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

GB/T 2423.22-2012

Replacing GB/T 2423.22-2002

**Environmental testing - Part 2: Test methods - Test N: Change of
temperature**

环境试验 第2部分：试验方法 试验N：温度变化

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Foreword

This part is the 22nd part of the GB/T 2423 standard. The components of the GB/T 2423 standard are listed in the informative appendix NA. This part is drafted in accordance with the rules given in GB/T 1.1-2009. This part replaces GB/T 2423.22-2002 "Electrical and Electronic Products Environmental Test Part 2. Test Method Test N. Temperature "Changes" and GB/T 2424.13-2002 "Electrical and Electronic Products Environmental Testing Part 2. Test Methods Temperature Change Test Guide". This part is mainly based on GB/T 2423.22-2002, which integrates part of GB/T 2424.13-2002 with GB/T 2423.22- In.2002, compared with GB/T 2424.13-2002, the main technical changes and editorial changes are as follows:

--- Test Na and test Nb, remove the relevant requirements for absolute humidity, tank wall temperature and air flow rate of the test chamber (see 7.2.1, 8.2.1);

--- Test Na, the provisions of the test chamber allowed to use a rapid temperature change rate are increased (see 7.2.1);

--- Test the severity of the Na and test Nb, increasing the "exposure duration" parameter (see 7.2.3, 8.2.3);

--- Test Na, deleted the "conversion time should be. (2 ~ 3) min, (20 ~ 30) s, < 10s" provisions, replaced by "conversion time T2 should not exceed 3 minutes" (see 7.2.5);

- Test Nb, increased two preferred values of temperature change rate. (10 ± 2) K/min and (15 ± 3) K/min (see 8.2.3);
- Test Nc, deleted two sets of standardized duration parameters;
- The unit of temperature deviation replaces "°C" with "K";
- Deleted the contents of 3.4.2 and Chapter 4 of GB/T 2424.13-2002;
- Updated the contents of 3.3 of GB/T 2424.13-2002;
- Updated all the diagrams;
- Combine the contents of the test Na, the test Nb, and the test Nc "initial and final test" into a separate chapter 6;

1 Scope

GB/T 2423.22 specifies Test N, change of temperature, one of the most used environmental tests there is. It is not the same thing as a high or low temperature test: what it looks for is the damage done by the change itself, the differential expansion between materials in an assembly, the cracking of seals and solder joints, the condensation that forms when a cold item is brought into warm air. The standard defines the several variants of the test, the slow change at a specified rate, the rapid change with two chambers between which the specimen is transferred, the rapid change by immersion in liquid baths, and the specification of each: the temperature extremes, the rate of change, the dwell time at each extreme, the number of cycles, the transfer time, the conditions before and after the test and the recovery period, together with the requirements on the chambers and the mounting of the specimen and on the severities to be selected. It is aligned with IEC 60068-2-14. For a manufacturer, a specification writer or a test house in China, this is the referenced procedure.

4.6 Application limits for temperature change tests Within the test sample, the rate of temperature change depends on the thermal conductivity of the test sample material, the spatial distribution of the test sample heat capacity, and the test. Sample size. The temperature change at a point on the surface of the test sample generally follows an exponential law. Within the large test sample, such an alternating exponential rise And falling results in a periodic, approximately sinusoidal temperature change that is much lower than the magnitude of the alternating temperature applied. The heat transfer mechanism between the test sample and the conditioning medium in the tank or tank should be considered. The flowing liquid causes the surface of the test sample to be very high The rate of temperature change, while still air causes a very low rate of change. The two-tank

method (test Nc) with water as the medium of regulation should be limited to sealed test samples or test samples with water-insensitive properties. Product, because the performance and characteristics of the test sample may be degraded by water immersion. In certain cases, such as test samples that are sensitive to water, it is necessary to stipulate the use of other liquids that are not water for testing. When designing this test During the inspection, it should be considered that the heat transfer characteristics of the liquid used may be different from water.

Note. The evaluation results obtained from Test Q. Seal (IEC 60068-2-17) may be helpful in evaluating the applicability of the two tank method.

2 Na test cycle

7.3 Recovery At the end of the test cycle, the test sample shall be held for a sufficient period of time under test standard atmospheric conditions to achieve temperature stability. For a particular type of test sample, the relevant specification can specify a specific recovery time.

7.4 Information to be given in the relevant specifications When the relevant specification contains this test, any of the following applicable details should be given.

- a) type of test;
- b) pretreatment;
- c) initial detection;
- d) installation and support details;
- e) low temperature TA, high temperature TB;
- f) exposure duration t1;
- g) the number of cycles;
- h) detection and/or load during the conditional test;
- j) final detection;
- k) Any deviation from the program agreed between the customer and the supplier.

3 Nb test cycle

8.3 recovery At the end of the test cycle, the test sample shall be held for a sufficient period of time under test standard atmospheric conditions to achieve temperature stability. For a particular type of test sample, the relevant specification can specify a specific recovery time.

8.4 Information to be given by the relevant specifications When the relevant specification

contains this test, any of the following applicable details should be given.

- a) type of test;
- b) pretreatment;
- c) initial detection;
- d) installation and support details;
- e) low temperature TA, high temperature TB;
- f) exposure duration t1;
- g) temperature change rate;
- h) the number of cycles;
- i) detection and/or load during conditional testing;
- k) final detection;
- l) Any deviation from the program agreed between the customer and the supplier.

4 General

4.1 Design of temperature change test Tests Na, Nb, and Nc include alternating high temperature and low temperature periods, and the conversion from one temperature to another is also well defined. From the laboratory ambient temperature to the first condition test temperature, then to the second condition test temperature, and then back to the laboratory ambient temperature The knot process is considered a test cycle.

4.2 Test parameters Test parameters include the following.

- Test room ambient temperature;
- high temperature;
- low temperature;
- Exposure duration;
- Conversion time or rate of change;
- The number of test cycles. High temperature and low temperature refer to the ambient temperature, which is reached by most test samples, but the time is delayed. Only in exceptional cases can the high temperature or low temperature be specified for normal storage or outside the operating temperature range of the test sample. Since the number of sudden changes in temperature during a given time is greater than the number of occurrences of field conditions, the test is accelerated.

4.3 Purpose of the test and selection of test methods It is recommended to select the