Designation: D6540 – 24

Standard Test Method for Accelerated Soiling of Pile Yarn Floor Covering[1]

This standard is issued under the fixed designation D6540; 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 equipment, and the test method for assessing the propensity of pile yarn floor coverings to soiling in the absence of abrasive wear and texture changes, using a standard synthetic soil composition.

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

1.3 This test method can be used to compare the soiling propensity of two or more carpets; or it can be used to soil carpets as a preliminary step to other test procedures.

1.4 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.

1.5 *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.*

1.6 *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:*[2]

D123 Terminology Relating to Textiles

D1776/D1776M Practice for Conditioning and Testing Textiles

D5684 Terminology Relating to Pile Floor Coverings

2.2 *ASTM Adjunct:*

TEX-PAC[3]

2.3 *AATCC Standards*[4]:

Evaluation Procedure 1 – Gray Scale for Color Change

AATCC LP4 : Laboratory Procedure for Synthetic Soil

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 standard: carpet, finished, finished pile yarn floor covering, floor covering, pile, pile lay, pile yarn floor covering, soiling, textile floor covering, tufted fabric, use-surface.

3.2 For all other terminology related to textiles, refer to Terminology D123.

4. Summary of Test Method

4.1 The carpet test specimens are secured to a backing sheet that is mounted inside the drum with the pile surface exposed, and are subjected to an accelerated soiling process. The degree of soiling is measured or assessed by comparing the change in color between soiled and original pile yarn floor covering, using a measurement device or visually matching the differences on the light-dark axis of Gray Scales.

NOTE 1—Differentiation between test samples is significantly reduced when Gray Scales are used.

5. Significance and Use

5.1 This test method may be used to soil test specimens in the absence of abrasive wear and texture changes under controlled conditions using a standard synthetic soil, or as a preliminary step to other procedures.

5.2 This test method will provide a uniformly soiled test specimen to evaluate, is reproducible (see Section 11), and is economical for Testing Laboratories.

5.3 This test method has been found to give results similar to the actual floor service soiling, but its use is recommended only as a screening test method and not as a replacement for floor testing.

[1] This test method 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] The PC program on floppy disks for analyzing Committee D13 interlaboratory data are available from ASTM. RequestADJD2904.

[4] Available from American Association of Textile Chemists and Colorists, PO Box 12215, Research Triangle Park, NC 27709.

5.4 The acceptance criteria of this test method shall be set by mutual agreement between the purchaser and supplier.

6. Apparatus and Materials

6.1 *Hexapod Tumble Tester*

6.1.1 *Drum*—Constructed of molded PVC and is capped by a lid that is secured. 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	12.00 in. ± 0.04 in.	(305 mm ± 1 mm)
Wall Thickness	0.03 in. approx.	(8 mm approx.)
Internal Depth	7.90 in. ± 0.04 in.	(200 mm ± 1 mm)

6.1.2 *Driving System*—Cradles the drum on rollers and keeps the axis of the drum level, rotates at 0.60 r/s ± 0.03 r/s (35 r/min ± 2 r/min). The driving system reverses every 15 min with approximately one minute stationary time.

6.2 *Specimen Backing Sheet*—is a polyethylene sheet 37.40 in. by 8.50 in. by 0.08 in. (950 mm by 215 mm by 2 mm).

6.3 *Tape*—double sided pressure sensitive adhesive, 2.0 in. (50 mm) width.

6.4 *Cleaning Frame*—a rectangular frame 39.4 in. by 11.8 in. (1000 mm × 300 mm) with a central rectangular aperture 37.0 in. by 7.9 in. (940 mm by 200 mm) to receive the test specimen, of material similar in construction to the test specimen and mounted on a backing sheet.

6.5 *Vacuum Cleaner*—upright type, with a rotating brush. An approved vacuum certified in the CRI Seal of Approval Program (SOA) shall be acceptable for use in this practice. Alternatively, a handheld vacuum that meets the following general specifications can be used: powered rotating brush, bagless design HEPA filtration 7A motor, nozzle width 6.5 in. ± 0.3 in. (165 mm ± 7 mm). Replace the bristles when the bristles length changes more than 15 % of the original length.

