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Environmental testing - Part 2: Test methods - Test Cy: Damp heat, steady state, accelerated test primarily intended for components

环境试验 第 2 部分：试验方法 试验 Cy：恒定湿热主要用于元件的加速试验

(IEC 60068-2-67:2019, Environmental testing - Part 2-67: Tests - Test Cy: Damp heat, steady state, accelerated test primarily intended for components, IDT)

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Environmental testing - Part 2: Test methods - Test Cy: Damp heat, steady state, accelerated test primarily intended for components

1 Scope

This document describes test methods for evaluating the resistance of small electrical and electronic products (primarily non-hermetically-sealed components) to the deteriorative effect of damp heat in an accelerated manner.

This test is not suitable for evaluating external effects such as corrosion and deformation.

2 Normative references

For the purpose of this document, there are no normative references.

3 Terms and definitions

For the purpose of this document, there are no terms or definitions that need to be defined.

4 General

In this test, the test specimen is subjected to very high, unsaturated damp heat vapor pressure for a relatively long period.

Bias voltage is usually applied.

This test is conducted at a relative humidity of 85 % and a temperature of 85 °C, with a number of preferred test durations available.

For plastic-encapsulated components, degradation is caused by absorption of moisture by the plastic and penetration of moisture along the terminals.

The physical significance of the test is described in Annex A.

5 Description of test apparatus

5.1 Test chamber

The test chamber parameters shall meet the following requirements:

a) It can meet the temperature and relative humidity conditions given in Table 1 and maintain them for at least 2000 h without interruption;

b) During the test, it can provide controlled temperature and humidity conditions, and the temperature can be increased and decreased according to the specified conditions;

c) The temperature and humidity within the test chamber can be monitored by sensors located in the working space and/or other areas that provide same results;

d) Water in the working space can be continuously drained and not reused;

e) Condensed water shall not fall on the test specimen;

f) The chamber wall construction material shall not cause any significant corrosion of the test specimen or degrade the quality of the humidifying water (see B.1 of Annex B).

The temperature tolerance of ±2 K takes account of absolute errors in the measurement, temperature fluctuations at any point and temperature differences between any two points within the working space.

However, to maintain the relative humidity within the specified tolerance of ±5 %, the temperature difference between any two points in the working space (at any time) shall be kept within a narrower range.

If such temperature differences exceed 1.5 K, the specified humidity tolerance will be exceeded. Therefore, short-term temperature fluctuations caused by the cyclic heating of the test chamber heater shall also be restricted to a similar value.

The test specimen should not significantly impede the air flow.

Condensation shall not form on the test specimen at any time during the test.

5.2 Humidifying water

Distilled or deionized water shall be used. At 23 °C, the resistivity shall be between 2000 Ω · m ~ 500 Ω · m, corresponding to a conductivity between 5 μS/cm ~ 20 μS/cm. Before filling the humidifier or water storage tank of the test chamber, all parts of the test chamber shall be cleaned. Guidance on cleaning is provided in B.3.

NOTE: A conductivity lower than 5 μS/cm may affect the humidifier system. A conductivity higher than 20 μS/cm can cause limescale or other mineral deposits to form in the humidifier system or on the specimen.

6 Severities

The relevant specification shall specify the severity defined by duration. Unless otherwise specified, the severity shall be selected from the durations given in Table 1.

7 Preconditioning

The relevant specification may specify preconditioning.

8 Initial tests

The test specimen shall be inspected for appearance, dimensions, and function as specified in the relevant specification.

9 Conditioning tests

9.1 The test chamber and test specimen shall be maintained at the same laboratory temperature, pressure, and humidity conditions, and the test specimen shall be placed in the working space of the test chamber.

9.2 The test specimen shall not be exposed to radiant heat from the heaters and the test chamber wall.

If required by the relevant specification, a specific specimen mounting device shall be used. The heat conductivity and the thermal capacity of the mounting fixtures shall be sufficiently low so that the test specimen is practically thermally isolated.

Care shall be taken in selecting the materials for the specimen mounting device and mounting fixture to minimize the effects of contamination and degradation due to corrosion and other causes (see B.1).

9.3 If required by the relevant specification, a bias voltage shall be applied to the test specimen during the test. Guidance on the application of bias voltage is provided in B.2.

The bias voltage (or periodic bias voltage) shall be applied to the test specimen when the temperature and relative humidity have reached the stable state and shall continue to be applied until the test specimen is under recovery conditions.

9.4 The test procedure is as follows.

a) The temperature and relative humidity of the test chamber shall be raised to appropriate values. During this period, the temperature and relative humidity shall not exceed the specified value. No condensation shall form on the specimen at any time during the test. The temperature and humidity shall stabilize within 3 h.

b) Within the duration specified in the relevant specification, the temperature and relative humidity shall be maintained within the specified range. The duration shall be counted from the moment when the test conditions have stabilized.

c) At the end of the specified duration, the temperature and relative humidity of the test chamber shall be restored to standard atmospheric conditions for measurement and tests within 1 ~ 4 h. During this period, the temperature and relative humidity shall not exceed the specified value, and the bias voltage shall be maintained.

d) Upon completion of the cooling phase, the test specimen shall enter the recovery procedure.

10 Intermediate tests

The relevant specification may require electrical and/or mechanical inspections during the test.

If intermediate tests are required, the relevant specification shall specify the test method and the phase (or phases) during the test period at which the intermediate tests shall be carried out. The intermediate tests shall not cause any change to the test conditions.

During the test, the test specimen shall not be removed from the test chamber for tests after recovery.

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