BRITISH STANDARD

BS EN
60068-3-7:2002
IEC
60068-3-7:2001

Environmental testing —

Part 3-7: Supporting documentation and guidance — Measurements in temperature chambers for tests A and B (with load)

The European Standard EN 60068-3-7:2002 has the status of a British Standard

ICS 19.040; 29.020

National foreword

This British Standard is the official English language version of EN 60068-3-7:2002. It is identical with IEC 60068-3-7:2001.

The UK participation in its preparation was entrusted to Technical Committee GEL/104, Environmental conditions, classification and testing, which has the responsibility to:

— aid enquirers to understand the text;

— present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;

— monitor related international and European developments and promulgate them in the UK.

A list of organizations represented on this committee can be obtained on request to its secretary.

From 1 January 1997, all IEC publications have the number 60000 added to the old number. For instance, IEC 27-1 has been renumbered as IEC 60027-1. For a period of time during the change over from one numbering system to the other, publications may contain identifiers from both systems.

Cross-references

The British Standards which implement these international or European publications referred to in this document may be found in the BSI Standards Catalogue under the section entitled "International Standards Correspondence Index", or by using the "Find" facility of the BSI Standards Electronic Catalogue.

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This British Standard, having been prepared under the direction of the Electrotechnical Sector Policy and Strategy Committee, was published under the authority of the Standards Policy and Strategy Committee on 19 February 2002

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EUROPEAN STANDARD

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EN 60068-3-7

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English version

Environmental testing
Part 3-7: Supporting documentation and guidance – Measurements in temperature chambers for tests A and B (with load) (IEC 60068-3-7:2001)

Essais d'environnement
Partie 3-7: Documentation d'accompagnement et guide – Mesures dans les chambres d'essai en température pour les essais A et B (avec charge)
(CEI 60068-3-7:2001)

Umweltprüfungen
Teil 3-7: Unterstützende Dokumentation und Leitfaden – Messungen in Temperaturprüfkammern für die Prüfungen A und B (mit Prüfgut)
(IEC 60068-3-7:2001)

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Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

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European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Ref. No. EN 60068-3-7:2002 E

Foreword

The text of document 104/211/FDIS, future edition 1 of IEC 60068-3-7, prepared by IEC TC 104, Environmental conditions, classification and methods of test, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 60068-3-7 on 2001-12-04.

The following dates were fixed:

– latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2002-09-01

– latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2004-12-01

This European Standard should be read in conjunction with EN 60068-3-5 and EN 60068-3-6.

Annexes designated "normative" are part of the body of the standard.
In this standard, annex ZA is normative.
Annex ZA has been added by CENELEC.

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Endorsement notice

The text of the International Standard IEC 60068-3-7:2001 was approved by CENELEC as a European Standard without any modification.

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CONTENTS

INTRODUCTION

IEC 60068 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 great influence on test results. The physical characteristics of temperature chambers can also influence test results.

ENVIRONMENTAL TESTING –

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

1 Scope

This part of IEC 60068 provides a uniform and reproducible method of confirming that temperature test chambers conform to the requirements specified in climatic test procedures of IEC 60068-2-1 and IEC 60068-2-2, when loaded with either heat-dissipating or non heat-dissipating specimens under conditions which take into account air circulation inside the working space of the chamber. This standard is destined primarily for users when conducting regular chamber performance monitoring.

2 Normative references

The following referenced documents are indispensable for the application 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 60068-2-1, *Environmental testing – Part 2: Tests – Test A: Cold*

IEC 60068-2-2, *Basic environmental testing procedures – Part 2: Tests. Test B: Dry heat*

IEC 60068-3-1, *Basic environmental testing procedures – Part 3: Background information – Section one: Cold and dry heat tests*

IEC 60068-3-5, *Environmental testing – Part 3-5: Supporting documentation and guidance – Confirmation of the performance of temperature chambers*

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

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

IEC 60751, *Industrial platinum resistance thermometer sensors*

3 Definitions

For the purpose of this part of IEC 60068, the following definitions apply.

