

COMMISSION ÉLECTROTECHNIQUE INTERNATIONALE

(affiliée à l'Organisation Internationale de Normalisation — ISO)

RECOMMANDATION DE LA CEI

INTERNATIONAL ELECTROTECHNICAL COMMISSION

(affiliated to the International Organization for Standardization — ISO)

IEC RECOMMENDATION

Publication 68-2-3

Troisième édition Third edition

1969

Essais fondamentaux climatiques et de robustesse mécanique

Deuxième partie: Essais — Essai Ca: Essai continu de chaleur humide

Basic environmental testing procedures

Part 2: Tests — Test Ca: Damp heat, steady state



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INTERNATIONAL ELECTROTECHNICAL COMMISSION

BASIC ENVIRONMENTAL TESTING PROCEDURES

Part 2: Tests — Test Ca : Damp heat, steady state

FOREWORD

- 1) The formal decisions or agreements of the IEC on technical matters, prepared by Technical Committees on which all the National Committees having a special interest therein are represented, express, as nearly as possible, an international consensus of opinion on the subjects dealt with.
- 2) They have the form of recommendations for international use and they are accepted by the National Committees in that sense.
- 3) In order to promote this international unification, the IEC expresses the wish that all National Committees having as yet no national rules, when preparing such rules, should use the IEC recommendations as the fundamental basis for these rules in so far as national conditions will permit.
- 4) The desirability is recognized of extending international agreement on these matters through an endeavour to harmonize national standardization rules with these recommendations in so far as national conditions will permit. The National Committees pledge their influence towards that end.

PREFACE

This Recommendation has been prepared by Sub-Committee 50B, Climatic Tests, of IEC Technical Committee No. 50, Environmental Testing.

It replaces Test C, Damp Heat (Long Term Exposure), second edition (1960). The only major difference from Test C is the deletion of severity VII: four days plus assisted drying.

A first draft was discussed at the meeting held in London in 1966, as a result of which, a new draft was submitted to the National Committees for approval under the Six Months' Rule in July 1967.

The following countries voted explicitly in favour of publication:

Australia	Korea (Democratic People's Republic of)
Austria	Netherlands
Belgium	Norway
Czechoslovakia	South Africa
Denmark	Sweden
France	Switzerland
Germany	Turkey
Hungary	Union of Soviet Socialist Republics
Israel	United Kingdom
Italy	United States of America
Japan	

This Recommendation should be used in conjunction with IEC Publication 68-1, Basic Environmental Testing Procedures, Part 1: General.

Reference is made to:

IEC Publication 260, Test Enclosures of Non-injection Type for Constant Relative Humidity, and to:

IEC Publication 68-2-28, Basic Environmental Testing Procedures, Part 2: Tests — Guidance for Damp Heat Tests.

BASIC ENVIRONMENTAL TESTING PROCEDURES

Part 2: Tests — Test Ca: Damp heat, steady state

1. Object

To determine the suitability of components, equipment or other articles for use and storage under conditions of high relative humidity.

This test is primarily intended to permit the observation of the effects of high humidity at constant temperature over a prescribed period.

2. Testing chamber

2.1 The chamber shall be so constructed that:

- 1) The temperature and humidity of the chamber are monitored by sensing devices located in the working space.
- 2) The temperature and relative humidity in the working space can be maintained at $40 \pm 2^\circ\text{C}$ and $93 \pm 3\%$ respectively.

Note. — The temperature tolerance of $\pm 2^\circ\text{C}$ is intended to take account of absolute errors in the measurement, slow changes of temperature, and temperature variations of the working space. It is necessary to keep the short term temperature fluctuation within $\pm 0.5^\circ\text{C}$ to maintain the required humidity.

- 3) Condensed water is continuously drained from the chamber and not used again until it has been re-purified.
- 4) When the humidity conditions are obtained by using an injection-type chamber, the water shall have a resistivity not less than $500\ \Omega\text{m}$.

2.2 Precautions shall be taken to ensure that:

- 1) The conditions prevailing throughout the working space are uniform and as similar as possible to those prevailing in the immediate vicinity of the monitoring devices.
- 2) The properties or loading of the specimen under test do not appreciably influence conditions within the chamber.
- 3) No condensed water from the walls and roof of the test chamber can fall on the specimens.

3. Testing procedure

3.1 Initial measurements

The specimen shall be visually inspected and electrically and mechanically checked, as required by the relevant specification.

3.2 Conditioning

3.2.1 The specimen shall be introduced into the chamber in the state specified in the relevant specification. At the time of introducing the specimen into the chamber, care shall be taken to avoid the formation of water droplets on the specimen. This can be done by pre-heating the specimen to the chamber temperature.

3.2.2 The specimen shall be introduced into the chamber and subjected to one of the following severities, as required by the relevant specification:

4 days

10 days

21 days

56 days

Note. — The severity VII (four days plus assisted drying) as laid down in the second edition (1960) of IEC Publication 68-2-3 has been deleted. Assisted drying can be obtained by prescribing an appropriate recovery condition (see Sub-clause 4.4).

3.2.3 The relevant specification may call for loading and/or measurements during, or at the end of, conditioning while the specimen is still in the chamber.

If such measurements are required, the relevant specification shall define the measurements and the period or periods after which they shall be carried out. For these measurements, the specimen shall not be removed from the chamber.

Note. — Measurements preceded by recovery, which would require removal of the specimens from the chamber, are not permissible during the conditioning.

If it is desired to know the performance of the type of specimen before the end of the prescribed duration, one additional lot will be required for each specified duration.

Recovery and final measurements shall be performed separately for each lot.

4. Recovery

4.1 At the end of the conditioning, the specimen shall be subjected to standard atmospheric conditions for recovery for not less than 1 h and not more than 2 h.

4.2 The specimen may be transferred to another chamber for recovery or may remain in the damp heat chamber depending upon the nature of the specimen and/or the capability of the testing laboratory.

In the former case, the change-over time shall be as short as possible and shall not exceed 5 min. In the latter case, the relative humidity shall be reduced to between 73 % and 77 % r.h. in not more than $\frac{1}{2}$ h, after which the temperature shall be adjusted to within ± 1 deg C of the laboratory temperature in not more than $\frac{1}{2}$ h.

4.3 The relevant specification shall state whether any special precautions shall be taken regarding removal of surface moisture.

4.4 If the standard conditions given above are not appropriate for the specimen to be tested, the relevant specification may call for other recovery conditions.

5. Final measurements

The specimen shall be visually inspected and electrically and mechanically checked, as required by the relevant specification.

The measurements shall be commenced immediately after the recovery period and the parameters most sensitive to changes of relative humidity shall be measured first. Unless otherwise specified, the measurement of these parameters shall be completed within 30 min.

6. Information required in the relevant specification

When this test is included in the relevant specification, the following details shall be given as far as they are applicable:

	Clause or sub-clause
a) Preconditioning procedure	—
b) Electrical and mechanical checks to be made prior to the test	3.1
c) State of the specimen as introduced into the chamber	3.2.1
d) Severity: number of days	3.2.2
e) Loading during conditioning	3.2.3
f) Electrical and mechanical checks to be made during conditioning and the period(s) after which they shall be performed	3.2.3
g) Special precautions to be taken regarding removal of surface moisture	4.3
h) Recovery conditions if other than standard	4.4
i) Electrical and mechanical checks to be made at the end of the test, the parameters to be measured first, and the maximum period allowed for the measurement of these parameters	5