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INTERNATIONAL STANDARD

REDLINE VERSION

Environmental testing -
Part 2-78: Tests - Test Cab: Damp heat, steady state

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IEC Secretariat
3, rue de Varembeé
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**Environmental testing -
Part 2-78: Tests - Test Cab: Damp heat, steady state**

FOREWORD

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This redline version of the official IEC Standard allows the user to identify the changes made to the previous edition IEC 60068-2-78:2012. A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text.

IEC 60068-2-78 has been prepared by technical committee 104: Environmental conditions, classification, and methods of test. It is an International Standard.

This third edition cancels and replaces the second edition published in 2012. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) revision of the requirements for the test chamber;
- b) revision of the severities and including the dew point temperatures;
- c) change of the temperature tolerances of the test to limits;
- d) inclusion of a specified preconditioning procedure;
- e) inclusion of a new figure for clarification purposes;
- f) revision of standardized requirements for the test report.

The text of this International Standard is based on the following documents:

Draft	Report on voting
104/1109/FDIS	104/1126/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

A list of all the parts in the IEC 60068 series, under the general title *Environmental testing*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn, or
- revised.

INTRODUCTION

This part of IEC 60068 provides a test method of high humidity at constant temperature without condensation on the specimen over a ~~prescribed~~ specified period. This test is performed to evaluate the specimen as it is influenced by the absorption and diffusion of moisture and moisture vapour.

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1 ~~Scope and object~~

This part of IEC 60068 establishes a test method for determining the ability of components or equipment to withstand transportation, storage and use under conditions of high humidity.

The object of this document is to investigate the effect of high humidity at constant temperature without condensation on a specimen over a ~~prescribed~~ specified period.

It is applicable to small equipment or components as well as large equipment, and can be applied to both heat-dissipating and non-heat-dissipating specimens.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60068-1:2013, *Environmental testing - Part 1: General and guidance*

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

~~IEC 60068-3-6, *Environmental testing - Part 3-6: Supporting documentation and guidance - Confirmation of the performance of temperature and humidity chambers*~~

~~IEC Guide 104, *The preparation of safety publications and the use of basic safety publications and group safety publications*~~

3 Terms and definitions

~~None.~~

For the purposes of this document, the terms and definitions given in IEC 60068-1 apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- IEC Electropedia: available at <https://www.electropedia.org/>
- ISO Online browsing platform: available at <https://www.iso.org/obp>

4 General test procedure

4.1 General

Test Cab can be applied to both heat-dissipating and non-heat-dissipating specimens.

The temperature and relative humidity limits given in this document are intended to take into account errors in the measurement, slow changes of temperature, and temperature variations of the working space.

NOTE 1 For further information on the working space, see IEC 60068-3-6.

The temperature and relative humidity refer to the control sensor of the test chamber, if not specified otherwise.

The limits stated in this document do not take measurement uncertainty into consideration.

NOTE 2 These limits are valid for an empty test space during stabilized temperature/humidity conditions of the test. In some conditions, where the specimen has a negligible impact on the chamber control, the limits can still be valid for the chamber with specimen(s). For further information on the operation of a test chamber with specimens, see IEC 60068-3-7.

NOTE 3 To maintain the relative humidity within the required limits, it can be necessary to keep the temperature difference between any two points in the working space at any moment within narrower limits.

The dimensions of the test sample shall be such that it is entirely within the working space of the test chamber. The specimen shall not be placed directly on the floor of the test chamber. The position of the specimen shall be specified in the relevant specification.

4.2 Description of test chamber ~~and measuring system~~

~~The temperature and humidity chamber shall be constructed and verified in accordance with specifications IEC 60068-3-6.~~

~~The chamber and measuring system shall be such that~~

~~— sensing devices can be located in the working space to monitor the temperature and humidity,~~

~~NOTE For heat-dissipating specimens, the temperature and humidity near the specimen may be influenced by the effect of heat dissipation from the specimen.~~

~~— condensed water is drained from the chamber and not re-used unless purified,~~

~~— no condensed water from the walls and roof of the test chamber can fall on the specimen(s),~~

~~— water utilized to maintain humidity levels has electrical conductivity of not more than 20 μ S/cm,~~

~~— the specimen under test shall not be subjected to radiant heat from the chamber conditioning devices,~~

~~— injected moisture, when applicable, is injected remotely from the specimen and without being directly on it,~~

~~— the volume of the test chamber is at least five times the total volume of the specimen under test,~~

~~— a mounting device, when used, has minimum influence on the heat and humidity exchanges between specimen and surrounding conditions, unless otherwise specified in the relevant specification.~~

The chamber shall be so constructed that:

- a) it can produce the temperature and relative humidity given in Table 1 for the requested time duration;
- a) the temperature and relative humidity in the working space can be maintained within the limits given in Table 1 and 4.5;
- b) the conditions prevailing at any point in the working space are uniform and are as similar as possible to those prevailing in the immediate vicinity of suitably located temperature- and humidity-sensing devices; the air in the chamber will therefore be continuously stirred at a rate necessary to maintain the specified conditions of temperature and humidity;
- c) the specimen under test is not subjected to radiant heat from the chamber conditioning processes;
- d) the water used for the chamber humidity system complies with the limits given in IEC 60068-2-67;
- e) any water is continuously drained from the chamber and not re-used unless purified;
- f) the materials used in the construction do not cause any significant corrosion of the specimen, or degradation of the quality of the humidifying water;

- g) injected moisture, when applicable, is not directly applied to the specimen but injected remotely from the specimen. Precautions shall be taken that no water droplets can deposit on the specimen as a result of water injection.

Precautions should be taken to ensure that no condensed water from the walls and roof of the test chamber can fall on the specimens. The specimen should not significantly impede the air flow.

Where no specific mounting is specified, the thermal conduction of the mounting shall be low, so that for all practical purposes the specimen is thermally isolated.

4.3 Severity

The test severity is defined by a combination of temperature, relative humidity and total test duration. Temperature and relative humidity severities may be selected from the methods given in Table 1, if not specified otherwise.

Table 1 – Preferred values for the temperature and relative humidity

Temperature °C	Relative humidity % RH
30 ± 2	93 ± 3
30 ± 2	85 ± 3
40 ± 2	93 ± 3
40 ± 2	85 ± 3

Method	Temperature °C	Relative humidity % RH	Dew point temperature °C
I	28 to 32	82 to 88	24,6 to 29,8
II	28 to 32	90 to 96	26,2 to 31,3
III	38 to 42	82 to 88	34,4 to 39,6
IV	38 to 42	90 to 96	36,1 to 41,2

Preferred test durations are 12 h, 16 h, 24 h, 2 days, 4 days, 10 days, 21 days or 56 days.

~~The total temperature tolerance of ± 2 K is intended to take account of absolute errors in the measurement, slow changes of temperature and temperature variations of the working space. However, in order to maintain the RH within the required tolerances, it is necessary to keep the temperature difference between any two points in the working space at any moment within narrower limits. The required humidity conditions will not be achieved if such temperature differences exceed 1 K. It may also be necessary to keep short term fluctuations within ± 0,5 K to maintain the required humidity.~~

NOTE 1 As detailed in IEC 60068-1:2013, Annex A, this test is used to express component climatic category in the third set of digits, which denotes the number of days of the damp heat, steady state test Ca.

NOTE 2 The dew point temperatures given in Table 1 are intended as an aid in order to be able to determine whether condensation can have occurred during the test. If the specimen temperature exceeds the maximum dew point temperature given in Table 1, the risk of condensation on the specimen can be considered minimal.

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