



SLOVENSKI STANDARD
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Basic environmental testing procedures - Part 2: Tests - Guidance for damp heat tests

Basic environmental testing procedures -- Part 2: Tests - Guidance for damp heat tests

Grundlegende Umweltprüfverfahren -- Teil 2: Prüfungen - Leitfaden für Prüfungen mit feuchter Wärme

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Essais fondamentaux climatiques et de robustesse mécanique -- Partie 2: Essais - Guide pour les essais de chaleur humide

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CENELEC

Rue Bréderode 2, Bte 5 - 1000 BRUXELLES
 Tél.: (+32.2) 519 68 71 - Telex: 26257 Cenlec b
 Fax: (+32.2) 519 68 19 - Teletex: 206 2210097 CENCEL

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**BASIC ENVIRONMENTAL TESTING PROCEDURES
 PART 2: TESTS
 GUIDANCE FOR DAMP HEAT TESTS**

Essais fondamentaux climatiques
 et de robustesse mécanique
 Deuxième partie: Essais
 Guide pour les essais de chaleur
 humide

Grundlegende
 Umweltprüfverfahren
 Teil 2: Prüfungen
 Leitfaden für Prüfungen mit
 feuchter Wärme

BODY OF THE HD

The Harmonization Document consists of:

- IEC 68-2-28 (1980) ed 2; IEC/SC 508, not appended

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This Harmonization Document was approved by CENELEC on 1988-03-01.

The English and French versions of this Harmonization Document are provided by the text of the IEC publication and the German version is the official translation of the IEC text.

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to publish their new harmonized national standard
 by or before 1989-03-01

to withdraw all conflicting national standards
 by or before -

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CEI
IEC
68-2-28

Troisième édition
Third edition
1990-02

Essais d'environnement

Deuxième partie:

Essais – Guide pour les essais de chaleur humide

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(Environmental testing)

Part 2: SIST HD 323.2.28 S1:2003

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Tests – Guidance for damp heat tests



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CEI/IEC 68-2-28: 1990

Vpřevzato z předchozího vydání, neplatí.

Révision de la présente publication

Le contenu technique des publications de la CEI est constamment revu par la Commission afin d'assurer qu'il reflète bien l'état actuel de la technique.

Les renseignements relatifs à ce travail de révision, à l'établissement des éditions révisées et aux mises à jour peuvent être obtenus auprès des Comités nationaux de la CEI et en consultant les documents ci-dessous :

- Bulletin de la CEI
- Annuaire de la CEI
- Catalogue des publications de la CEI
Publié annuellement

Terminologie

En ce qui concerne la terminologie générale, le lecteur se reportera à la Publication 50 de la CEI: Vocabulaire Electrotechnique International (VEI), qui est établie sous forme de chapitres séparés traitant chacun d'un sujet défini, l'Index général étant publié séparément. Des détails complets sur le VEI peuvent être obtenus sur demande.

Les termes et définitions figurant dans la présente publication ont été soit repris du VEI, soit spécifiquement approuvés aux fins de cette publication.

Revision of this publication

The technical content of IEC publications is kept under constant review by the IEC, thus ensuring that the content reflects current technology.

Information on the work of revision, the issue of revised editions and amendment sheets may be obtained from IEC National Committees and from the following IEC sources:

- IEC Bulletin
- IEC Yearbook
- Catalogue of IEC Publications
Published yearly

Terminology

For general terminology, readers are referred to IEC Publication 50: International Electrotechnical Vocabulary (IEV), which is issued in the form of separate chapters each dealing with a specific field, the General Index being published as a separate booklet. Full details of the IEV will be supplied on request.

The terms and definitions contained in the present publication have either been taken from the IEV or have been specifically approved for the purpose of this publication.

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Symboles graphiques et littéraires

Pour les symboles graphiques, symboles littéraires et signes d'usage général approuvés par la CEI, le lecteur consultera :

- la Publication 27 de la CEI: Symboles littéraires à utiliser en électrotechnique;
- la Publication 617 de la CEI: Symboles graphiques pour schémas.

Les symboles et signes contenus dans la présente publication ont été soit repris des Publications 27 ou 617 de la CEI, soit spécifiquement approuvés aux fins de cette publication.

Publications de la CEI établies par le même Comité d'Etudes

L'attention du lecteur est attirée sur le deuxième feuillet de la couverture, qui énumère les publications de la CEI préparées par le Comité d'Etudes qui a établi la présente publication.

Graphical and letter symbols

For graphical symbols, and letter symbols and signs approved by the IEC for general use, readers are referred to:

- IEC Publication 27: Letter symbols to be used in electrical technology;
- IEC Publication 617: Graphical symbols for diagrams.

The symbols and signs contained in the present publication have either been taken from IEC Publications 27 or 617, or have been specifically approved for the purpose of this publication.

IEC publications prepared by the same Technical Committee

The attention of readers is drawn to the back cover, which lists IEC publications issued by the Technical Committee which has prepared the present publication.

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

ENVIRONMENTAL TESTING

Part 2: Tests - Guidance for damp heat tests

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 international unification, the IEC expresses the wish that all National Committees should adopt the text of the IEC recommendation for their national rules in so far as national conditions will permit. Any divergence between the IEC recommendation and the corresponding national rules should, as far as possible, be clearly indicated in the latter.

PREFACE

This standard has been prepared by Sub-Committee 50B: Climatic tests, of IEC Technical Committee No. 50: Environmental testing.

This third edition of IEC Publication 68-2-28 replaces the second edition, issued in 1980.

The text of this standard is based on the following documents:

Six Months' Rule	Report on Voting
50B(C0)271	50B(C0)273

Full information on the voting for the approval of this standard can be found in the Voting Report indicated in the above table.

