



Designation: **D6962—17** **D6962 – 20**

## Standard Practice for Operation of a Roller Chair Tester for Pile Yarn Floor Coverings<sup>1</sup>

This standard is issued under the fixed designation D6962; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reappraisal.

### 1. Scope

1.1 This practice covers a procedure for the operation of a weighted roller chair testing device that rotates and moves across a test specimen of pile yarn floor coverings.

1.2 This practice is applicable for testing unused pile yarn floor covering of all types.

1.3 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.5 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

### 2. Referenced Documents

2.1 *ASTM Standards:*<sup>2</sup>

[D123 Terminology Relating to Textiles](#)

[D1776 Practice for Conditioning and Testing Textiles](#)

[D2240 Test Method for Rubber Property—Durometer Hardness](#)

[D5684 Terminology Relating to Pile Floor Coverings](#)

### 3. Terminology

3.1 For definitions of terms relating to Pile Floor Coverings, D13.21, refer to Terminology [D5684](#).

3.1.1 The following terms are relevant to this practice: carpet, durability, finished, finished pile yarn floor covering, floor covering, pile, pile yarn floor covering, practice, resistance to delamination, secondary backing, textile floor covering, tufted fabric, underlay.

3.2 For all other terminology related to textiles, refer to Terminology [D123](#).

<sup>1</sup> 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 July 15, 2017; Nov. 1, 2020. Published August 2017; November 2020. Originally approved in 2003. Last previous edition approved in 2012 as [D6962–12–17](#). DOI: [10.1520/D6962-17](#); [10.1520/D6962-20](#).

<sup>2</sup> 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.

#### 4. Summary of Test Method

4.1 The carpet test specimen is secured to a table with the pile surface exposed and is subjected to the action of three castors which produce an eccentric turning motion under a weighted roller chair device that moves across the test specimen for a specified number of cycles.

#### 5. Significance and Use

5.1 This practice is applicable for use in testing the durability of pile yarn floor covering of all types.

5.2 This practice is designed to simulate the stress on a pile yarn floor covering from the action of weighted roller chair castors over an extended period of time.

5.3 The specimen is tested under conditions that may simulate an actual flooring installation. This may include the pile yarn floor covering plus a specified underlayment cushion.

5.4 This practice is used to prepare specimens for additional testing, including but not limited to: visual assessment of delamination of the secondary backing, visual assessment of the pile surface, resistance to delamination measurement, tuft bind, and pile yarn raveling.

#### 6. Apparatus and Materials

6.1 *Roller Chair Tester* is constructed of steel with a rotating circular table and a weighted roller fixture, rotating off-center to the table. The apparatus also has electronic controls, a protective cage, and a vacuum system to remove lint and dust. The area of contact between the rollers and the pile yarn wear will be an annulus with an outside diameter of  $23.6 \pm 0.6$  in. ( $600 \pm 15$  mm) and inside diameter of  $3.9 \pm 0.6$  in. ( $100 \pm 15$  mm).

6.1.1 Rotating circular table is  $31.3 \pm 0.4$  in. ( $795 \pm 10$  mm) diameter and  $0.5 \pm 0.1$  in. ( $12 \pm 1$  mm) thick with two stabilizing bolts positioned to prevent the specimen from moving during the test. The base plate rotates at a speed of  $2.1 \pm 0.4$  rad/s ( $20 \pm 4$  r/min; rpm). The disc base plate rotates in one direction for approximately 3 min and then stops for 3 to 5 s before reversing direction.

6.1.2 The roller fixture is offset  $7.8 \pm 0.2$  in. ( $198 \pm 4$  mm) from the center of the base plate and has three chair castor wheels that are  $2.0 \pm 0.1$  in. ( $50 \pm 1$  mm) diameter by  $0.75 \pm 0.10$  in. ( $20 \pm 1$  mm) wide made of polyamide. Hardness is  $95 \pm 5^\circ$  Shore A, as measured by Test Method **D2240** for Rubber Property—Durometer Hardness. The three wheels are positioned  $5.1 \pm 0.1$  in. ( $130 \pm 2$  mm) from the center of the fixture and staggered by  $2.1 \pm 0.1$  radians ( $120^\circ$ ) around the circle. The wheels are offset from the position in the fixture by  $1.3 \pm 0.1$  in. ( $32 \pm 2$  mm) so as to lag behind during the rotary motion of the fixture.

