



Edition 2.0 2018-01

# **REDLINE VERSION**



Environmental testing – Part 3-5: Supporting documentation and guidance – Confirmation of the performance of temperature chambers

INTERNATIONAL ELECTROTECHNICAL COMMISSION

ICS 19.040

ISBN 978-2-8322-5318-2

Warning! Make sure that you obtained this publication from an authorized distributor.

## CONTENTS

FOREW	/ORD	3
INTROE	DUCTION	5
1 Sco	ope	6
2 No	rmative references	6
3 Terms and definitions		
4 Me	asuring chamber performances	9
4.1	Test area environment	9
4.2	Temperature measurement system	9
4.3	Temperature chamber test <del>-loads</del> specimens	9
4.4	Installation Specified location of temperature sensors in working space	9
4.5	Determination of temperature performance Measurement method	11
4.5	6.1 General	11
4.5	6.2 Achieved temperature	11
4.5	5.3 Temperature stabilization	11
4.5	5.4 I emperature fluctuation	12
4.5	5.5 L'emperature gradient	13
4.5	5.6 Temperature variation in space	14 11
4.5	Standard temperature sequence	14
Eva	luation criteria	
5 Info	ormation to be given in the performance test report	
Bibliogr	anhy	17
Distiogr	apriy	
Figure 1	1 – Working space	7
Figure 2	2 – Example of temperature differences	8
Figure 3	3 – Location of <del>air temperature</del> sensors for temperature chambers up to 2 000 I	10
Figure 4	4 – Location of minimal additional <del>air temperature</del> sensors for temperature	
chambe	ers over 2 000 I	10
Figure 5	5 – Example of achieved temperature	11
Figure 6	6 – Example of temperature stabilization for chambers up to 2 000 I	12
Figure 7	7 – Example of temperature fluctuation	12
Figure 8	B – Example of temperature gradient for chambers up to 2 000 I	13
Figure §	9 – Example of temperature gradient for chambers <2 000 L	14
Figure 1	10 – Example of temperature rate of change for heating and cooling of a test	
chambe	μ	15
I		
Table 1	- Practical dimensions	8

### INTERNATIONAL ELECTROTECHNICAL COMMISSION

#### **ENVIRONMENTAL TESTING –**

## Part 3-5: Supporting documentation and guidance – Confirmation of the performance of temperature chambers

#### 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 may 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.
- The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

#### DISCLAIMER

This Redline version is not an official IEC Standard and is intended only to provide the user with an indication of what changes have been made to the previous version. Only the current version of the standard is to be considered the official document.

This Redline version provides you with a quick and easy way to compare all the changes between this standard and its previous edition. A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text.

International Standard IEC 60068-3-5 has been prepared by IEC technical committee 104: Environmental conditions, classification and methods of test.

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) Confirmation procedures are clarified.

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

FDIS	Report on voting
104/759/FDIS	104/778/RVD

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

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- 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 publication using a colour printer.

#### INTRODUCTION

IEC 60068 (all parts) contains fundamental information on environmental testing procedures and severities.

The expression "environmental conditioning" or "environmental testing" covers the natural and artificial environments to which components or equipment may be exposed so that an assessment can be made of their performance under conditions of use, transport and storage to which they may be exposed in practice.

Temperature chambers used for "environmental conditioning" or "environmental testing" are not described in any publication, although the method of maintaining and measuring temperature and/or humidity has a great influence on test results. The physical characteristics of temperature chambers can also influence test results.

## **ENVIRONMENTAL TESTING –**

## Part 3-5: Supporting documentation and guidance – Confirmation of the performance of temperature chambers

#### 1 Scope

This part of IEC 60068 provides a uniform and reproducible method of confirming that temperature test chambers, without load specimens, conform to the requirements specified in climatic test procedures of IEC 60068-2 (all parts) and other standards. This document is intended for users when conducting regular chamber performance monitoring.

#### 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, Environmental testing – Part 1: General and guidance

IEC 60068-2 (all parts), Environmental testing – Part 2: Tests

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

IEC 60068-3-7, Environmental testing – Part 3-7: Supporting documentation and guidance – Measurements in temperature chambers for tests A and B (with load)

IEC 60068-3-11, Environmental testing – Part 3-11: Supporting documentation and guidance – Calculation of uncertainty of conditions in climatic test chambers

IEC 60584-1, Thermocouples - Part 1: Reference tables

IEC 60751, Industrial platinum resistance thermometer sensors

ISO 10012-1, Quality assurance requirements for measuring equipment – Part 1: Metrological confirmation system for measuring equipment

ISO 10012-2, Quality assurance for measuring equipment – Part 2: Guidelines for control of measurement processes





Edition 2.0 2018-01

# INTERNATIONAL STANDARD

Environmental testing – Part 3-5: Supporting documentation and guidance – Confirmation of the performance of temperature chambers



## CONTENTS

FOREWORD	3
INTRODUCTION	5
1 Scope	6
2 Normative references	6
3 Terms and definitions	6
4 Measuring chamber performances	8
4.1 Test area environment	8
4.2 Temperature measurement system	8
4.3 Temperature chamber test specimens	8
4.4 Specified location of temperature sensors in working space	9
4.5 Measurement method	
4.5.1 General	10
4.5.2 Achieved temperature	10
4.5.3 Temperature stabilization	10
4.5.4 Temperature fluctuation	11
4.5.5 Temperature gradient	12
4.5.6 Temperature variation in space	12
4.5.7 Temperature rate of change	13
4.6 Standard temperature sequence	
5 Information to be given in the performance test report	14
Bibliography	16
Figure 1 – Working space	7
Figure 2 – Example of temperature differences	8
Figure 3 – Location sensors for temperature chambers up to 2 000 I	9
Figure 4 – Location of minimal additional sensors for temperature chambers	
over 2 000 I	9
Figure 5 – Example of achieved temperature	10
Figure 6 – Example of temperature stabilization for chambers up to 2 000 I	11
Figure 7 – Example of temperature fluctuation	11
Figure 8 – Example of temperature gradient for chambers up to 2 000 I	12
Figure 9 – Example of temperature gradient for chambers <2 000 L	
Figure 10 – Example of temperature rate of change	14
Table 1 – Practical dimensions	7

#### INTERNATIONAL ELECTROTECHNICAL COMMISSION

## **ENVIRONMENTAL TESTING –**

## Part 3-5: Supporting documentation and guidance – Confirmation of the performance of temperature chambers

#### 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 may 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.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 60068-3-5 has been prepared by IEC technical committee 104: Environmental conditions, classification and methods of test.

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) Confirmation procedures are clarified.