Test Method for Carpets: Cleaning of; Hot Water Extraction

Developed in 1987 by AATCC Committee RA57; reaffirmed 1988, 1989, 2000, 2005, 2014; editorially revised 1991, 1997, 2008; revised 1995 (with title change), 2019; editorially revised and reaffirmed 2010.

Foreword

Over the years, Committee RA57, Floor Covering Test Methods, has evaluated the various techniques for on-site cleaning of carpets as they have emerged. Information exchanged with professional carpet cleaning organizations led to the selection of the system described in this test method as typical of a majority of actual cleaning operations.

1. Purpose and Scope

1.1 This test method provides a laboratory procedure to clean textile floor coverings by a technique simulating cleaning of installed floor coverings by hot water extraction, sometimes erroneously called "steam cleaning."

1.2 This test method may be used to clean a carpet in a manner that duplicates the most popular (70%) means of actual on-floor cleaning of carpets.

1.3 This test method prepares specimens that can be tested for many properties; e.g., colorfastness, dimensional stability, permanency of finishes, ease of cleaning, etc.

2. Principle

2.1 The test is performed by securing a specimen of carpet, face up, on a floor or a mounting board. An extraction cleaning head is passed over each section of the specimen. The pile is erected with a brush or pile rake and the specimen is dried at room temperature.

3. Terminology

3.1 **carpet,** n.—all textile floor coverings not designated as rugs.

3.2 **carpet pile brush,** n.—a hand operated brush having long, semi-rigid bristles intended specifically for erecting the pile of small areas of carpet (see also *pile lifter*).

3.3 **cleaning head,** n.—a vacuum head modified with spray nozzles for cleaning solution application. Some types include a powered brush unit to facilitate wetting and soil release.

3.4 **hot water extraction,** n.—a method of cleaning carpet by injecting a heated cleaning solution into the pile and quickly removing the solution and soil by vacuum (see also *steam cleaning*).

NOTE: Hot water extraction is often erroneously called "steam cleaning." Hot water is used at a temperature of 60 ± 3°C (140 ± 5°F). These temperatures are far below the temperature of steam of 100°C (212°F).

3.5 **pilate,** n.—see *pile lifting*.

3.6 **pile lifter,** n.—a vacuum cleaning device with motorized rotating brushes designed to erect and agitate carpet pile to facilitate soil removal (see also *carpet pile brush*).

3.7 **pile lifting,** n.—the act of erecting the pile tufts of a carpet with a *carpet pile brush*, *pile lifter*, or *pile rake* to allow imbedded soil to be more easily removed and erecting the pile after cleaning to restore a uniform overall appearance (also called *pilate*).

3.8 **pile rake,** n.—a hand tool with smooth circular plastic tines used for pile lifting.

3.9 **rug,** n.—a textile floor covering of limited area which is complete in itself and is intended for use as a partial covering of a floor or another floor covering.

3.10 **steam cleaning,** n.—see the correct term, *hot water extraction*.

3.11 **textile floor covering,** n.—an article having a use-surface composed of textile material and generally used for covering floors.

3.12 **use-surface,** n.—*of textile floor covering*, the part of a textile floor covering directly exposed to foot traffic.

3.13 **wand,** n.—a tool used to deliver cleaning solution to carpets and apply vacuum to remove the solution.

NOTE: A *wand* usually consists of an extension handle and a *cleaning head*. Various types are light weight wand, drag wood (heavy duty) and power wand which has a motorized rotating or vibrating part to aid soil release.

4. Safety Precautions

NOTE: These safety precautions are for information purposes only. The precautions are ancillary to the testing procedures and are not intended to be all inclusive. It is the user's responsibility to use safe, and proper techniques in handling materials in this test method. Manufacturers MUST be consulted for specific and other manufacturer's recommendations. All OSHA standards and rules must also be consulted and followed.

4.1 Good laboratory practices should be followed. Wear safety glasses in all laboratory areas.

4.2 All chemicals should be handled with care.

4.3 Eye protection should be used when mixing, handling or applying the detergent and detergent solutions.

4.4 Gloves or protective hand cream are recommended for handling detergents and solutions.

4.5 Observe operating procedures and precautions by the manufacturer of the extraction machine. Liquid under pressure and high vacuum can cause excessive splashing of liquids and/or hose "kick back."

5. Apparatus and Materials

5.1 AATCC Detergent #171, for all synthetic fiber carpets (see 11.1).

5.2 Hot water extraction unit (see 11.2).

5.3 Carpet brush or pile rake.

5.4 Mounting boards (see 11.3).

5.5 Extraction wand with a vacuum slot that is free of obstructions.

6. Test Specimens

6.1 The preferred minimum specimen size is 30 × 70 cm (12 × 27 in.) with the pile lay in the 70 cm (27 in.) direction (see 11.4).

6.2 If the entire specimen requires uniform cleaning, a border carpet of similar thickness is necessary for uniform extraction of the cleaning solution.

