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Standard Laboratory Test Practice For Efficacy Evaluation of Interim Carpet Maintenance Systems

1. Scope

1.1 This is a standardized laboratory procedure for determining the interim maintenance efficacy of carpet maintenance systems which are designed to be used between deep cleaning maintenance. The interim maintenance system is tested on uniformly soiled control carpets then rated visually and instrumentally to determine the degree to which the maintenance system was able to visually improve the appearance of the control carpet.

1.2 This test practice is applicable to all interim carpet maintenance systems.

2. Reference Documents

2.1 Standard Test Method for Accelerated Soiling of Pile Yarn Floor Covering ASTM D6540-10.

2.2 ASTM F2828

2.3 AATCC Evaluation Procedure 1 - Gray Scale for Color Change

2.4 AATCC Evaluation Procedure 6 - Instrumental Color Measurement

2.5 AATCC Evaluation Procedure 7 - Instrumental Assessment of Color Change

3.0 Definitions

3.1 Interim Maintenance System - Equipment and chemicals used as directed by the manufacturer to visually improve the appearance of a carpet.

4.0 Precision & Bias

4.1 No precision and bias has been established.

5.0 Significance & Use

5.1 This test practice will provide an indication of the capability of an interim carpet maintenance system to improve the appearance of a uniformly soiled floor covering. The level of visual improvement in the laboratory practice will differ from that in home/commercial installations due to variations in carpet styles, soil and other solid particulate composition, the maintenance process employed by individual operators and other factors.

5.2 In order to provide a uniform basis for measuring the performance in 1.1, standardized test carpets and standardized test soil is employed in this practice.

6.0 Apparatus and Materials

6.1 Weighing scale accurate to 0.01 gram and having a capacity of at least 2000 grams.

6.2 Ball jar capable of containing a 263 mm x 1000 mm (10 3/8" x 39 3/8") test specimen.

6.3 Unitized Jar Mill

6.4 Nylon pellets (ULTRAMID® B2712)

6.5 Chrome alloy ball bearings 9.5 mm, (.375") diameter

6.6 AATCC Standard Dry Soil

6.7 Conveyor with a minimum bed length of 3.05 m (10 feet) and stroke of 2.13 m (7 feet) and minimum bed width of 88.9 cm (35 inches). Conveyor must be capable of maintaining specified test speed both forward and reverse. Conveyor must be equipped with brackets to hold the test equipment stationary, exert no horizontal or vertical force, provide a point to electrically ground the unit and maintain the handle height to assure proper test equipment contact with the test material.

6.8 Conveyor plate to which sample is affixed must be made of a rigid material. Suitable material is 6.35 mm (0.25"- inch) aluminum.

6.9 Tachometer used to measure conveyor speed in meters/second (feet/second).

6.10 Template comprised of the same material as test carpet a minimum of 102 mm (4 inches) wider than the head of test equipment mounted to conveyor plate using double sided fiber reinforced tape or other suitable mounting material.

6.11 Room conditioned and maintained at 50% ± 5% relative humidity and 21.1°C ± 2°C (70°F ± 5°F).

6.12 45/0 Spectrophotometer with one 25.4 mm (1 inch) or larger viewing aperture.

6.13 45/0 Spectrophotometer template comprised of ten (10) viewing locations. See Diagram 1 for template blueprint.

6.14 Thermometer capable of ranges of 0°C to 100°C (32°F to 212°F)

6.15 Control vacuum with rotating agitator head with soil removal performance range as specified in ASTM F2828.

6.16 A control pump up sprayer minimum 1 gallon capacity, capable of a fan spray pattern providing a uniform application of the chemical.

6.17 Standard Test Material (See Table 1)

Table 1

Commercial Loop Pile	
Style	10203
Weight	30 oz/sq
Color	*00201
Finished Pile Thickness	0.115
Gauge	1/10
Stitches/Inch	10
Yarn	Nylon
Fluorochemical	No

7.0 Conditioning

7.1 Test room - temperature and humidity are maintained in standard laboratory conditions, 50% ± 5% relative humidity and 21.1°C ± 2°C (70°F ± 5°F) in which all conditioning and testing is done.

7.2 All components involved in the test shall remain and be exposed in the test room for at least 16 hours prior to the start of the test.

8.0 Initial Preparation and Conditioning of Test Carpet

8.1 New test carpet shall conform to 6.17.

8.2 Cut three (3) samples of the test carpet to fit the inside wall of the soiling drum. The long dimension should be parallel to the machine direction.

8.3 Mark the test specimen with test identification number

8.4 Prepare carpet for testing by vacuuming to remove loose fibers with the control vacuum, using 10 passes at 0.55m/second (1.8 ft./second).

