



Association of Textile, Apparel & Materials Professionals

AATCC takes no position respecting the validity of any patent rights asserted in connection with any item mentioned in this test method. Users of this test method are expressly advised that determination of the validity of any such patent rights, and the risk of infringement of such rights, are entirely their own responsibility.

This test method is subject to revision at any time by the responsible technical committee and must be reviewed every five years and if not revised, either reaffirmed or withdrawn. Your comments are invited either for revision of this test method or for additional procedures and should be addressed to the AATCC Technical Center. Your comments will receive careful consideration at a meeting of the responsible technical committee, which you may attend. If you feel that your comments have not received a fair hearing, you should make your views known to Diana A. Wyman, Technical Director, at the address shown below.

This test method is copyrighted by AATCC, PO Box 12215, Research Triangle Park, NC 27709 USA. Individual reprints (single or multiple copies) of this method may be obtained by contacting AATCC at the above address or tel: 919-549-3526; fax: 919-549-8933, or e-mail: orders@aatcc.org.

AATCC License Agreement: This test method is copyrighted by the American Association of Textile Chemists and Colorists (AATCC), PO Box 12215, 1 Davis Drive, Research Triangle Park, NC USA. All rights reserved.

AATCC grants you a license as follows: The right to download one electronic file of this AATCC test method for temporary storage on one computer for purposes of viewing, and/or printing one copy of the AATCC test method for individual use. Neither the electronic file nor the hard copy print may be reproduced in any way. In addition, the electronic file may not be distributed elsewhere over computer networks or otherwise. The hard copy print may only be distributed to other employees for their internal use within your organization.

This test method is not for resale.

Fluorine Content of Carpet Fibers

Developed in 2000 by AATCC Committee RA57; editorially revised and reaffirmed 2001, 2007; reaffirmed 2002, 2012; editorially revised 2005, 2010.

1. Purpose and Scope

1.1 This method is for determining the amount of fluorocarbon soil-resist agent present on carpet fibers by measurement of elemental fluorine on the pile fiber. It is useful for measurement of fluorocarbon present on carpet pile fiber as tested within the practical range of 100-1000 µg/g (ppm). It may also be used for yarns treated with fluorocarbon anti-soiling agents.

2. Principle

2.1 A weighed fiber specimen is burned in an oxygen combustion flask and the released hydrogen fluoride is absorbed into a sodium hydroxide solution. The fluorine content is measured as dissolved sodium fluoride at a constant pH and ionic strength using a fluoride ion activity electrode and a specific ion meter.

3. Terminology

3.1 **fluorine content**, *n*.—*in textile floor coverings*, the ratio of the weight of total elemental fluorine to the total weight of carpet fibers.

3.2 **soil resist agent**, *n*.—a material applied to, or incorporated in, carpet face fiber which retards and/or limits the build-up of soil.

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.

4.2 All chemicals should be handled with care. Use chemical goggles or face shield, impervious gloves and an impervious apron during the dispensing and mixing of the fluoride and sodium hydroxide standards. The standards should be made and dispensed in a hood.

4.3 An eyewash/safety shower should be located nearby and a self-contained breathing apparatus should be readily available for emergency use.

4.4 Exercise care in cutting the specimens with the scalpel or razor blade; protective gloves may provide additional protection.

4.5 Oxygen supply pressure from the pressure regulator should not exceed 14 kPa (2 psi).

4.6 Do not operate the test equipment until the manufacturer's operating instructions have been read and understood. It is the responsibility of whoever operates the test equipment to conform to the manufacturer's directions for safe operation.

4.7 Exposure to chemicals used in this procedure must be controlled at or below levels set by governmental authorities (e.g., Occupational Safety and Health Administration's [OSHA] permissible exposure limits [PEL] as found in 29 CFR 1910.1000; see web site: www.osha.gov for latest version). Fluoride salts and sodium hydroxides are listed with OSHA permissible exposure limits [PEL]. In addition, the American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLVs) comprised of time weighted averages (TLV-TWA), short term exposure limits (TLV-STEL) and ceiling limits (TLV-C) are recommended as a general guide for air contaminant exposure which should be met (see 12.1).

5. Apparatus, Reagents, Materials

5.1 500 mL combustion flask with ball stopper (with platinum wire hook) and clamp (one each per specimen; reusable).

5.2 Platinum carrier basket (one per sample; reusable).

5.3 Infrared ignition cabinet.

5.4 Black paper specimen wrappers (one per sample).

5.5 Specific ion meter.

5.6 Fluoride ion selective electrode.

5.7 Reference electrode.

5.8 0.001*N* Sodium Hydroxide (NaOH).

5.9 TISAB (Total Ionic Strength Adjustment Buffer with CDTA (1,2-cyclohexanediaminetetraacetic acid) or formulated for fluorine analysis to prevent aluminum interference) (see 12.2).

5.10 Re-pipette or bottle-top dispenser (optional).

5.11 Sodium Fluoride (NaF) standard (see Appendix A).

5.12 Mechanical shaker (optional).

6. Calibration

6.1 Calibrate the specific ion meter using the procedures described in the operation manuals for the fluoride ion activity electrode and the specific ion meter. Calibrate the voltage output on the specific ion meter to read 40.0 for every 1 µg/g (ppm) fluoride in the standard solution (see 12.3, 12.4). Calibration should be done on a daily or every shift basis.

7. Sampling

7.1 Prepare the yarn sample by removing the tufts from the carpet sample with a scalpel or razor blade. Cut the tufts as close to the primary backing as possible having a stubble not greater than 1 mm. Twenty to 40 tufts are required for a single sample, depending on carpet construction. Place the tufts in a paper envelope and identify by test number.

7.1.1 *Sampling Option #1*. To determine an overall average fluorine content of carpet fibers, take samples from across the entire width of the carpet to compensate for possible variability in application and combine the tufts in a single envelope.

7.1.2 *Sampling Option #2*. To determine the variability of fluorine content across a carpet sample, take multiple samples from various areas of the carpet and analyze each set of carpet tufts separately (see 12.5).

8. Procedure

8.1 Weigh samples using tared weighing pans. Weigh between 0.110 g and 0.150 g of randomly selected tufts from each sample and record the weight. Fold all of the weighed tufts into the black paper sample holder and place the paper holder into the platinum basket. Suspend the basket from the platinum wire hook on the flask stopper.

8.2 Number each combustion flask and plastic cup.

8.3 Pipette 20.0 mL of the 0.001*N* sodium hydroxide solution into the oxygen combustion flask (see 12.6).

8.4 Turn on the oxygen supply. Place the flexible plastic tube into the oxygen combustion flask. Turn on the pressure regulator and allow oxygen to fill the flask for about 5-20 s. Turn off the oxygen flow (see 12.7).

8.5 Immediately place the flask stopper with the platinum basket suspended from the hook on the flask and clamp in place. Do not allow the sample basket to become wet or the sample will not ignite.