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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 2423.24-2013

**Environmental testing - Part 2: Test methods - Test Sa:
Simulated solar radiation at ground level and guidance for solar
radiation testing**

(English Translation)

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1 Scope

This part of GB/T 2423 provides guidance for testing equipment or components, under solar radiation conditions.

The purpose of the test is to check the extent to which equipment or components are affected by solar radiation.

The comprehensive test method can detect changes in electrical, mechanical or other physical properties.

2 Normative references

The following documents are essential to the application of this document. For the dated documents, only the versions with the dates indicated are applicable to this document; for the undated documents, only the latest version (including all the amendments) is applicable to this standard.

IEC 60068-1 Environmental testing - Part 1.General and guidance

IEC 60068-2-1 Environmental testing - Part 2-1.Tests - Test A. Cold

IEC 60068-2-2 Environmental testing - Part 2-2.Tests - Test B. Dry heat

IEC 60068-2-78 Environmental testing - Part 2-78.Tests - Test Cab. Damp heat, steady state

CIE 85.19891) Solar spectral irradiance

3 Terms and definitions

The terms and definitions as defined in IEC 60068-1, as well as the following terms and definitions, apply to this document.

1 The original text of IEC is "CIE 85.1985", which is wrong in the year. It is corrected here to "CIE 85.1989".

If required, the recommended value of IEC 60068-2-78 shall be used first.

The relevant specifications shall specify the humidity during the following test

AND whether it needs to be maintained.

- a) Only during the irradiation period;
- b) Only in the dark period;
- c) The entire test duration.

5.4 Ozone and other polluting gases

The ozone, which is produced by the short-wave ultraviolet rays in the test radiation source, is usually discharged out of the test box, by a filter that corrects the spectral energy distribution. Because ozone and other polluting gases will significantly affect the degradation process of certain materials, it is important to exhaust these gases from the test box, unless otherwise required by relevant specifications.

5.5 Surface contamination

Dust and other surface contaminants can significantly change the absorption characteristics of the irradiated surface. Unless otherwise required, the test sample should be tested, under clean conditions. However, if the impact of surface contaminants is to be evaluated, relevant specifications should include necessary information such as surface preparation.

5.6 Installation of test sample

The test sample shall be installed on a raised support, turntable or a special base, which has known thermal conductivity and heat capacity, in the test box, according to the relevant

specifications. There shall be sufficient spacing between test samples, to avoid the radiation from the light source OR secondary radiant heat. The temperature sensor should be attached to the test sample, as required.

5.7 Test facility

The optical parts, lamps, reflectors, filters of the test equipment shall be kept clean.

The irradiance on the specified measurement plane shall be measured, before each test.

Any specified auxiliary environmental conditions, such as ambient temperature, humidity, air flow rate or other parameters, shall be continuously monitored, throughout the test period.

5.8 Test equipment

The test box for the test shall be able to provide a light source, which meets the spectral distribution, which is specified in Table 1. Its irradiance on the specified radiation measurement plane is $1120 \times (1 \pm 10\%) \text{ W/m}^2$. The irradiance value shall include any radiation, which is reflected from the test box AND received by the test sample; however, it shall not include the long-wave infrared radiation, which is emitted by the test box.

The test box shall be equipped with a device, which is capable of maintaining the specified temperature, air velocity, humidity conditions.

The temperature measurement in the test box shall be carried out, at one or several positions on a horizontal plane, 0 ~ 50 mm lower than the prescribed radiation measurement plane. The temperature measuring device shall be sufficiently shielded, to prevent radiant heat. At the same time, this (these) measurement position is at half the distance, between the test sample and the test box wall, OR 1 m away from the test sample, whichever is the smaller of these two positions.

6 Initial inspection

The test samples shall be subject to the visual inspection, size and function inspection, as required by relevant specifications.

7.1 Overview

During the exposure period, the temperature inside the box shall be raised or lowered at a rate of less than 1 K/min 4) AND maintained at a value recommended by IEC 60068-2-1 or IEC 60068-2-2, OR a value specified by relevant specifications.

In program A, the temperature in the test box shall start to rise, 2 h before the start of the irradiation period.

During the dark period of programs A and B, the temperature in the test box shall be

lowered at a rate of less than 1 K/min 5) AND kept at 25 °C. If the required temperature is lower than 25 °C, then the temperature shall be maintained at the required temperature value.

The requirements for the relationship between irradiance, temperature, time are

4) The original IEC "rate of 1 K/min" is changed to "rate of less than 1 K/min", for the same reason as footnote 3).

5) Same as 4).

Appendix A (Informative)

Interpretation of test results

A.1 Compliance with specifications

The relevant specifications should specify the allowable external conditions and/or performance changes, after the test sample is exposed to the required irradiance level, for a specified duration. In addition to these requirements, the following explanations can be considered.

A.2 Short-term effects

The main concern is the thermal effect. The short-term effects to be understood are mainly the nature of local overheating.

A.3 Long-term effects

The purpose of the long-term test is to determine the degradation mode, which has the following two purposes. to observe whether there is an initial sharp change AND to evaluate the effective life of the test sample.

A.4 Thermal effect

The maximum surface temperature and internal temperature reached by the test sample or device depends on.

- a) Ambient air temperature;
- b) Irradiance;
- c) Air velocity;
- d) Duration of exposure;
- e) The thermal properties of the object itself, such as surface reflectivity, size and shape, thermal conductivity, specific heat.