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Interested committees:

Title: BS EN IEC 60068-3-11 Environmental testing

Part 3-11: Supporting documentation and guidance - Calculation of uncertainty of conditions in climatic test chambers

Please notify the secretary if you are aware of any keywords that might assist in classifying or identifying the standard or if the content of this standard

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## Introduction

This draft standard is based on national and international discussions. Your comments on this draft are invited and will assist in the preparation of the consequent standard.

For international standards, comments will be reviewed by the relevant UK national committee before sending the consensus UK vote and comments to the international committee, which will then decide appropriate action. If the international standard is approved, it is usual for the text to be published as a British Standard.

For national standards, comments will be reviewed by the relevant UK national committee and the resulting standards published as a British Standard.

## UK Vote

Please indicate whether you consider the UK should submit a negative (with supporting technical reasons) or positive vote on this draft. Please indicate if you are aware of any reason why this draft standard should not be published as a British Standard.

## Submission of Comments

- **Annotated drafts are not acceptable and will be rejected.**
- All comments should be submitted online at <https://standardsdevelopment.bsigroup.com/>. You will need to register in order to comment.

## Template for comments and secretariat observations

|                  |                        |
|------------------|------------------------|
| Date: xx/xx/20xx | Document: ISO/DIS xxxx |
|------------------|------------------------|

| 1  | 2                                          | (3)                          | 4               | 5                                                                                                                                  | (6)                                                                      | 7                                                  |
|----|--------------------------------------------|------------------------------|-----------------|------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|----------------------------------------------------|
| MB | Clause No./ Subclause No./Annex (e.g. 3.1) | Paragraph/Figure/ Table/Note | Type of comment | Commend (justification for change) by the MB                                                                                       | Proposed change by the MB                                                | Secretariat observations on each comment submitted |
|    | 3.1                                        | Definition 1                 | ed              | Definition is ambiguous and needs clarifying.                                                                                      | Amend to read '...so that the mains connector to which no connection...' |                                                    |
|    | 6.4                                        | Paragraph 2                  | te              | The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK. | Delete reference to UV photometer.                                       |                                                    |



# 104/999/CD

COMMITTEE DRAFT (CD)

PROJECT NUMBER:

**IEC 60068-3-11 ED2**

DATE OF CIRCULATION:

**2023-05-19**

CLOSING DATE FOR COMMENTS:

**2023-08-11**

SUPERSEDES DOCUMENTS:

**104/990/RR**

IEC TC 104 : ENVIRONMENTAL CONDITIONS, CLASSIFICATION AND METHODS OF TEST

SECRETARIAT:

Sweden

SECRETARY:

Mr Henrik Lagerström

OF INTEREST TO THE FOLLOWING COMMITTEES:

PROPOSED HORIZONTAL STANDARD:



Other TC/SCs are requested to indicate their interest, if any, in this CD to the secretary.

FUNCTIONS CONCERNED:

☐ EMC

☐ ENVIRONMENT

☒ QUALITY ASSURANCE

☐ SAFETY

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Recipients of this document are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

Recipients of this document are invited to submit, with their comments, notification of any local regulations or technical reasons that may exist and should be considered should this proposal proceed, recognizing that failure to address such requirements could result in the need for new or existing "In Some Countries" clauses. (SEE [AC/22/2007](#) OR [NEW GUIDANCE DOC](#)).

TITLE:

**Environmental testing - Part 3-11: Supporting documentation and guidance - Calculation of uncertainty of conditions in climatic test chambers**

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

## ENVIRONMENTAL TESTING

**Part 3-11: Supporting Documentation and Guidance – Verification of The Temperature and Humidity Conditions Within Climatic Chambers**

## FOREWORD

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International Standard IEC 60068-3-11 has been prepared by IEC technical committee 104: Environmental conditions, classification, and methods of test.

This edition has clarified the purpose of the document, revised the layout and content of the previous edition, and corrected a number of minor errors. As this document is intended as a guidance document, this edition has also removed a number of misplaced normative statements. The revision has incorporated the content of IEC 60068-3-7, which is no longer necessary, as well as including relevant guidance from IEC 60068-3-5 (which now incorporates IEC 60068-3-6).

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

| FDIS | Report on voting |
|------|------------------|
| xxx  | xxx              |

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts in the IEC 60068 series, published 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 "<http://webstore.iec.ch>" in the data related to the specific document. At this date, the document will be

109 reconfirmed,  
110 withdrawn,  
111 replaced by a revised edition, or  
112 amended.

**IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.**

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## INTRODUCTION

This document provides methodologies intended to establish variations and uncertainties of the climatic conditions which may occur within environmental climatic test chambers. The information derived using these methodologies is intended to be used to substantiate, in a uniform and reproducible manner, whether the climatic test specification requirements have been met.

Additionally, this document provides guidance and examples on the determination of uncertainties arising in the measurement of temperature and humidity within climatic chambers. The analysis of these uncertainties exploits information derived from the measurement procedures also set out within this document.

The methodologies presented in this document also provide information to allow the selection of a suitable chamber for a specific combination of test procedure and specimens. The methodologies can also be used to verify the performance of climatic chambers following installation, modification, or maintenance.

## ENVIRONMENTAL TESTING –

### Part 3-11: Supporting Documentation and Guidance – Verification of The Temperature and Humidity Conditions Within Climatic Chambers

#### 1.1 1 Scope

This document provides methodologies intended to establish variations and uncertainties of the climatic conditions within environmental test chambers. The information derived using these methodologies is intended to be used to substantiate, in a uniform and reproducible manner, whether the climatic test specification requirements have been met.

Additionally, this document provides guidance and examples on the determination of uncertainties arising in the measurement of temperature and humidity within climatic chambers. The analysis of these uncertainties exploits information derived from the measurement procedures also set out within this document.

