the pile when the backing sheet is curved to fit the drum.

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 the use of 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 Hexapod Tumble Drum Tester in the standard atmosphere for testing textiles.

9.2 Wipe the hexapod tumbler and the inside of the drum with a clean lint free tissue and one of the recommended solvents.

9.3 Inspect the studs on the hexapod tumbler for signs of wear or damage. Replace the studs when severe wear is apparent. Place the hexapod tumbler with new studs on the pile surface drum tester and allow to tumble for a minimum of 4 h prior to regular testing.

9.4 Ensure that the specimen lies smoothly around the internal circumference when the backing sheet is curved to fit the drum and that it is firmly held in place by the locating grooves. If necessary, adjust the specimen length.

9.5 Place the hexapod tumbler in the drum on the specimen surface.

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

9.7 Set the revolution counter for 2,000 revolutions. When the machine stops, remove the mounted specimen and place in the central aperture of the cleaning frame.

9.8 Using the upright vacuum cleaner, make four forward and four backward passes along the length of the mounted specimen ensuring all the area is covered and the final pass is in the lay of the pile.

9.9 Return the mounted specimen to the drum and repeat 9.4-9.8 until the required number has been completed.

10. Report

10.1 State that the tester was operated as directed in Practice D 5252.

10.2 Report the following information:

10.2.1 The number of revolutions.

10.2.2 The type of vacuum cleaner used.

10.2.3 Detail any deviations from this practice.

11. Keywords

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