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INTERNATIONAL STANDARD



**Environmental testing –
Part 3-4: Supporting documentation and guidance – Damp heat tests**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

ENVIRONMENTAL TESTING –

Part 3-4: Supporting documentation and guidance – Damp heat tests

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with can participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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IEC 60068-3-4 has been prepared by IEC technical committee 104: Environmental conditions, classification and methods of test. It is an International Standard.

This second edition cancels and replaces the first edition published in 2001. This edition constitutes a technical revision.

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

- a) the requirements for distilled and deionized water have been revised;
- b) recommendations for the cleaning procedure of test chambers have been included;
- c) humidification systems (ultrasonic humidifiers and atomizers) have been added;
- d) the description of water penetration mechanisms has been refined.

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

Draft	Report on voting
104/985/FDIS	104/1001/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.

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INTRODUCTION

Temperature and relative humidity (RH) of the air, in varying combinations, are climatic factors which act upon a product during storage, transportation and operation.

Meteorological measurements made over many years have shown that a relative humidity > 95 % combined with a temperature > 30 °C does not occur in free-air conditions over long periods, except in regions with extreme climates. In dwelling rooms and workshops temperatures of > 30 °C ~~may~~ can occur but in most cases are combined with a lower relative humidity than in the open air.

Special conditions exist in certain wet rooms, for example in the chemical industry, metallurgical plants, mines, electroplating plants and laundries, where the temperature can reach 45 °C combined with a relative humidity up to saturation over long periods.

Certain equipment placed under particular conditions ~~may~~ can be subjected to a relative humidity of more than 95 % at higher temperatures. This ~~may~~ can happen when the equipment is placed in enclosures, such as vehicles, tents or aircraft cockpits, since this can result in intense heating through solar radiation while, because of inadequate ventilation, any humidity that ~~may~~ can be developed will be retained permanently within the interior.

In rooms having several heat sources, temperatures and relative humidity ~~may~~ can vary in different parts of the room.

To take these climatic factors over the lifetime of the product into account, environmental testing includes the practice of accelerated testing (see Clause 6).

Atmospheric pollution 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, for example corrosion and mould growth, are to be investigated, a suitable test from the IEC 60068-2 series should be used.

ENVIRONMENTAL TESTING –

Part 3-4: Supporting documentation and guidance – Damp heat tests

1 Scope

This part of IEC 60068 provides the necessary information and the basic principles of the effect of humidity in the context of environmental testing to assist in preparing relevant specifications, such as standards for components or equipment, ~~in order to select appropriate tests and test severities for specific products and, in some cases, specific types of application.~~ Furthermore, information is provided on operating climatic test chambers.

The object of this document is to present supporting documentation and guidance for a range of damp heat tests which, when specified by the relevant specification, can be applied to demonstrate the performance of equipment for which damp heat testing is required with the main aim of achieving qualification. This information and basic principles are intended to help selecting appropriate tests and test severities for specific products and, in some cases, specific types of application.

The object of damp heat tests is to determine the ability of products to withstand the stresses occurring in a high relative humidity environment, with or without condensation, and with special regard to variations of electrical and mechanical characteristics. Damp heat tests ~~may~~ can also be utilized to check the resistance of a specimen to some forms of corrosion attack.

2 Normative references

There are no normative references in this document.

INTERNATIONAL STANDARD

NORME INTERNATIONALE

**Environmental testing –
Part 3-4: Supporting documentation and guidance – Damp heat tests**

**Essais d'environnement –
Partie 3-4: Documentation d'accompagnement et recommandations – Essais de
chaleur humide**

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COMMISSION ÉLECTROTECHNIQUE INTERNATIONALE

ESSAIS D'ENVIRONNEMENT –

Partie 3-4: Documentation d'accompagnement et recommandations – Essais de chaleur humide

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L'IEC 60068-3-4 a été établie par le comité d'études 104 de l'IEC: Conditions, classification et essais d'environnement. Il s'agit d'une Norme internationale.

Cette deuxième édition annule et remplace la première édition parue en 2001. Cette édition constitue une révision technique.

Cette édition inclut les modifications techniques majeures suivantes par rapport à l'édition précédente:

- a) les exigences relatives à l'eau distillée et à l'eau déionisée ont été révisées;
- b) des recommandations concernant la procédure de nettoyage des chambres d'essai ont été introduites;
- c) des systèmes d'humidification (humidificateurs à ultrasons et atomiseurs) ont été ajoutés;

d) la description des mécanismes de pénétration d'eau a été affinée.