The following IEC publications are quoted in this standard:

- Publications Nos. 68-2-3 (1969): Basic environmental testing procedures, Part 2: Tests - Test Ca: Damp heat, steady state.
- 68-2-30 (1980): Test Db and guidance: Damp heat, cyclic (12 + 12-hour cycle).
- 68-2-38 (1974): Test Z/AD: Composite temperature/humidity cyclic test.
- 68-2-56 (1988): Environmental testing, Part 2: Tests - Test Cb: Damp heat, steady state, primarily for equipment
- 260 (1968): Test enclosures of non-injection type for constant relative humidity.
- 355 (1971): An appraisal of the problems of accelerated testing for atmospheric corrosion.
- 721-2-1 (1982): Classification of environmental conditions, Part 2: Environmental conditions appearing in nature. Temperature and humidity.
- 721-3 (1984): Part 3: Classification of groups of environmental parameters and their severities.

ENVIRONMENTAL TESTING

Part 2: Tests - Guidance for damp heat tests

1. Scope and object

This guide includes the necessary information for those experts who, when preparing a relevant specification (e.g. standards for components or equipment), have to select the appropriate tests and test severities for a particular product and possibly a given kind of application.

The object of damp heat tests is to determine the ability of electro-technical products to withstand the stresses occurring in a climate of high relative humidity, with or without condensation, with special regard to variations of electrical and mechanical characteristics. Damp heat tests may also be applied to check the resistance of a specimen to some forms of corrosion attack (see Sub-clause 8.3).

This guide should be used together with the following parts of IEC Publication 68 which contain damp heat tests i.e.:

- STANDARD PREVIEW**
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- 68-2-3: Test Ca: Damp heat, steady state.
- 68-2-56: Test Cb: Damp heat, steady state, primarily for equipment.
- 68-2-30: Test Db and guidance: Damp heat, cyclic (12 + 12-hour cycle).
- 68-2-38: Test Z/AD: Composite temperature/humidity cyclic test.

2. Environmental influence of damp heat

Temperature and relative humidity of the air, in varying combinations, are climatic factors which always act upon a product during storage, transport and operation.

Meteorological measurements made over many years have shown that a relative humidity above or equal to 95% combined with a temperature above 30 °C does not occur in free air conditions over long periods, except in regions with extreme climates (e.g. Persian Gulf). For a classification of climates and climatic data, see IEC Publication 721-2-1. In dwelling-rooms and workshops, temperatures above 30 °C may occur, but are in most cases combined with a lower relative humidity than in the open air. Climatic data for various environments for different applications are given in the series of IEC Publication 721-3.

Special conditions exist in certain wet rooms in the chemical industry, metallurgical plants, mines, electroplating plants, laundries, etc., where the temperature can reach as much as 45 °C combined with a relative humidity of 100% over long periods.

However, it is possible that certain equipment placed under particular conditions may be subjected to relative humidities of more than 95% at higher temperatures. In particular, this may happen when the equipment is placed in unventilated enclosures such as vehicles, tents, or aircraft cockpits. In these circumstances the intense heating through solar radiation can be combined with a high relative humidity because of moisture released from hygroscopic materials, the breathing and perspiration of people, open vessels containing water, or other sources of moisture.

In rooms having several heat sources, temperatures and relative humidities may differ in different parts of the room.

Atmospheric pollution, which is found to a large extent in a number of places, can intensify the effects of a damp climate on products. Attention is drawn to this fact because of its general importance although pollutants are not contained in the atmospheres used for damp heat testing. If the effects of pollutants are to be investigated, a suitable test, for example corrosive atmospheres or mould growth, should be used.

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3. Definitions <https://standards.iteh.ai/catalog/standards/sist/b4cbcd4e-256b-4c66-b799-3ca8876f4ffc/sist-hd-323-2-28-s1-2003>

For the purpose of this publication, the following definitions apply.

a) *Condensation*

The precipitation of water vapour on a surface when the surface temperature is lower than the dew-point temperature of the ambient air. The water is thereby transformed from the vapour to the liquid state of aggregation.

b) *Adsorption*

The adherence of water vapour molecules to a surface when the surface temperature is higher than the dew-point temperature.

c) *Absorption*

The accumulation of water molecules within a material.

d) *Diffusion*

The transportation of water molecules through a material produced by a partial pressure difference.

Note.- Diffusion results in a balance of partial pressures whilst flow (such as through leaks, when the dimensions of such leaks are great enough to provide viscous or laminar flow) always finally results in the balance of the total pressures.

e) *Breathing*

Exchange of air between a hollow space and its surroundings, produced by a change of temperature which results in a change of internal pressure. This phenomenon can produce an accumulation of water in the hollow space.

f) *Flow*

The transportation of water molecules through a leak due to a pressure difference.

4. Procedures for the production of humidity

4.1 *General*

There are a great number of humidity test chambers available, equipped with different systems of generation of humidity and of humidity control.

In the following sub-clauses, only the principal methods of generation of humidity are mentioned.

4.2 *Water spraying*

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De-ionized water is atomized to very fine particles.

The aerosol produced in this way moistens the air stream before it enters into the working space of the chamber the greater part of the droplets evaporating on the way. Direct water injection into the working space should be avoided.

This simple system gives rapid humidification and needs little maintenance. However, when using direct injection, small amounts of aerosol may remain in the working space; rapid changes of humidity may be difficult to control (overshoot).

4.3 *Injection of water vapour*

Hot water vapour is blown into the working space of the chamber.

This simple system gives rapid humidification and it is easy to control the quantity of vapour (steam valve). Condensation on cooler parts of the chamber may occur. The heat input may necessitate additional cooling with possible de-humidification effects.