3.1
test specification
procedure applied to test chambers with or without forced air circulation; suitable for a wide range of chamber sizes

NOTE A summary of test conditions in IEC 60068-2-1 and IEC 60068-2-2 is given in the following table:

Table 1 – Test conditions

Temperature range	Test	Heat-dissipating		Change of temperature	
		None	With	Sudden	Gradual
–65 °C to +5 °C	Aa	❍		❍	
	Ab	❍			❍
	Ad		❍		❍
+30 °C to +400 °C	Ba	❍		❍	
	Bb	❍			❍
	Bc		❍	❍	
	Bd		❍		❍

3.2
confirmation method (procedure 1)
specified method of making continuous measurements in order to establish whether the performance of a test chamber conforms with the requirements detailed in IEC 60068-2-1, test A and/or IEC 60068-2-2, test B

3.3
routine monitoring method (procedure 2)
specified method of making measurements, continuously or at intervals, to ensure that the test chamber performance is being maintained

3.4
test load
test specimen that is installed in the test chamber for the confirmation measurements

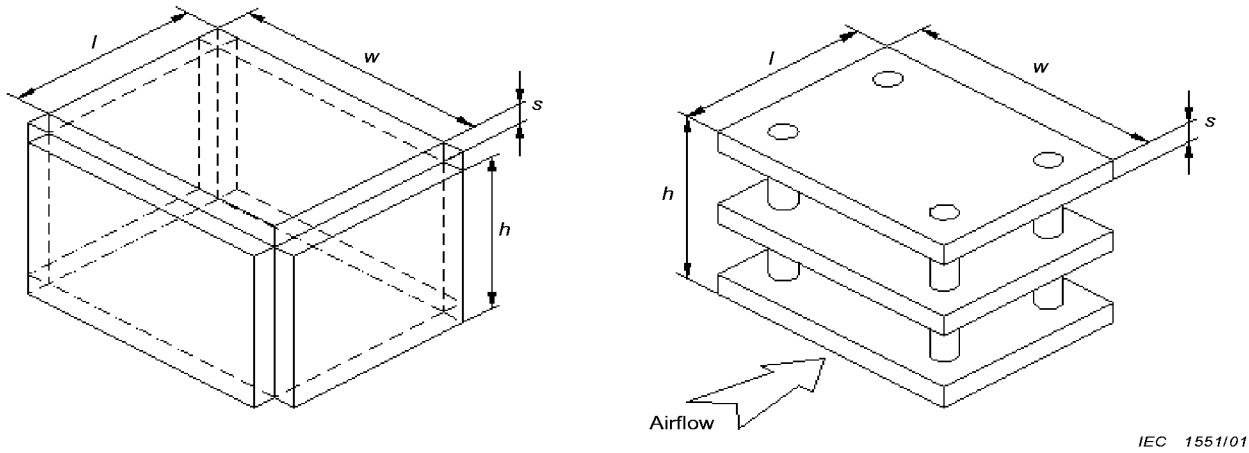
NOTE The test load is defined by geometric dimensions and by thermal properties.

3.5
artificial load
test load made in accordance with this standard with dimensions and thermal properties related to the geometric dimensions and thermal capacity of the specimens intended to be tested in the chamber

NOTE Table 2 provides values for an artificial load.

Table 2 – Artificial load - Values

Dimensions	Volume approximately 20 % of working space
Heat transmission	Approximately 10 kJ/m^{2}K
Heat radiation emissivity	>0,7
Heat dissipation	In accordance with appendix C of IEC 60068-2-2



NOTE s = 3 mm stainless steel or 4 mm aluminium (h, l and w should be smaller than the relevant dimensions of the working space).

Figure 1 – Examples of artificial loads

4 Measuring system

The system used for the confirmation and routine monitoring measurements, either built-in or independent of the chamber, should comply with the following requirements.

4.1 Temperature

Platinum resistance thermometers (in accordance with IEC 60751) or thermocouples (in accordance with IEC 60584-1) should be used.

4.1.1 Temperature sensor

In a temperature range from –200 °C to +200 °C the sensor measurement uncertainty should be in accordance with class A of IEC 60751.

4.2 Humidity

Required for confirmation of IEC 60068-2-2 tests only.

Place the sensor independent of humidity as near as practical to the centre of the working space.

Types of humidity monitoring sensors are described in 4.3 of IEC 60068-3-6.

4.2.1 Humidity sensor

Sensor measurement uncertainty should not exceed ±3 % RH.

4.3 Wall emissivity

Emissivity of the chamber enclosure should be in accordance with table IV of appendix J of IEC 60068-3-1.

4.4 Air velocity

An airflow sensor should be installed such that the maximum air velocity impinging on the load can be monitored.

4.4.1 Air velocity sensor

The air velocity sensor measurement uncertainty should be compatible with IEC 60068-2 tolerances.

4.4.2 Air velocity sensor response time

The air velocity sensor response time should be greater than 5 s to avoid any influence on it by airflow fluctuation.

4.5 Recording device

For confirmation monitoring, data should be recorded at least once a minute. For routine monitoring, data should be recorded every 5 min. The device utilized for recording data from the chamber monitoring sensors should be independent of the chamber control system.

5 Determination of temperature performances

5.1 Test area environment

In accordance with 4.1 of IEC 60068-3-5.

5.2 Chamber loading

Provision is made for measurement of test chamber performance with different loading conditions.

