SOA S-200 (CE) Test Method for Cleaning Effectiveness of Pre-Spray and In-Tank Solutions

1. Scope

1.1 This test method describes a laboratory procedure used to evaluate the cleaning effectiveness of in-tank and pre-spray solutions for the Seal of Approval (SOA) program.

1.2 This method details procedures for the evaluation of cleaning effectiveness of cleaning solutions in removing uniformly applied soil to cut pile carpets.

2. Safety

2.1 This practice does not purport to address all 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.

3. References

3.1 ASTM D6540 Standard Test Method for Accelerated Soiling of Pile Yarn Floor Coverings

3.2 AATCC Evaluation Procedure 2 – Gray Scale for Staining

3.3 AATCC Evaluation Procedure 6 – Instrumental Color Measurement

3.4 AATCC Evaluation Procedure 7 – Instrumental Assessment of Color Change

3.5 AATCC LP4 Laboratory Procedure for Synthetic Soil

3.6 Seal of Approval S-100 Preparation of Solution and Test

4. Terminology

4.1 In-tank Solution – Carpet cleaning solution that is applied and removed using an extractor.

4.2 Pre-spray Solution – Carpet cleaning solution that is sprayed onto the carpet and removed using water extraction.

4.3 Grade – the number assigned to a test specimen resulting from comparison to a scale.

5. Apparatus and Materials

5.1 Hexapod tumble tester drum – meeting specifications, as stated in ASTM D6540
5.2 Tape – double sided pressure sensitive adhesive, 2.0 in. (50 mm) width
5.3 Vacuum cleaner – upright type SOA-specified vacuum with a rotating brush
5.4 Polyamide pellets having a size of 2-3 mm
5.5 Weighing scale accurate to 0.01 gram and having a capacity of at least 2000 grams
5.6 Chrome alloy ball bearings 9.5 mm (0.375") diameter
5.7 AATCC Standard Soil, as specified in AATCC LP4 Laboratory Procedure for Synthetic Soil
5.8 AATCC Gray Scale for Staining
5.9 Illumination System capable of providing a minimum of 1000 ± 50 lux (100 lumens/sq. ft) of north sky light or equivalent light source.
5.10 Conveyor with a minimum bed length of 10 feet and stroke of 5 feet and minimum bed width of 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 and exert no horizontal or vertical force.
5.11 Tachometer used to measure conveyor speed in meters/second (feet/second).
5.12 Carpet mounting platform comprised of the same material as test carpet a minimum of 102 mm (4 in.) wider than the head of control extractor mounted to conveyor plate using double sided tape.
5.13 45/0 spectrophotometer with one 25.4 mm (1 inch) or larger viewing aperture
5.14 45/0 spectrophotometer template comprised of ten (10) viewing locations
5.15 Commercial Chemical Applicator capable of maintaining spray pressure
5.16 Portable type (box and wand) extractor specified by CRI
5.17 Test room – temperature and humidity maintained in standard laboratory conditions, 50% (+/- 5%) relative humidity and 70 (+/- 5) degrees Fahrenheit in which all conditioning and testing is done
5.18 Distilled water

6. Test Specimen

6.1 Test Carpet Description: Residential Cut Pile (See SOA Test Carpet Specifications)
6.2 Cut six samples of the test carpet to fit the inside wall of the Hexapod tumble tester drum
(8.5 in. by 37.4 in.) The long dimension should be parallel to the machine direction.
6.3 Mark the test specimen with the test identification number.
6.4 Prepare carpet for testing by vacuuming to remove loose fibers with the control vacuum, using 10 passes at 0.55 m/second (1.8 ft/second)
6.5 Condition prepared samples in test room a minimum of 16 hours prior to testing.

7. Preparation of the Soiling Media

7.1 Place 3 (+/- 0.05) grams of the AATCC standard soil for each 1000 (+/- 1) grams of polyamide pellets in the Hexapod tumble tester drum.

7.2 Mix the soil and pellets in the Hexapod tumble tester drum for 20 minutes to ensure a homogeneous mixture of the soil and polyamide pellets.

7.3 The soiled pellets are ready to use.

8. Test Format

8.1 Review COC for additional cleaning instructions prior to following the test method below. Follow cleaning instructions provided in the COC. If no cleaning instructions are provided, follow the test method as written.

8.2 Using the 45/0 spectrophotometer template and spectrophotometer, measure the ten L_{ab} values and report the average as the initial L_{ab}.

8.3 Secure the carpet to the inside wall of the Hexapod tumble tester drum with the pile lay direction if present in the opposite direction of the Hexapod tumble tester drum rotation (double sided tape may be used.)