6.6 *Mixing Container*—a wide mouth container such as a Standard Mill jar.

6.7 *Polymer Pellets*—polyamide polymer pellets having a maximum size of 0.27 in. ± 0.08 in. (7 mm ± 2 mm)

6.8 *Chrome Alloy Steel Balls (Ball Bearings)*—with a 0.37 in. ± 0.01 in. (9.50 mm ± 0.02 mm) diameter.

6.9 *Standard Soiling Compound*—a soiling compound which is compatible with the test equipment, such as AATCC Synthetic Soil Formula listed in AATCC LP4: Laboratory Procedure for Synthetic Soil.

6.10 *Control Pile Yarn Floor Covering*—an internal standard light colored carpet of known specifications used as a reference for each test evaluation.

6.11 *Color Measurement Equipment*—A color measurement device with a 2.0 in. ± 0.2 in. (50 mm ± 0.5 mm) aperture, capable of measuring the color of pile yarn floor covering and expressing the results in Delta E (dE) or Delta L (dL).

6.12 *Gray Scales*—standard gray scales used to visibly assess change in color of pile yarn floor covering as per AATCC Procedure 1.

6.13 *Template*—to be the same size as the test specimen with 3 holes of the same dimensions as the measuring head of the color measuring device. See Fig. 1.

6.14 *Magnet*—capable of attracting and holding several chrome alloy steel balls at one time.

7. Sampling, and Preparation of Soiled Pellets, Sampling, and Test Specimens

7.1 *Preparation of Soiled Polyamide Polymer Pellets*

7.1.1 Place 0.1058 oz ± 0.0017 oz (3.00 g ± 0.05 g) of the standard soiling compound (see 6.9) and 2.205 lb ± 0.002 lb (1000 g ± 1 g) of polyamide polymer pellets (see 6.7) in the mixing container. Secure the lid and place the mixing container on the driving system for 10 min, reverse direction and continue for an additional 10 min, for a total of 20 min to ensure a homogeneous mixture of the soil and polyamide polymer pellets.

NOTE 2—To simulate particular use areas, it may be necessary to adjust the type or quantity, or both, of soiling compound and document the change in the written report.

NOTE 3—If large quantities of soiled pellets are prepared, that is more than 4.409 lb (2000 g), they shall be kept in an airtight container to ensure no loss of moisture from the mixture occurs, and the supply shall not be allowed to dwindle below 25 % of the original quantity.

NOTE 4—This test method was developed using AATCC synthetic soiling compound and if another soiling compound is used the amount of soil used to prepare the soiled polymer pellets must be adjusted.

7.2 Ensure the inside of the drum and chrome alloy steel balls are clean.

7.3 *Size of Test Specimens*

7.3.1 Cut a minimum of two test specimens per pile yarn floor covering, measuring a minimum of 5.00 in. ± 0.04 in. (125 mm ± 1 mm) in the direction of manufacture by 8.00 in. ± 0.08 in. (205 mm ± 2 mm) wide. Mark an arrow in the direction of the pile lay on the back of the test specimen. All

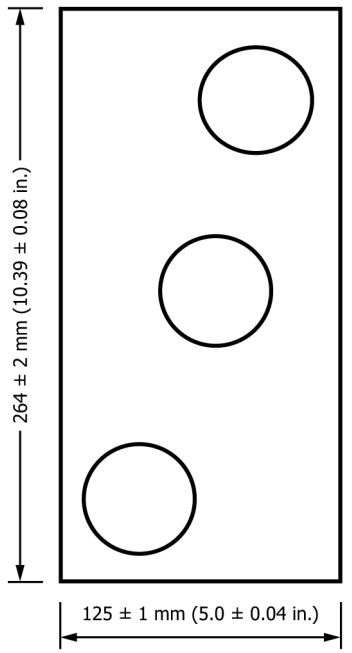

FIG. 1 Example of a Suitable Template for Color Measurement