The methodologies also provide information to allow the selection of a suitable chamber for a specific combination of test procedure and specimens. The methodologies can also be used to verify the performance of climatic chambers following installation, modification, or maintenance.

This document is applicable to temperature chambers as well as temperature/humidity chambers. The methodologies are intended to be used with an empty climatic test chamber, a chamber containing a test load, or a chamber contain a test specimen undergoing testing. Guidance is provided on which of these options is applicable in different circumstances.

#### 1.2 2 Normative References

There are no normative references in this document.

#### 1.3 3 Terms and Definitions

For the purposes of this document, the terms and definitions defined in IEC 60068-3-5 [1] apply. Where for convenience of the reader, a definition from that source is included here, the derivation is indicated along with any departure from those definitions.

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

- IEC Electropedia: available at <http://www.electropedia.org/>
  - ISO Online browsing platform: available at <http://www.iso.org/obp>
- The additional terms and definitions that follow are also applicable.

#### 1.4 4 Background

##### 1.4.1 4.1 General

When a test specimen is to be temperature or temperature/humidity conditioned, it is essential to know, after a test has been completed, whether the test specification requirements have been met and to understand any deficiencies that may have occurred. Prior to the test it is important to understand whether a chamber will be capable of both achieving and maintaining the required conditions within the specified tolerances. The methodologies set out in this document are intended to provide the information necessary to verify the conditions achieved as well as allowing the selection of a suitable chamber for different specimen types.

There are fundamentally three options available to establish the variations in conditions which exist within a chamber. These are using an empty climatic test chamber, a chamber containing a test load, or a chamber contain a test specimen undergoing testing. Each of these options has distinct advantages and disadvantages in different circumstances. The selection of the most appropriate approach from amongst these options is largely influenced by the characteristics of the specimen to be tested. Guidance on the selection of a suitable option for different specimen types is provided within Clause 5.

Provided within this document is guidance and methodologies for establishing a measure of the variations, from the required condition, that occur within temperature and temperature/humidity chambers. Parameters which may be used to quantify variations in temperature and humidity, occurring within a climatic chamber, are described in Clause 6 and the methodologies for their derivation from measured data are set out in Clause 9. Guidance on measurement systems which

may be used to quantify the conditions is provided in Clause 7. If the chamber is required to contain a test load or a specimen additional guidance on these aspects is given in Clause 8.

In order to verify whether the required test conditions have been achieved, the uncertainties in the chamber climatic measurements need to be considered. In this regard tolerances are not the same as uncertainties. Tolerances are the acceptable limits which are chosen for a particular combination of test procedure and materiel. Most often the main purpose of understanding the uncertainty is to decide whether a tolerance has been, or is capable of been, met. In deciding this the deviation from the required condition, together with the uncertainty, needs to be established. Guidance as well as a process and examples to determine the uncertainties of measured temperature and humidity conditions is provided in Clauses 11 to 15.

#### 1.4.2 4.2 Variations of Temperature and Humidity Within a Chamber

Temperature differences occur from place to place within the volume of a climatic chamber and those differences also vary over time. This is the case even for an empty chamber and when the air within a climatic chamber is thoroughly stirred. The level and distribution of these differences will be modified when a non-heat dissipating test load is introduced into the chamber. The extent of the changes will depend on the size of the test load compared to the chamber space. The level and distribution of the temperature differences are further liable to change if the test load is heat-dissipating or is modifying the airflow within the chamber. The temperature differences may also be influenced by chamber operating conditions (heating or cooling) and operating temperature.

Similar variations also exist within humidity chambers. However, it is generally assumed that the water vapour content, within a climatic chamber, is uniform throughout the volume. Practical evidence has confirmed that this is normally the case. As dew point is directly related to water vapour content, a single direct measurement of dew point can be considered as a measure of the water vapour content at any temperature. However, this does not mean that the relative humidity is constant throughout the chamber. This is because, the temperature variations, discussed above, will produce differences in relative humidity. Most environmental tests specify and tolerance humidity conditions in terms of relative humidity. This is because this humidity parameter directly influences the degradation of organic material, physical geometric changes in plastics and wood, biological activity, electrical impedance as well as corrosion rates.

#### 1.4.3 4.3 Working Space

To achieve the most advantageous performance, climatic test chambers have an internal working space, which is smaller than the physical internal volume of the chamber. This working space is illustrated in Figure 1 and is that portion of the volume of the chamber in which the specified conditions can be maintained within the specified tolerances.

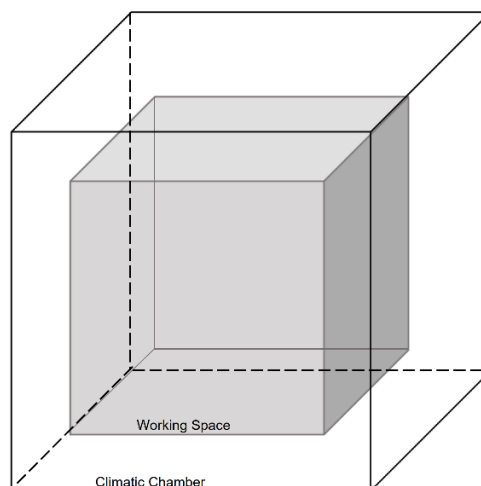


Figure 1 - Working space

The dimensions of the working space will set the maximum size of non-heat dissipating specimen that can be tested within the chamber, as no part of the specimen should be located outside the working space, for the purpose of testing. In practice, it may not always be possible to utilise the full working space of an empty chamber. This is because a specimen which fills the working space may modify the normal airflow in the chamber, so that even within the working space it may not be possible to achieve the required conditions within the specified tolerances. Heat-dissipating specimens and