Test Method for Carpet Soiling: Visual Rating

Developed in 1967 by AATCC Committee RA57; reaffirmed 1970, 1973, 1976, 1979, 1982, 1989, 2000, 2005, 2010; editorially revised 1986, 1991, 2008, 2019; editorially revised and reaffirmed 1987, 2014; revised 1995.

1. Purpose and Scope

1.1 This test method covers the measurement of the degree of cleanness of pile floor coverings, in the range from clean to a middle degree of soiling. It can be used to measure the accumulation of soil, or the removal of soil by a cleaning procedure. It can be used with pile floor coverings of any color, pattern, structure or fiber content.

1.2 This test method does not evaluate structural appearance changes (see 14.1).

2. Principle

2.1 The degree of difference in cleanness between an original or clean area, and the area under examination is determined by visual matching with a stepwise series of differences in gray chips selected to form a geometrical scale of differences on the light-dark axis.

3. Terminology

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

3.2 **cleanness,** n.—*in carpet soiling tests*, the absence of change in appearance due to soil, specifically the degree to which the specimen approaches the original clean, unsoiled condition.

NOTE: Cleanness is independent of changes of physical structure which may be present because of exposure to traffic or action of cleaning procedures.

3.3 **soil,** n.—dirt, oil or other substances not normally intended to be present on a substrate such as a textile material.

3.4 **soiling,** n.—*in textiles*, a process by which a textile substrate becomes more or less uniformly covered with/or impregnated with soil.

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

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

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 details such as material safety data sheets 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.

5. Uses and Limitations

5.1 The complex surface structure of pile floor coverings, the depth of the pile and its compressibility make it difficult to specify a method of measurement of reflectance appropriate for all classes of pile floor covering or for comparison between classes. The interpretation of differences in reflectance, particularly for materials of different color or original reflectance, is also uncertain. The present method avoids both sets of difficulties by obtaining comparison of one difference, that between clean and soiled, with a standardized scale of difference in reflectance, by visual recognition of equivalent magnitudes of difference.

6. Apparatus

6.1 Gray Scale for Color Change (AATCC EP1) (see 14.2).

7. Verification of Gray Scales

7.1 Visual verification. Inspection of the Gray Scales should show a recognizable, approximately-equal, apparent difference between each successive pair. If such visual stepwise progression is apparent, the scale is satisfactory. The Gray Scale must be clean for proper evaluation.

7.2 Reflectance measurement. If there is doubt about the visual test, it may be checked by reflectance measurement. Use any reflectance measuring equipment appropriate to chip size (10 × 38 mm). The measured reflectance for each of the chips of Grade 5 and each of the reference chips of all the other pairs should differ from their average by less than one-half the difference between the pair in Step 4 for a nine-step scale which includes half steps. The difference between reflectances of the chips in a pair, when plotted on semilog paper against the grade step or half step, should form a straight line. The difference between chips at the 4-5 step may be in line with the others since this difference is on the order of the variation in the Grade 5 chips. If the other steps form a regular series, the 4-5 step is less critical.

8. Preparation of Specimens

8.1 Clean reference specimen. Use a specimen of original or clean carpet large enough to show any pattern of structure of color in a representative way. If there are light and dark colors, be sure to locate the light colors at an edge. Cut a sharp edge on the reference specimen.

8.2 Leave the soiled floor covering, or the floor covering after cleaning, intact on the floor, or cut out a specimen convenient for handling. If a specimen is cut, use a portion which is representative of the exposure to soil or to the cleaning process, as well as representative of the pattern, and which includes the lighter colors.

9. Conditioning

9.1 Use the prevailing room conditions. Be sure that the floor covering is dry, within normal regain, if on-location cleaning methods have been used.

10. Procedure

10.1 Place the clean reference specimen on the specimen to be examined, or beside it, with no gap between the specimens. Orient the two specimens in the same way with respect to the structure and pattern. Use a standard lighting system which may include a daylight and artificial light source. Any other lighting should be standardized as much as possible for visual testing.

10.2 Compare the pairs of chips in the Gray Scale with the pair of specimens, until the nearest corresponding pair of chips has been found. Use the dark shield to expose only one pair of chips at a time.

10.3 Record the number of the step or half step which most nearly corresponds in difference to the difference in cleanness between the specimens. Keep in mind that it is degree of difference which is being matched; do not attempt to match gray shades in the less clean specimen on the Gray Scale.

10.4 Repeat the ratings with at least

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four observers. For greater precision, use five or six observers. Arrange that no observer knows the ratings given by other observers. If observers who do not have previous experience with this method are used, give practice by going through a set of three or more comparisons, including the full range of differences which are to be compared, without recording the ratings, before doing the series of ratings which is recorded.

11. Calculation of Results

11.1 Average the ratings given by the four or more observers, to the nearest 0.1 scale unit.

12. Report

12.1 Report the average grade of cleanness, and the number of observers, on the scale from 5, no difference from clean standard, to 1, the largest difference in the reference scale.

13. Precision and Bias

13.1 The variance (the square of the standard deviation) of ratings given the same specimen by different observers ranges from 0.2 for experienced observers to 0.5 for learners. Values of 0.3-0.4 are likely. From this, four to six observers are required to ensure that a difference of 0.5 scale units will be reported by another similar group of observers at the 95 or 90% confidence level.

13.2 Information on differences between laboratories is limited but variations from 0.2-0.5 scale units have been encountered.

13.3 The bias of the test method can be considered in terms of its definition as a means of measuring magnitude of subjective appreciation of a difference in cleanness by means of a geometric scale of physical differences. The results obtained are by definition subjectively accepted as valid for different structures, patterns and colors, and show general correlation with reflectance measurements on any one type of floor covering, if the original reflectance is high. For darker colors, the visual rating is independent of change of reflectance.

14. Notes

14.1 Procedures for the determination of change of the structural aspects of appearance caused by traffic are covered in ASTM D7330, Standard Test Method for Assessment of Surface Appearance Change in Pile Floor Coverings using Standard Reference Scales, available from ASTM International, 100 Barr Harbor Dr., W. Conshohocken PA 19428; tel: +1.610.832. 9500; fax: +1.610.832.9555; web site: www. astm.org.

14.2 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.

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