7. Procedure

7.1 Secure the specimen to the floor or mounting board with staples, tacks or other suitable means (see 11.4).

7.2 Prepare the cleaning solution according to the directions supplied (see 11.1.1).

7.3 Purge the system of cold cleaning solution before beginning each cleaning cycle.

7.3.1 Visually inspect and remove any obstructions from the vacuum slot (see 8.2).

7.4 Pour 8 L (2 gal) or more of preheated solution, 60°C (140°F), into the empty solution tank of the hot water extraction unit.

7.5 With water-feed spray and vacuum on, and the cleaning head in contact with the carpet surface, draw the cleaning head across the surface of the carpet in a direction against the lay of the pile. Without changing the position of the carpet,

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place the cleaning head in the same starting position of the carpet surface as before and with only the vacuum on (water-feed spray off) draw the cleaning head across the carpet as in the first pass. These two passes of the cleaning head constitute one cleaning cycle. In most cases, two cleaning cycles will be necessary to obtain measurable results. However, the number of cycles may be increased depending on the degree of soiling and the purpose of the test.

7.6 The wand should be moved at about 46.0 cm/s (1.5 ft/s) to deliver between 0.4-0.6 L/m^2 (0.10-0.14 gal/yd^2) of cleaning solution. The speed of the second (vacuum) stroke should be approximately the same as above, but may be decreased to achieve maximum liquid retrieval. CAUTION: Some jet size - jet height combinations may cause pile distortion from excessive liquid impact (see 11.5).

7.6.1 An effective professional unit should remove between 90-95% of the liquid, depending on fiber absorbency. A properly operating vacuum system should leave no more than 40.0 g/m^2 (1.2 oz/yd^2) of liquid (that is in excess of natural regain) in a carpet specimen.

7.7 Should the cleaning of a larger area of carpet than covered by a single cleaning cycle be required, reposition the cleaning head on the carpet so that in successive cleaning cycles the cleaning head will overlap the previously cleaned area by 5 cm (2 in.).

7.8 Erect the pile with a carpet brush or pile rake in the direction opposite to the lay of the pile.

7.9 Remove the specimen from the mounting board or floor and dry it at ambient conditions in a horizontal position.

8. Evaluation

8.1 Specimens which are subjected to the cleaning procedure of this test method may be tested for many properties; e.g., colorfastness, dimensional change, permanency of finishes, ease of cleaning, etc.

8.2 If an obstruction exists, a banding or striped look may appear after removing specimen for evaluation. This may be caused by blockages in the extraction wand's vacuum slot. Banding is not normal; therefore, the specimen should be retested after ensuring the vacuum slot is clear of obstruction.

9. Report

9.1 State that the specimens were cleaned according to this procedure.

9.2 Report the number of cleaning cycles used.

9.3 State the pH of the diluted cleaning solution after it has been prepared according to directions provided by the supplier.

9.4 Report evaluation data and cite the test method for each property evaluated.

10. Precision and Bias

10.1 Precision and bias statements are not applicable because data are not generated by this test method.

11. Notes

11.1 AATCC Detergent 171 available from AATCC, P.O. Box 12215, Research Triangle Park NC 27709; tel: +1.919.549.8141; fax: +1.919.549.8933; e-mail: ordering@aatcc.org; web site: www.aatcc.org.

11.1.1 Dilution:

U.S. 11-17 g/gal of tap water
U.K. 13-18 g/gal (Imperial)
Metric: 3.0-4.5 g/L

11.2 A commercial hot water extraction device of professional quality, either portable, dolly, or truck mount. Small units and "add on" devices are generally unsuitable because of insufficient liquid capacity, delivery pressure, and/or vacuum for liquid retrieval. The device should meet or exceed the following specifications:

The tank shall have a means of maintaining the liquid at 60 ± 3°C (140 ± 5°F) and a thermometer to measure this.

A liquid delivery pump delivering at least 3 L/min (0.75 gal/min) at a pressure of 207 kPa (30 psi) or more.

The liquid recovery vacuum pump shall have a minimum lift of 250 mm (100 in.) sealed and a flow of 43 L/s (90 cfm) open orifice.

A standard floor wand of 25 cm (10 in.) width.

11.3 The mounting boards should be constructed from l.27 cm (0.5 in.) CD grade exterior plywood or better. Each board should measure 78.7 × 96.5 cm (31.0 × 38.0 in.).

11.4 The specimen and mounting board size may be adjusted to conform with other tests to be run on the sample. Examples: AATCC TM122, Test Method for Carpet Soiling: Service Soiling, or AATCC TM134, Test Method for Electrostatic Propensity of Carpets.

11.5 Spray jet(s) to deliver 3.0-4.0 L/min (0.75-1.0 gal/min) with a line pressure of 207 kPa (30 psi). The spray pattern should give even liquid delivery over the entire wand width. There should be no heavy or light streaks. The liquid impact on the face of the carpet should not cause matting or other pile distortion. Jet(s) orifice size and/or distance from the carpet face should be adjusted to avoid pile distortion and give even liquid distribution. EXAMPLE: If spray pattern is too narrow and pile matts, increase height. If pattern is wide enough and pile matts, increase orifice size.

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