

Weather Resistance of Textiles: Xenon Lamp Exposure

Developed in 1987 by Committee RA64; reaffirmed 1988, 1989; revised 1990, 2003; editorially revised and reaffirmed 1995.

1. Purpose and Scope

1.1 This test method provides a procedure for the exposure of textile materials of all kinds, including coated fabrics and products made thereof, in an artificial weathering apparatus using controlled conditions of test. This test method includes procedures for both controlled wetting and no wetting of the specimen.

1.2 Resistance to degradation is measured either as percent strength loss or percent residual strength (breaking, tearing, or bursting) and/or colorfastness of the material when evaluated under standard textile testing conditions.

2. Principle

2.1 Samples of the textile material to be tested and the agreed upon comparison standard are exposed simultaneously to a xenon lamp source under specified conditions. Resistance of the test material to degradation is compared to that of a comparison standard.

3. Terminology

3.1 **breaking strength**, n.—the maximum force applied to a specimen in a tensile test carried to rupture.

3.2 **bursting strength**, n.—the force or pressure required to rupture a textile by distending it with a force, applied at right angles to the plane of the fabric, under specified conditions.

3.3 **colorfastness**, n.—the resistance of a material to change in any of its color characteristics, to transfer of its colorant(s) to adjacent materials, or both, as the result of exposure of the material to any environment that might be encountered during processing, storage, use or testing of the material.

3.4 **irradiance**, n.—radiant power per unit area as a function of wavelength expressed as watts per square meter, W/m^2 .

3.5 **irradiation**, n.—the time integral of irradiance expressed in joules per square meter (J/m^2).

3.6 **radiant energy**, n.—energy traveling through space in the form of photons or electromagnetic waves of various lengths.

3.7 **radiant flux density**, n.—rate of flow of the radiant energy past the specimen.

3.8 **radiant power**, n.—energy per unit time emitted, transferred, or received as radiation.

3.9 **spectral energy distribution**, n.—the variation of energy due to the source over the wavelength span of the emitted radiation.

3.10 **spectral transmittance**, n.—the percent of incident radiant energy passing through a given material and not absorbed in the process, as a function of wavelength.

3.11 **standard atmosphere for testing textiles**, n.—air maintained at $21 \pm 1^\circ C$ ($70 \pm 2^\circ F$) and $65 \pm 2\%$ relative humidity.

3.12 **tearing strength**, n.—the average force required to continue a tear previously started in a fabric.

3.13 **total irradiance**, n.—radiant power integrated over all wavelengths at a point in time expressed in watts per square meter (W/m^2).

3.14 **weather**, n.—climatic conditions at a given geographical location, including such factors as sunlight, rain, humidity, and temperature.

3.15 **weather resistance**, n.—ability of a material to resist degradation of its properties when exposed to climatic conditions.

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 safety data sheets and other manufacturer's recommendations. All OSHA standards and rules must also be consulted and followed.

4.1 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.

4.2 The test equipment contains high intensity lamps. The door of the test machine must be kept closed whenever it is running.

4.3 Before servicing xenon lamps, allow time for cool down after test machine is shut down.

4.4 When servicing the test machine, shut off both the off switch and, if applicable, unplug the machine from the wall

electrical socket. Insure that the main power indicator light on the machine front panel goes out.

5. Uses and Limitations

5.1 Results obtained by this test method should not be considered equivalent to those results obtained by weathering in an outdoor environment unless a mathematical correlation for a given material has been established and agreed upon by the contractual parties. Outdoor environments vary with respect to season, geography and topography and, as a consequence, the effects of outdoor exposure will vary accordingly. Not all materials are affected equally by the same environment. The instruments for determining weather resistance described in this test method are considered satisfactory, since they have been used extensively in the trade for acceptance testing of textile materials. The decision as to which machine type to use should be agreed upon by the purchaser and supplier based on their historical data and experience. There may be distinct difference in spectral distribution, water spray application, air and humidity sensor location, and test chamber size between weathering test machines supplied by different manufacturers that can result in differences in reported test results (see 16.1-16.8). Consequently, data obtained from machines supplied by different manufacturers and different size test chambers and xenon lamps cannot be used interchangeably unless a mathematical correlation has been established and agreed upon. No comparison between differently manufactured test apparatus is known to AATCC Committee RA64.

5.2 When using this test method, the contracting parties must agree upon a reasonable test program cycle incorporating light, humidity, and wetting effects. The cycle selected must reflect expected environmental conditions relative to season, geography, and topography associated with the use of the material (see Option 1, 7.2.1).

5.3 When using this test method, use a standard of comparison, which has a known change in property value after a specific exposure.

5.4 Other procedures for measuring resistance to degradation can be used as agreed upon between the contracting parties.