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STANDARD

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(IEC 60068-2-66 : 1994)

(RCJ/JSA)

**Environmental testing—Part 2 :
Test methods—Test Cx :
Damp heat, steady state
(unsaturated pressurized vapour)**

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following from 20 March 2004.

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ICS 19.040; 32.020

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Foreword

This translation has been made based on the original Japanese Industrial Standard established by the Minister of Economy, Trade and Industry through deliberations at the Japanese Industrial Standards Committee according to the proposal of establishing a Japanese Industrial Standard from the Reliability Center for Electronic Components of Japan (RCJ)/ the Japanese Standards Association (JSA), with a draft of Industrial Standard based on the provision of Clause 1, Article 12 of the Industrial Standardization Law.

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In the event of any doubts arising as to the contents,
the original JIS is to be the final authority.

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Environmental testing— Part 2 : Test methods— Test Cx : Damp heat, steady state (unsaturated pressurized vapour)

Introduction This Japanese Industrial Standard has been prepared based on the first edition of **IEC 60068-2-66** *Environmental testing—Part 2 : Test methods—Test Cx : Damp heat, steady state (unsaturated pressurized vapour)* published in 1994 without modifying the technical contents.

1 Scope This Standard provides a standard test procedure for the purpose of evaluating, in an accelerated manner, the resistance of small electrotechnical products, primarily non-hermetically sealed components, to the deteriorative effect of damp heat.

The test is not intended to evaluate external effects, such as corrosion and deformation.

Remarks : The International Standard corresponding to this Standard is as follows.

In addition, symbols which denote the degree of correspondence in the contents between the relevant International Standard and **JIS** are IDT (identical), MOD (modified), and NEQ (not equivalent) according to **ISO/IEC Guide 21**.

IEC 60068-2-66 : 1994 *Environmental testing—Part 2 : Test methods—Test Cx : Damp heat, steady state (unsaturated pressurized vapour)*
(IDT)

2 General description In this test, the specimen is subjected to very high levels of unsaturated damp heat for a relatively short period.

Electrical bias is usually applied.

Due to the very accelerated nature of the test, careful consideration must be given to the choice of test conditions, since this may have an important effect on the type of failure mode which could occur (see annex B).

The test provides three temperatures at a relative humidity of 85 %. The test severity is defined by the duration at one of the temperatures.

Care shall be taken not to reach the maximum rated temperature of the specimen and/or the critical temperature of any encapsulating materials. The glass transition temperature of a plastic is a typical example of a critical transition temperature.

In the case of plastic encapsulated components, degradation results from absorption of water-vapour by the plastic, and penetration of moisture along terminals.

3 Description of test apparatus

3.1 The test chamber The chamber shall be so constructed that:

- a) it can produce the temperature and relative humidity given in table 1, and sustain the pressure values given in clause 4, note 3;
- b) it is capable of providing controlled conditions of temperature, relative humidity and pressure during testing, and the ramp-up to, and ramp-down from, specified test conditions;
- c) the temperature and relative humidity of the chamber can be monitored by means of sensing devices located in the working space, and/or other areas giving the same results (e.g. a steam generator).

NOTE : The direct measurement of relative humidity during this test is not possible with current techniques. Guidance on the determination of the relative humidity in the working space is given in annex C.

- d) the enclosed atmosphere can be expelled from the chamber by the water-vapour prior to the commencement of testing;
- e) condensed water is not allowed to fall on the specimen;
- f) the materials used in the construction shall not cause any corrosion of the specimen, or degradation of the quality of the humidifying water (see clause D.2). The temperature tolerance of $\pm 2^\circ\text{C}$ is intended to take account of absolute errors in the measurement, fluctuations of the chamber temperature at any point, and variations between all points within the working space.

However, in order to maintain the relative humidity within the specified tolerance of $\pm 5\%$, it is necessary to keep the difference between any two points in the working space (at any instant) within narrower limits than $\pm 2^\circ\text{C}$.

The specified humidity tolerance will be exceeded if such temperature differences exceed 1.5°C . It is also necessary to restrict the short-term temperature fluctuations due to cycling of the chamber heater to a similar value.

The specimen should not significantly impede the vapour flow.

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

3.2 The humidifying water Distilled or deionised water shall be used. The water shall have a resistivity of not less than $0.5\text{ M}\Omega\text{cm}$ (nor more than $2\text{ }\mu\text{S/cm}$ in electric conductivity) at 23°C . The pH value shall be between 6.0 and 7.2 at 23°C .

Before the water is placed in the humidifier, all internal parts of the chamber shall be cleaned. Guidance on cleaning is given in clause D.4.

4 Severities One of the combinations of temperature and duration shown in table 1 shall be used unless otherwise specified in the relevant specification. For each temperature, three durations are defined.

Table 1 Severity

Temperature °C ⁽¹⁾	Relative humidity % ⁽²⁾	Duration (in hours) ⁽³⁾		
		I	II	III
110	85	96	192	408
120	85	48	96	192
130	85	24	48	96
NOTES ⁽¹⁾ ± 2 °C in the chamber working space. ⁽²⁾ ± 5 %. ⁽³⁾ 0, +2 h.				

NOTES 1 It is not recommended that a test should be restarted; however, if, at a given temperature it is required to subject the specimen to a longer duration than that given in column III of table 1, then the test shall be recommenced in accordance with the requirements of clause 6. The test shall be recommenced within 96 h of the end of the ramp-down period of the previous test.

During the interval between the tests, the specimen shall be held under standard atmospheric conditions for measurement and tests, unless otherwise specified in the relevant specification.

- 2 The durations given for testing at the specified conditions do not include the additional time required for the ramp-up and ramp-down period and the chamber cleaning and preparation time.
- 3 The vapour pressures are approximately 0.12 MPa, 0.17 MPa and 0.23 MPa at 110 °C, 120 °C and 130 °C respectively.

5 Initial measurements The specimen shall be submitted to the visual, dimensional and functional checks prescribed by the relevant specification.

6 Testing

6.1 With the chamber and specimen at the laboratory conditions of temperature, pressure and humidity, the specimen shall be installed in the working space in the chamber.

6.2 Positioning and mounting of the specimen The specimen shall not be subjected to radiant heat from the heaters or the chamber wall.

If required by the relevant specification, a specific mounting structure shall be used. The heat conductivity and the thermal capacity of the mounting fixtures shall be low so that for all practical purposes the specimen is thermally isolated.

Care shall be exercised in the choice of mounting structure and mounting fixture materials to minimize the effects of contamination and to minimize degradation due to corrosion and other mechanisms (see clause D.2).

6.3 Bias voltage If required by the relevant specification, the specimen shall have a bias voltage applied during exposure. Guidance on the application of bias is given in annex D.