6.1.3 Motor drive controls the rotation of the circular table and the roller fixture simultaneously at a speed of  $6.0 \pm 0.5$  rad/s ( $57 \pm 5$  r/min; rpm).

6.1.4 Weighted disks provide a force of 66 lb per roller for a total of  $198 \pm 4$  lb ( $90 \pm 2$  kg). A handwheel on a screw is used to engage weights and raise or lower the roller fixture.

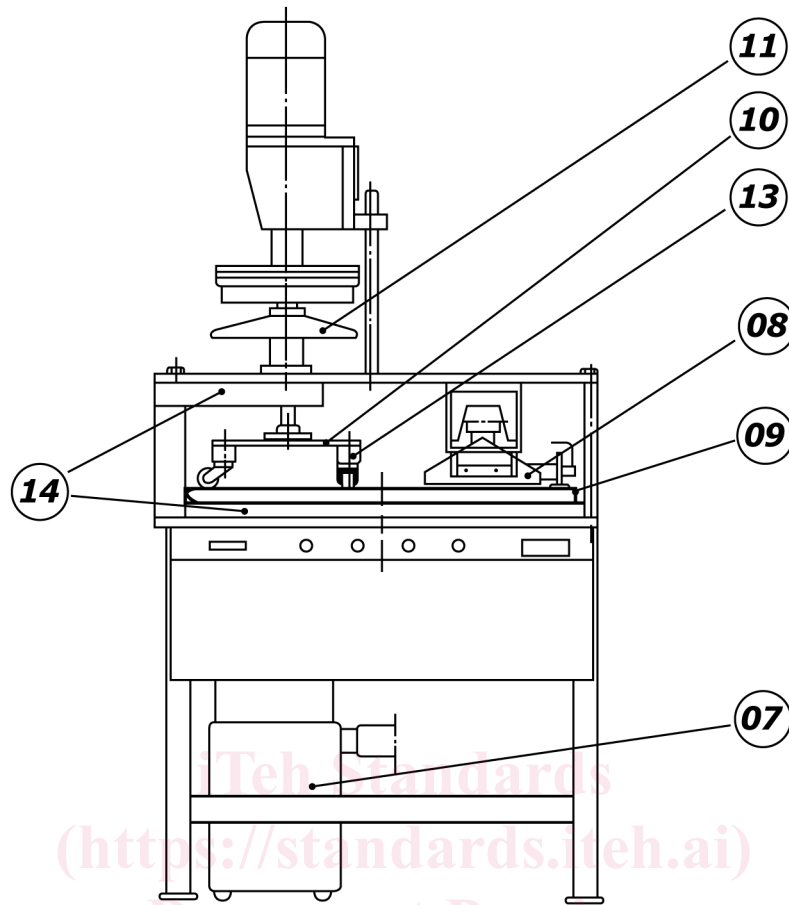
6.1.5 Protective cage covers the rotating table and roller fixture and is in place before operation of the electric motor begins.

6.1.6 Vacuum cleaner with suction hose is attached to a height adjustable head to remove lint and residue during testing. The width of the vacuum head extends across the section traveled by the castor chair wheels. The suction opening is  $120 \pm 8$  in<sup>2</sup> ( $75\,000 \pm 5\,000$  mm<sup>2</sup>). The suction efficiency is  $60 \pm 6$  ft<sup>3</sup>/min ( $27 \pm 3$  L/s). The vacuum system will operate for 1 to 1.5 min for every 5 min of operation of the equipment.

6.1.7 The following controls and safety interlocks for the motor are used. Refer to the manufacturer's operation guide regarding other controls and operations:

6.1.7.1 Digital counter with setpoint and reset buttons to measure and control the total number of cycles of rotation.

6.1.7.2 Safety limit switches interlocked to the motor to prevent access to rotating parts during operation.



- 07—Vacuum Cleaner
- 08—Suction Nozzle
- 09—Base Table
- 10—Roller Fixture
- 11—Handwheel and weighted disks
- 13—Chair Castors
- 14—Chain guards

FIG. 1 Roller Castor Chair Tester

6.1.7.3 Limit switch in the sample area interlocked to the motor to prevent damage to the equipment in the event the specimen obstructs the rotational path.

