

Weather-Ometer
AATCC Test Method 16-1998
Colorfastness to Light

What this test is used for:

This test imitates exposure of the textile materials to light in an artificial setting with controlled conditions. Any textile material including those with colorants, finishes, and treatments may be used.

Test options include:

- A – Carbon-Arc Lamp, Continuous Light
- B – Sunlight (Discontinued)
- C – Daylight
- D – Carbon-Arc Lamp, Alternate Light and Dark
- E – Water-Cooled Xenon-Arc Lamp, Continuous Light
- F – Water-Cooled Xenon-Arc Lamp, Alternate Light and Dark
- G – Fastness Above L-7 (Discontinued)
- H – Air-Cooled Xenon-Arc Lamp, Continuous Light
- I – Air-Cooled Xenon-Arc Lamp, Alternate Light and Dark

For the purposes of the Quality Assurance class, you will be using Option E to examine colorfastness.

How this test works:

Conditions for the appropriate procedure are determined and programmed into the Weatherometer. (Refer to the owner's manual) The cut samples are placed in specimen plates and mounted on a turning apparatus inside the machine. The Weatherometer is run for the specified time period to expose the specimens to prescribed xenon lamp irradiance, temperature, relative humidity. After completion of the cycle and the cool-down period, specimens are prepared for comparison.

Scientific Testing Requirements:

When using this equipment for scientific purposes, the fabric must be allowed to reach moisture equilibrium in the atmosphere for testing textiles, or conditioned according to ASTM D-1776, Conditioning Textiles for Testing.

Equipment Needed:

- Weather-Ometer
- Specimen mounting plate
- White Card Stock Backing
- Pre-Cut Fabric Swatch of Material 5.5"(warp) x 2.75"(weft)
- AATCC Gray Scale for Color Change

Weather-O-Meter Conditions (Option E):

- Light Source – Xenon
- Light Monitors & Controls - Optional
- Lamp Cooling – Water
- Black Panel Temperature – $63 \pm 1^{\circ}\text{C}$
- Dry Bulb Temperature – $43 \pm 2^{\circ}\text{C}$
- Relative Humidity – 35 ± 5
- Light Cycles – Continuous
- Irradiance $\text{W/m}^2/\text{nm}$ (at 420) – 1.10 ± 0.03

Procedure:

Sample Preparation:

1. Cut a 5.5"(warp) x 2.75"(weft) sample. One sample per person.
2. Condition sample in dry oven for 24 hours prior to testing.

3. Place the sample into the frame with “technical face” facing down. Next, slide the white card backing into the frame (should be touching the “technical back” of the fabric sample). Last, slide the clamp into the frame. Twist clamps to secure fabric and white card backing.
4. Check the framed sample to ensure the fabric face is smooth. (without wrinkles or folds)

Loading the Weather-OMeter:

1. Samples are hung on the circular specimen rack inside the chamber.
2. Hang the samples on the rack by placing the “technical face” of the fabric towards the center. Push the “hooks” down onto the top circular bar.
3. Turn the rack clockwise to allow more room for specimens.
4. Hang sample so that the entire circle is filled with specimen frames.
5. If there are not enough samples to fill the rack, use frames holding white samples cards to fill the empty spaces. The blanks must be dispersed evenly throughout the rack to ensure even light reflection.

Start the Weather-OMeter and allow to run through the 20 hour cycle and the cool-down period. (See owner’s manual)

Preparation for Evaluation:

1. When the exposure cycle is completed, remove the test specimens from the exposure rack.
2. Transfer specimens to conditioning chamber. Allow the specimen to condition for at least four hours.

Evaluation:

1. Compare sample fabric to the control fabric that was previously cut out.
2. Use the AATCC Gray Scale for Color Change to evaluate results.
3. Conduct the comparison in the light box with the setting at D65.
4. Record color change.

Results

The level of satisfaction the sample fabric displays will be determined by the specification written for the fabric. For the Quality Assurance class, this is the specification the group wrote for the textile material.

For reference in the industry the level of satisfaction determined by the amount of color change is as follows:

Satisfactory – If the test specimen exhibits a color change of less than or equal to Step 4.

Unsatisfactory – If the test specimen exhibits a color change or more than Step 4.

Evaluation Report

Include the following information for a report of colorfastness:

1. Type of test apparatus, elapsed exposure time
2. Temperatures Controlled by (°C): Ambient (Dry Bulb), Black Panel, Black Standard
3. Percent Relative Humidity
4. AATCC Gray Scale for Color Change Rating
5. Report any deviation from this method or the performance of the standard of comparison.

A sample report is shown on page 31 in the 2003 addition of the AATCC manual, vol.78.