8.4 Place 1000 (+/- 2) grams of chrome alloy ball bearings and 250 (+/- 0.2) grams of soiled pellets (previously prepared) into the Hexapod tumble tester drum.

8.5 Start the Hexapod tumble tester drum and allow it to rotate for 30 minutes.

8.6 Remove the test carpets and physically remove any loose pellets from the carpet.

8.7 Using the vacuum conveyor and control vacuum, vacuum the test carpet using 4 passes in the long direction at 1.8 feet per second.
Note: Ensure the last stroke of the vacuum is in the direction of the pile lay.

8.8 Using the 45/0 spectrophotometer template and spectrophotometer, measure the ten L_{ab} values and report the average as the soiled L_{ab}. Calculate the ΔE between the initial L_{ab} and the soiled L_{ab}. The ΔE shall be 6.8 (+/- 0.6) which is the equivalent of 2.0 grade using the AATCC gray scale for color change.

8.9 Label the soiled test carpets with the date soiled. All soiled test carpets must be used within 7 days of the soil preparation.

9. Application of Pre-spray Cleaning Solution

9.1 Prepare solution as described in the SOA S-100 Preparation of Solution and Test Method for pH and Optical Brightener.

9.2 Place one soiled carpet on the scale and weigh the carpet prior to pre-spray application.

9.3 Spray solution evenly across the entire surface of the test carpet until the application rate specified on the COC is achieved. If pre-spray application exceeds the specified application rate, the test carpet is discarded, and a new sample will be prepared.

9.4 Repeat steps 9.1 through 9.3 for the three test carpets.

9.5 Allow each pre-spray treated carpet to dwell for 10 (+/- 1) minute before the extraction of pre-spray application.

10. Extraction of Pre-spray Application

10.1 Mount the portable type (box and wand) extractor with water only to the conveyor. Ensure the extractor wand head contact with the carpet.
10.2 Set conveyor speed at 1 foot per second.
10.3 Operate extractor for 2 wet passes followed by 2 dry passes with the final pass with the direction of the pile.
10.4 Remove each cleaned carpet from the mount.
10.5 Place each cleaned carpet on conditioning racks to dry for 16 hours (not to exceed 72 hours).

11. Cleaning of Samples with Water Only (Pre-spray)

11.1 Prepare soiled samples as specified in 8.2 through 8.9.
11.2 Follow steps for Application of Pre-Spray Solution and Extraction of Pre-spray application with water only.

12. Application and Extraction of In-tank Cleaning Solution

12.1 Prepare solution as described in the SOA S-100 Preparation of Solution and Test Method for pH and Optical Brightener.
12.2 Mount the portable type (box and wand) extractor with prepared solution to the conveyor. Ensure the extractor wand head contact with the carpet.
12.3 Set conveyor speed at 1 foot per second.
12.4 Mount each soiled carpet on the carpet mounting platform of the test conveyor.
12.5 Operate extractor for 2 wet passes followed by 2 dry passes with the final pass with the direction of the pile.
12.6 Remove each cleaned carpet from the mount.
12.7 Place each cleaned carpet on conditioning racks to dry 16 hours (not to exceed 72 hours).

13. Cleaning of Samples with Water Only (In-tank)

13.1 Prepare soiled samples as specified in 8.2 through 8.9.
13.2 Follow steps for Application and Extraction of In-tank Cleaning Solution with water only.

14. Evaluation

14.1 Erect pile of cleaned carpet samples.

14.2 Grade each cleaned carpet sample in accordance with AATCC Evaluation Procedure 2-Gray Scale for Staining for each of the 6 test carpets. Compare cleaned samples to an unsoiled carpet sample.

14.3 Individual grades for each carpet are determined for the solution cleaned samples.

14.4 Individual grades for each carpet are determined for the samples cleaned with water only.

14.5 Steps 14.1 through 14.4 are completed by three different trained technicians.

15. Report

15.1 The identifying information for the cleaning solution (manufacturer name, product name, and solution type).

15.2 Record date pellets were soiled.

15.3 Record spectrophotometer initial L_{ab}, the soiled L_{ab}, and ΔE.

15.4 Record the grams of soiled pellets used to achieve the ΔE.

15.5 Record date carpet was soiled and cleaned and report date.

15.6 The average grade of all soiled carpet samples cleaned with solution.

15.7 The average grade of all soiled carpet samples cleaned with water only.

15.8 The final result for cleaning effectiveness is the average of the solution grade minus the average of the water only grade.

15.9 Any deviations from this test method.