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Light Blocking Effect of Textiles: Spectrophotometric Method

Developed in 2014 by AATCC Committee RA36.

Foreword

The AATCC Test Method (TM) 148-1989, Light Blocking Effect of Curtain Materials, was discontinued in 1994. During the time of its discontinuance, it was found that a standard laboratory sphere spectrophotometer used in transmission mode could be used to measure the light blocking effect of textiles used in end uses such as partial and full blackout curtains in both residential and contract applications. This method uses spectrophotometric measuring equipment that provides precise, reproducible and traceable light measurements. These instruments are currently in wide industrial use.

1. Purpose and Scope

1.1 This test method is intended to spectrophotometrically measure the light blocking properties of window covering textiles against light passing through them and being seen by a standard observer on the darkened side of the textile (typically a curtain or drape).

1.2 This method is applicable to all types of fabrics, including knits, wovens, and non-wovens, as well as to fabrics taken from end product items. However, it is not recommended for mesh structures with mesh holes greater than 3 mm across.

2. Principle

2.1 The test method assesses the percentage of light from a light source blocked by a textile material by measuring the original light and subtracting from it the light passing through the materials. The amount of light transmitted through the fabric is compared on a percentage basis, to the amount of light transmitted without any blocking of the light (total transmission). The percent of light that is not transmitted, out of the total transmission, represents the material's light blocking capability.

3. Terminology

3.1 **diffuse transmission,** n.—process by which incident light, while being transmitted through an object, is redirected or scattered over a range of angles.

3.2 **light blocking,** n.—the ability of a textile to prevent the transmission of light.

3.3 **regular transmission,** n.—process by which incident light is transmitted through an object in a rectilinear, straight-through manner, without diffusion.

3.4 **spectrophotometer,** n.—an instrument used for measuring the transmittance and/or reflectance of specimens as a function of wavelength.

3.5 **total transmission,** n.—the amount of light transmitted comprising diffuse plus non-diffuse transmission.

3.6 **transmission,** n.—process by which incident light is transmitted through an object.

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 materials 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 The manufacturer's safety recommendations should be followed when operating laboratory testing equipment.

5. Uses and Limitations

5.1 This test is performed under controlled laboratory temperature and relative humidity conditions. While the test may be performed at alternative conditions, such as household ambient temperature and relative humidity, for comparison of results, the same conditions must be used.

5.2 The light this test is performed with is from a xenon lamp. Different light sources may be used and results may, therefore, also be different, such as with spectrophotometric instruments with band width infrared (IR) capacity.

6. Apparatus and Materials

6.1 Spectrophotometer with transmission measuring capability with a means of precisely mounting and anchoring a specimen in the transmission holding clamp.

6.2 Means of covering reflectance or external port with a white standard tile to establish the one-hundred percent transmission standard and to complete the sphere for further transmission readings.

6.3 Means of blocking transmission to determine zero percent transmission.

7. Sampling

7.1 Take five representative test specimens from the sample. Increase the number of specimens accordingly to include different areas that may have varying light transmission characteristics within the total sample area. Textiles such as long repeat jacquards may require a larger number of specimens in order to obtain a more representative sample. Textiles containing large repeats of alternating diaphanous and opaque areas may have the light blocking effect of each area sampled separately.

8. Test Specimens

8.1 Each specimen should be large enough to fit onto the specimen holding frame and completely cover the transmission port of the spectrophotometer.

8.2 Take multiple specimens to provide an appropriate random sample from different width and length areas of the fabric, not taking any specimens from within 10% of the width from the selvedge or machine edge.

9. Conditioning

9.1 Prior to testing, condition test specimens as directed in ASTM D1776, Standard Practice for Conditioning and Testing Textiles (see 13.2). Condition the specimens adequately in an atmosphere of 21 ± 1°C (70 ± 2°F), 65 ± 2% RH, by laying each specimen separately on a screen or perforated shelf of a conditioning rack.

9.2 Perform all tests in the standard atmosphere for testing.

10. Procedure (see Fig. 1)

10.1 Operational check of total transmission with no light blocking.

10.1.1 Block the external/reflectance port with a white standard to complete

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