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Electrostatic Propensity of Carpets

Developed in 1969 by AATCC Committee RA32; jurisdiction transferred in 2007 to AATCC Committee RA57; revised 1975, 1979, 1991, 2001, 2011; reaffirmed 1986, 1996, reaffirmed and editorially revised 2006; editorially revised 2007, 2008, 2013. Related to ISO 6356.

1. Purpose and Scope

1.1 This test method assesses the static-generating propensity of carpets developed when a person walks across them. This method uses controlled laboratory simulation of the conditions, that may be encountered in use. The simulation is focused on the use of those conditions, which are known from experience to be strong contributors to excessive accumulation of static charges.

1.2 This test method does not include standards of performance. The specification requirements pertinent to any given application can vary considerably, depending on the specific demands of the application. Specifiers should give attention to the variability of the method as described below in Section 11.

2. Principle

2.1 Build-up of a static charge on a person walking across a carpet under conditions of low atmospheric humidity has been recognized as a classic example of the triboelectric effect, whereby a separation of electrical charges is produced when two dissimilar surfaces in contact are separated. The magnitude of the charge separation and the resultant voltage on the person vary under the influence of many factors. The most important factors for the purpose of this test are:

(a) the chemical and physical characteristics of the two materials brought into contact, rubbed and separated; i.e., the shoe soles and carpet;

(b) the surface contamination on one or both;

(c) the nature of the rubbing and/or separation, i.e., the method of walk, including the height of the shoe above the carpet; and

(d) the ambient conditions (especially the relative humidity).

2.2 A carpet brought to moisture equilibrium at controlled atmospheric conditions is walked on by a test operator in a specified manner with specified shoe soles and heels. The static charge, which builds up on the operator, is monitored continuously by a voltage indicator with

a recorder.

2.3 The maximum voltage, generated on the person by the accumulated charge, measured during the test period is *defined* as the static-generating propensity of the carpet under the conditions of the test.

3. Terminology

3.1 **electrostatic propensity**, n.—the ability to produce and accumulate an electrostatic charge.

NOTE: For the purposes of this test, it is the *resultant voltage* on a person walking across the surface of a textile floor covering under specified conditions, which has been caused by the accumulation of an electrostatic charge on the body.

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.

4.3 Isopropyl alcohol is a flammable liquid and should be stored in the laboratory only in small containers away from heat, open flames and sparks.

4.4 Manufacturer's safety recommendations should be followed when operating laboratory testing equipment.

4.5 Ground all electrical equipment.

4.6 High-voltage sources should have an internal impedance of not less than 1×10^8 ohm (or the maximum output current limited to 1 milliampere) to avoid shock hazard in calibration of the detection system.

5. Apparatus and Materials

5.1 A room that can be maintained at a temperature of $21 \pm 1^\circ\text{C}$ ($70 \pm 2^\circ\text{F}$) and at $20 \pm 2\%$ RH, and suitable means for monitoring these conditions. Special requirements of end-use may dictate the use of other testing conditions (e.g., for aircraft or for controlled-humidity environments) and the test facility should be capable of achieving and maintaining those conditions.

5.1.1 The room should be of such di-

mensions and so arranged that the test operator comes no closer than approximately 600 mm to extraneous grounded or charged surfaces (such as walls or workbenches) during testing and should be equipped with open-wire shelves, racks or horizontal rods suitable for hanging carpet samples for conditioning. Air must pass freely around all surfaces of the samples to facilitate moisture equilibration.

5.2 Test sandals should be used only for testing carpet. New test sandals should be cleaned before use as prescribed in 8.7.1. Soles must be attached to the sandals by gluing and/or stitching. Tacks or rivets must not be used.

5.2.1 One pair of AATCC Method 134 sandals (see 12.1) manufactured with XS 664 P-HK Neolite soles. A second pair of Neolite test shoes or sandals with optional self-adhesive (i.e., replaceable) suede leather attached to the shoe sole. The second pair of Neolite shoes or sandals must be dedicated to this use only.

5.2.2 Reagent grade isopropyl alcohol and cheesecloth.

5.3 Electrostatic detection and recording means for voltages up to at least 20 kV (see 12.2 and 12.3).

5.3.1 The system should have a high input impedance and be suitably damped such that a steady recorder or meter indication of 3000 V will, when the input is grounded, decay to 1500 V in not less than 1 s or more than 3 s (this corresponds to a time constant of 1.4–4.3 s). To achieve reasonable accuracy in use, the input capacitance, including lead-in wire, should not exceed 30 pF. (See Appendix A for additional information on measurement of damping and Appendix B for information on damping techniques.)

5.4 A grounded metal plate approximately 1200×1200 mm.

5.5 A standard 1350 g/m^2 rubberized jute/hair cushion underlay (see 12.1) at least 1200×1200 mm. The vertical resistance through the cushion shall not be less than 10^{12} ohms (see 12.6).

5.6 A set of AATCC Method 134 AATCC Static Control Carpets (see 12.1) consisting of static unprotected and static protected versions.

5.7 An optional metronome.

5.8 An optional handheld blowing-fan balanced ionizer (see 12.4).

6. Specimens

6.1 Cut each carpet test specimen to a size of approximately 900×900 mm or