

Colorfastness to Light

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1. Purpose and Scope

1.1 This test method provides the general principles and procedures which are currently in use for determining the colorfastness to light of textile materials. The test options described are applicable to textile materials of all kinds and for colorants, finishes and treatments applied to textile materials.

Test options included are:

- 1—Enclosed Carbon-Arc Lamp, Continuous Light
- 2—Enclosed Carbon-Arc Lamp, Alternate Light and Dark
- 3—Xenon-Arc Lamp, Continuous Light, Black Panel Option
- 4—Xenon-Arc Lamp, Alternate Light and Dark
- 5—Xenon-Arc Lamp, Continuous Light, Black Standard Option
- 6—Daylight Behind Glass

1.2 The use of these test options does not imply, expressly or otherwise, an accelerated test for a specific application. The relationship between any lightfastness test and the actual exposure in use must be determined and agreed upon by the contractual parties.

1.3 This test method contains the following sections that assist in the use and implementation of the various options for determining lightfastness of textile materials.

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2. Principle

2.1 Samples of the textile material to be tested and the agreed upon comparison standard(s) are exposed simultaneously to a light source under specified conditions. The colorfastness to light of the specimen is evaluated by comparison of the color change of the exposed portion to the masked control portion of the test specimen or unexposed original material using the AATCC Gray Scale for Color Change, or by instrumental color measurement. Lightfastness classification is accomplished by evaluation versus a simultaneously exposed series of AATCC Blue Wool Lightfastness Standards.

3. Terminology

3.1 **AATCC Blue Wool Lightfastness Standard**, n.—one of a group of dyed wool fabrics distributed by AATCC for use in determining the amount of light exposure of specimens during lightfastness testing (see 32.1).

3.2 **AATCC Fading Unit (AFU)**, n.—a specific amount of exposure made under the conditions specified in various test methods where one AFU is one-twentieth (1/20) of the light-on exposure required to produce a color change equal to Step 4 on the Gray Scale for Color Change or 1.7 ± 0.3 CIELAB units of color difference on AATCC Blue Wool Lightfastness Standard L4.

3.3 **black-panel thermometer**, n.—a temperature measuring device, the sensing unit of which is coated with black paint designed to absorb most of the radiant energy encountered in lightfastness testing (see 32.2).

3.3.1 This device provides an estimation of the maximum temperature a specimen may attain during exposure to natural or artificial light. Any deviation from the geometry of this device described in 32.2 may have an influence on the measured temperature.

3.4 **black standard thermometer**, n.—a temperature measuring device, the sensing unit of which is coated with black material designed to absorb most of the radiant energy encountered in lightfastness testing and is thermally insulated by means of a plastic plate (see 32.2).

3.4.1 This device provides an estima-

tion of the maximum temperature a specimen may attain during exposure to natural or artificial light. Any deviation from the geometry of the device described in 32.2 may have an influence on the measured temperature. The temperature measured by the black standard thermometer will not be the same as that measured by the black-panel thermometer; therefore, they cannot be used interchangeably.

3.5 **broad bandpass radiometer**, n.—a relative term applied to radiometers that have a bandpass width of more than 20 nm at 50% of maximum transmittance and can be used to measure irradiance at wavelengths such as 300-400 nm or 300-800 nm.

3.6 **color change**, n.—as used in colorfastness testing, a change in color of any kind whether a change in lightness, hue or chroma or any combination of these, discernible by comparing the test specimen with a corresponding untested specimen.

3.7 **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 a result of exposure of the material to any environment that might be encountered during the processing, testing, storage or use of the material.

3.8 **colorfastness to light**, n.—the resistance of a material to a change in its color characteristics as a result of exposure of the material to sunlight or an artificial light source.

3.9 **infrared radiation**, n.—radiant energy for which the wavelengths of the monochromatic components are greater than those for visible radiation and less than about 1 mm.

NOTE: The limits of the spectral range of infrared radiation are not well defined and may vary according to the user. Committee E-2.1.2 of the CIE distinguishes in the spectral range between 780 nm and 1 mm:

IR-A	780-1400 nm
IR-B	1.4-3.0 μm
IR-C	3 μm to 1 mm

3.10 **irradiance**, n.—radiant power per unit area incident on a receiver, typically reported in watts per square meter, W/(m²nm).

3.11 **“L” designation**, n.—the sequence number given each AATCC Blue Wool Lightfastness Standard according to the number of AATCC Fading Units required to produce a color change equal to Step 4 on the AATCC Gray Scale for Color Change.