9.0 Preparation of Soiling Media

9.1 Soil application of nylon pellets.

9.2 Place two (2) grams of the standard AATCC dry soil for each 1000 grams of Nylon pellets (ULTRAMID® B2712) in a two 3.8 liter (2.0 gal) cylindrical container.

9.3 Rotate the container on the jar mill for 30 minutes at 37 ± 3 rpm reversing the direction of rotation after 15 minutes.

9.4 The soiled pellets are ready for use.

10.0 Soil Application of Test Carpet

10.1 Collect, record and average ten (10) L_{ab} measurements on a specimen of the test carpet using the spectrophotometer. Report as "initial" L_{ab}.

10.2 Secure the carpet to the inside wall of the drum with the pile lay direction if present in the opposite direction of the drum rotation (double-sided tape may be used). Make sure the sample is firmly attached and properly contoured to the curvature of the drum, otherwise non-uniformities will occur.

10.3 Position the soiling drum containing the test carpet on its side. Place 3 ± 0.2 grams of the chrome alloy ball bearings per square inch of the test material into the drum. Spread 150 ± 2 grams of the soiled nylon pellets over the ball bearings inside the soiling drum.

NOTE: The amount of soiled pellets used in the drum may need to be adjusted in order to achieve the desired soil level yielding a ΔE of 7.0 ± 0.6, which corresponds with step 2 of the AATCC Gray Scale for Color Change.

10.4 Close the drum and rotate on jar mill at 40 rpm for 30 ±1 minutes.

10.5 Open drum, remove the ball bearings, pellets and carpet sample. Physically remove any loose pellets from the carpet.

10.6 Vacuum soiled carpet sample using control vacuum.

10.6.1 Place the soiled carpet into the conveyor template from the same or like carpet construction 2.13 m x 88.9 cm - that is larger than the test sample - double sided tape may be used to secure the sample to the conveyor plate.

10.6.2 Make four (4) passes in the long direction with the control vacuum cleaner at 0.55 m/second (1.8 feet/second). (Note: Ensure the last stroke of the vacuum is in the direction of the pile lay).

10.6.3 Repeat measuring steps as described in 10.1 for the soiled carpet and calculate ∆E and AATCC Gray Scale rating and record as initial soil level.

10.6.4 The initial target level of soiling is ∆E 7.0 ± 0.6, equivalent to step 2 on the AATCC Gray Scale. All soiled carpets released for use in this procedure will fall within the predetermined target depth of soiling.

10.6.5 The soiled carpet sample must be labeled with the date it was prepared. Cleaning must be accomplished with seven (7) days from the time of carpet soiling.

11.0 Cleaning Procedure

11.1 Place the soiled carpet sample in an appropriate template of the same style of carpet so that a larger carpet sample is presented to the maintenance equipment, and the maintenance process does not encounter a transition at any edge of the sample. Follow the manufacturer directions for any adjustable settings on the cleaning equipment. All adjustable settings shall be recorded and reported. Mount the maintenance unit in place and initiate maintenance of the sample. Testing is conducted following published operating instructions of the system provider.

11.2 In general, the interim maintenance process will include a vacuuming step, followed by a chemical application and agitation step, although maintenance processes that involve other steps can be evaluated by this test method.

11.3 The final pass of the interim maintenance equipment shall be with the lay of the carpet pile. Previous pass directions shall be as dictated by the details of the equipment client supplied operating instructions. If the operation of equipment sets no limitations, the passes shall be made against the pile, with the pile, against the pile, with the pile. The stroke details and total number of strokes shall be recorded and reported.

11.4 After completing the maintenance process, the carpet samples are to be stored horizontally on a non-ventilated drying rack to dry at standard conditions. After a minimum of 16 hours, and not more than 72 hours.

11.5 Collect, record and average ten (10) Lab measurements on a cleaned specimen of the test carpet using the spectrophotometer as described in 10.1. Report as "final" Lab.

12. Report

12.1 Complete product descriptions of all equipment and chemicals tested.

12.2 "Starting" and "final" average soil levels measured by spectrophotometer. Report ΔE, Lab and AATCC Gray Scale rating.

12.3 Number of carpet samples tested per unit, the number of units tested per population sample, and a statement that the testing has not accounted for variations within models, and that this variation may be significant.

12.4 Carpet sample details, including carpet style, sample size, and any variation in carpet detail from the information given in Table 1.

12.5 Maintenance process details. Details of the equipment, chemicals used, concentrations, number of passes, speed of each pass, process, equipment settings, etc.

13. Precision and Bias

13.1 Precision – No interlaboratory test have been performed; therefore, no precision statements regarding the repeatability and reproducibility of this test methods are available at this time.

13.2 Bias – No justifiable statement can be made on the accuracy of this test method, since the true value of the property cannot be established by an acceptable referee method.

Diagram 1