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**Textiles - Determination of thermal blocking property**

纺织品 遮热性能的测定

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# Textiles - Determination of thermal blocking property

## 1 Scope

This document describes the test methods for the thermal blocking properties of textiles.

This document applies to all types of fabrics and their products.

## 2 Normative references

The following documents contain the provisions which, through normative reference in this document, constitute the essential provisions of this document. For the dated referenced documents, only the versions with the indicated dates are applicable to this document; for the undated referenced documents, only the latest version (including all the amendments) is applicable to this document.

GB/T 6495.9-2006 Photovoltaic devices - Part 9: Solar simulator performance requirements

GB/T 6529 Textiles - Standard atmospheres for conditioning and testing

GB/T 19565-2017 Pyranometer

## 3 Terms and definitions

The following terms and definitions apply to this document.

### 3.1 thermal blocking property

The performance of textiles to suppress the temperature rise by shielding light radiation, expressed as the thermal blocking rate and the maximum temperature change value.

## 4 Principles

After the solar simulator irradiates the sample, the light radiation passing through the sample is absorbed by the metal blackboard; the temperature change of the metal blackboard is detected by a temperature sensor to characterize the thermal blocking performance of the sample.

**5.2 Clamping device:** It shall be made of materials with thermal insulation properties, and the effective area of the sample to be irradiated by the solar simulator shall be 150 mm×150 mm. The central position of the clamping device shall be the same as the central position of the light source irradiation, the light of the solar simulator can only be irradiated to the metal blackboard (5.4) through the sample.

**5.3 Solar simulator:** It shall at least provide a light source with a wavelength of 400 nm~1100 nm and meet the requirements of Grade C in GB/T 6495.9-2006; it shall be able to provide the center of the sample with an irradiance of  $(400\pm10)$  W/m<sup>2</sup> when it is placed at a vertical distance of 300 mm~500 mm relative to the surface of the sample. The solar simulator shall be able to achieve irradiation stability within 3 minutes after it is turned on. Before each test, use an irradiance meter (5.6) to verify the irradiance of the solar simulator.

Note: Ensure the irradiance at the center of the sample by adjusting the vertical distance of the solar simulator relative to the surface of the sample, or by adjusting the current intensity of the solar simulator.

**5.4 Metal blackboard:** The thickness shall be  $(0.5\pm0.1)$  mm, and the size shall be 150 mm×150 mm; the material shall be aluminum, and the surface shall be coated with black body paint with an emissivity of above 0.94.

**5.5 Temperature sensor:** It shall be located in the center below the metal blackboard and able to display and record the real-time temperature of the metal blackboard; its accuracy shall be at least 0.1 °C.

**5.6 Irradiance meter:** It shall at least meet the requirements of Class II in GB/T 19565-2017.

## **6 Atmosphere for humidity control and test**

The standard atmosphere for humidity control and test shall be in accordance with the provisions of GB/T 6529.

## **7 Sample preparation**

### **7.1 Fabric**

Cut out three samples, and the size of the samples shall meet the requirement that the effective area is at least 150 mm × 150 mm after clamping; one side of the sample shall be parallel to the warp direction or vertical direction of the sample. The samples shall be representative; take the samples at a distance of more than 15 cm from the selvedge, avoid defects, stains, wrinkles, and holes, and cut them out of a flat fabric. Decorative parts such as embroidery and applique that are different from the main structure shall be avoided.

## 7.2 Products

Select three representative positions on the flat part of the finished product for direct testing, and the size of the test part shall at least meet the requirement that the effective light area is 150 mm×150 mm after clamping. Avoid defects, stains, wrinkles, and holes when sampling. Decorative parts such as embroidery and applique that are different from the main structure shall be avoided.

## 8 Test steps

**8.1** All lighting of the test site shall be turned off before the test, and the entire test process shall be carried out without other external light sources. Turn on the temperature sensor (5.5) to ensure that the difference between the temperature of the metal blackboard (5.4) and the laboratory ambient temperature is within 1.0 °C. Record the temperature  $T'_0$  of the metal black-plate (5.4) at this time and express it in °C.

**8.2** Turn on the solar simulator (5.3) and turn on the temperature sensor (5.5); record the temperature change of the metal blackboard (5.4) within 30 minutes and the maximum temperature  $T'_{\max}$  of the metal blackboard (5.4) during the process, and express it in °C.

**8.3** Turn off the solar simulator (5.3) and wait until the difference between the temperature of the metal blackboard (5.4) and the laboratory ambient temperature does not exceed 1.0 °C. Record the temperature  $T_{i,0}$  of the metal blackboard (5.4) at this time, and express it in °C.

**8.4** Install the prepared sample in the clamping device (5.2). When clamping, let the front of the sample face the solar simulator (5.3). After clamping, ensure that the sample is kept in a flat state. The sample shall not be in contact with the metal blackboard (5.4) during the test. For some soft fabrics, the pre-tension can be appropriately increased when they are being clamped to ensure that the sample is not in contact with the metal blackboard during the entire test process.

**8.5** Turn on the solar simulator (5.3), and after the irradiation is stable for 2 min~3 min, turn on the temperature sensor (5.5); make the sample receive the irradiation of the solar simulator (5.3), record the temperature change of the metal blackboard (5.4) within 30 minutes and the maximum temperature  $T_{i,\max}$ , and express it in °C.

**8.6** According to the requirements of 8.1~8.5, test the remaining samples.

## 9 Result calculation and presentation

**9.1** Calculate the average value  $\overline{T}_{\max}$  of the maximum temperature of the metal

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Contact: Wayne Zheng, [Sales@ChineseStandard.net](mailto:Sales@ChineseStandard.net)

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