Le texte de cette Norme internationale est issu des documents suivants:

Projet	Rapport de vote
104/985/FDIS	104/1001/RVD

Le rapport de vote indiqué dans le tableau ci-dessus donne toute information sur le vote ayant abouti à l'approbation de cette norme.

La langue employée pour l'élaboration de cette Norme internationale est l'anglais.

Le présent document a été rédigé selon les Directives ISO/IEC, Partie 2, il a été développé selon les Directives ISO/IEC, Partie 1 et les Directives ISO/IEC, Supplément IEC, disponibles sous www.iec.ch/members_experts/refdocs. Les principaux types de documents développés par l'IEC sont décrits plus en détail sous www.iec.ch/publications.

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INTRODUCTION

La température et l'humidité relative (HR) de l'air, combinées de façon variable, constituent des facteurs climatiques qui agissent sur un produit pendant son stockage, son transport et son fonctionnement.

Des mesurages météorologiques effectués sur plusieurs années ont montré qu'une humidité relative supérieure à 95 % associée à une température supérieure à 30 °C ne se présente pas en conditions d'air libre durant de longues périodes, sauf dans des régions de climats extrêmes. Dans les locaux d'habitation et les ateliers, les températures peuvent dépasser 30 °C, mais celles-ci sont dans la plupart des cas corrélées à une humidité relative inférieure à celle rencontrée à l'air libre.

Des conditions particulières existent par exemple dans certaines salles humides de l'industrie chimique, dans les installations pour la métallurgie, les mines, les locaux d'électrolyse et les blanchisseries où la température peut atteindre 45 °C, associée à une humidité relative allant jusqu'à la saturation, pendant de longues périodes.

Il peut cependant arriver que certains matériels placés dans des conditions particulières soient soumis à une humidité relative supérieure à 95 % avec des températures plus élevées. Cela peut se produire lorsque le matériel est placé dans des enceintes comme des véhicules, des tentes ou des carlingues d'avion. Ces conditions peuvent conduire à un échauffement intense provoqué par les rayonnements solaires alors que, en raison d'une ventilation inadaptée, de l'humidité pouvant se développer est maintenue en permanence à l'intérieur.

Dans des locaux comportant plusieurs sources de chaleur, les températures et l'humidité relative des différentes parties du local peuvent varier d'un point à l'autre.

Pour évaluer l'influence de ces facteurs climatiques sur la durée de vie du produit, les essais d'environnement incluent la réalisation d'essais accélérés (voir l'Article 6).

La pollution atmosphérique peut accentuer les effets d'un climat humide sur les produits. L'attention est attirée sur ce point, en raison de son importance générale, même si aucun agent polluant n'est présent dans les atmosphères utilisées pour les essais de chaleur humide. Si l'influence des agents polluants (corrosion et moisissures, par exemple) doit être évaluée, il convient d'utiliser un essai approprié issu de l'IEC 60068-2.

ESSAIS D'ENVIRONNEMENT –

Partie 3-4: Documentation d'accompagnement et recommandations – Essais de chaleur humide

1 Domaine d'application

La présente partie de l'IEC 60068 contient les informations nécessaires et les principes de base concernant les effets de l'humidité dans le contexte des essais d'environnement pour fournir un appui à l'élaboration des spécifications pertinentes (normes pour les composants ou les matériels, par exemple). Des informations relatives au fonctionnement des chambres climatiques d'essai sont également données.

L'objet du présent document est de fournir une documentation d'accompagnement et des recommandations pour une variété d'essais de chaleur humide qui, lorsque cela est indiqué dans la spécification pertinente, peuvent être utilisés pour démontrer les performances de matériels pour lesquels des essais de chaleur humide sont exigés principalement à des fins de qualification. Ces informations et principes de base permettent de choisir les essais appropriés et les sévérités d'essai associées pour des produits spécifiques et, dans certains cas, pour des types d'applications spécifiques.

L'objet des essais de chaleur humide est de déterminer l'aptitude des produits à supporter les contraintes d'un environnement à forte humidité relative, avec ou sans condensation, et plus particulièrement d'étudier les variations de leurs caractéristiques électriques et mécaniques. Les essais de chaleur humide peuvent aussi être appliqués en vue de vérifier la résistance d'un spécimen à certains types d'attaques par corrosion.

2 Références normatives

Le présent document ne contient aucune référence normative.