6.2 Specimen backing sheet of rigid acrylic or comparable material is  $31.25 \pm 0.13$  in. ( $790 \pm 4$  mm) diameter and approximately 0.6 in. (15 mm) thick.

6.2.1 Alternately, use particle board or AC grade plywood with the A-side in contact with the specimen, approximately 0.25 to 0.625 in. (6 to 16 mm) thick, depending upon the thickness of the composite of carpet, underlayment, adhesive, and backing sheet, to permit adequate clearance between the top of the carpet and limit switch.

NOTE 1—A thickness of approximately 0.625 in. (16 mm) is preferred to maintain a rigid and stable substrate.

6.2.2 Either a circular or semicircular specimen template or die is used to cut the carpet specimen. A  $31.25 \pm 0.13$  in. ( $790 \pm 4$  mm) diameter acrylic sheet is preferred.

6.3 Underlayment cushion may be used to simulate the specific pile yarn floor covering installation. Choose from one of the many choices of commercially available underlayments.

6.4 The pile yarn floor covering specimen, underlayment cushion (if used), and specimen backing sheet shall be secured together following standard pile yarn floor covering installation methods or alternate methods. This composite will be termed the test specimen assembly.

6.4.1 A flooring adhesive may be applied according to the guidelines of the manufacturer to secure the test specimen or the underlayment and test specimen directly to the backing sheet.

6.4.2 Alternate methods may be used to secure the test specimen and underlayment to the backing sheet, including but not limited to: double sided tape, knitted nylon coated with a pressure sensitive adhesive, tack strips, and wood screws if the specimen is mounted on plywood.

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

**7. Sampling**

7.1 Perform this practice on a test specimen of pile yarn floor covering measuring  $31.25 \pm 0.13$  in. ( $790 \pm 4$  mm) diameter using a circular template or die.

7.1.1 If a semi-circular test specimen is required, use a straight edge and razor knife to cut the specimen in the direction of manufacture into two semicircles.

7.1.2 Alternately, use a semi-circular template or die to cut a test specimen.

**8. Conditioning**

8.1 Condition the specimens as directed in Practice D1776 in the standard atmosphere for testing textiles.

**9. Preparation of Test Specimens**

9.1 *Direct Adhesion to the Backing Sheet:*

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9.1.1 Apply flooring adhesive according to the guidelines of the manufacturer to the backing sheet and attach either a full circle test specimen or two semicircle specimens such that the straight edges are joined together.

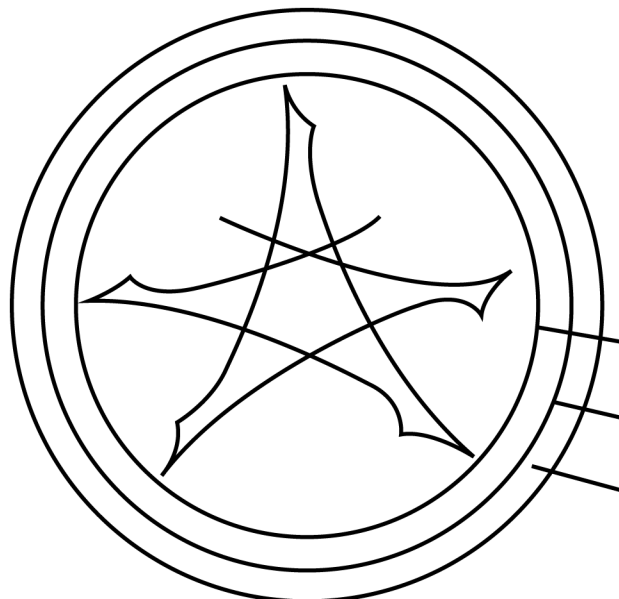


FIG. 2 Curved Pattern of a Castor Wheel