Test loads:	heat-dissipating
	non heat-dissipating
Artificial loads:	heat-dissipating
	non heat-dissipating

NOTE However, when testing large, high heat dissipating specimens, it may be desirable to allow the specimen to develop thermal gradients by using 'free air' chambers or those with a low airflow (typically less that 1 m/s). In such cases the chamber may not have a uniform temperature within the working space and it is necessary to monitor the temperatures of the air entering and exiting the specimen.

5.2.1 Location of test load

The test load should always be located in the enclosure so that it is entirely within the working space.

For heat dissipating multiple loads, heating effects should be minimized in accordance with the following subclauses of IEC 60068-2-2:

no forced air circulation 29.1.1.2 and 40.1.1.2,

forced air circulation 29.1.2.2 and 40.1.2.2.

5.3 Installation of temperature sensors

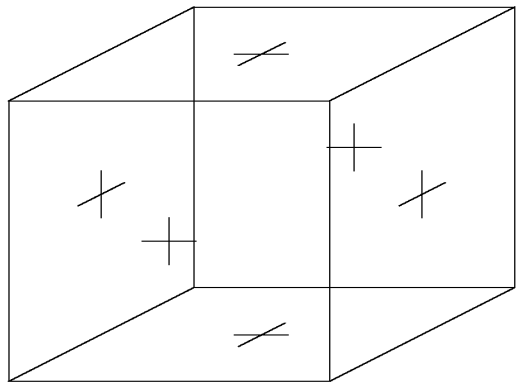
The temperature sensors should be protected from heating and cooling sources and from direct heat radiation. In addition, the wall and load sensors should be protected from convection heat transfer from the surrounding air by suitable insulation.

5.3.1 Position of temperature sensors

In accordance with IEC 60068-3-5.

5.3.2 Position of wall sensors

When chamber walls are directly heated and/or cooled, additional sensors located in accordance with figure 2 are necessary.



IEC 1552/01

Figure 2 – Location of wall sensors

5.3.3 Position of load sensors

Test load temperature sensors should be positioned on representative points of the load to indicate that temperature stability is reached.

6 Test procedures

6.1 Confirmation methods

Tests should be conducted at temperatures and with loads which are representative of the intended use of the chamber.

6.1.1 Test without load

In accordance with IEC 60068-3-5.

6.1.2 Test with load

- Install and operate the test load.
- Repeat test sequence as in 6.1.1 above.

6.2 Routine monitoring methods

Routine monitoring should be conducted at regular intervals for control purposes. Additional monitoring should be conducted whenever the chamber undergoes repair/maintenance to the heating/cooling system, the air circulating system or to the chamber control system. Sensors used for routine monitoring should be selected from locations identified in 4.4 of IEC 60068-3-5.

Monitor the temperature at the selected points at 5 min intervals.

Routine monitoring is used to determine that the chamber is working within its tolerances for a given test load. However the temperature tolerance on a single monitoring point will be different from that given for confirmation monitoring, i.e. ±1,5 K (cold test) and ±1,0 K (heat test).

7 Evaluation criteria

The performance of the temperature test chamber is confirmed if all results are within the specification limits of the appropriate IEC 60068-2 series of standards.

8 Information to be given in the performance report

- Atmospheric conditions in the test area.
- Size and volume of chamber enclosure and working space.
- Temperature fluctuation and temperature gradient at each temperature stage of clause 5 of IEC 60068-3-5.
- Temperature rate of change, heating and cooling.
- Temperature extremes.
- Any deviations such as overshoot.
- Details of test load.
- Details of data acquisition system.
- Air flow speed.
- Evaluation of measurement uncertainties.

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Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

Publication	Year	Title	EN/HD	Year
IEC 60068-2-1	- [1)]	Environmental testing Part 2: Tests - Tests A: Cold	EN 60068-2-1	1993 [2)]
IEC 60068-2-2	- [1)]	Part 2: Tests - Test B: Dry heat	HD 323.2.2 S1	1988 [2)]
IEC 60068-3-1	- [1)]	Part 3: Background information -- Section 1: Cold and dry heat tests	EN 60068-3-1	1999 [2)]
IEC 60068-3-5	- [1)]	Part 3-5: Supporting documentation and guidance - Confirmation of the performance of temperature chambers	EN 60068-3-5	2002 [2)]
IEC 60068-3-6	- [1)]	Part 3-6: Supporting documentation and guidance - Confirmation of the performance of temperature/humidity chambers	EN 60068-3-6	2002 [2)]
IEC 60584-1	- [1)]	Thermocouples Part 1: Reference tables	EN 60584-1	1995 [2)]
IEC 60751	- [1)]	Industrial platinum resistance thermometer sensors	EN 60751	1995 [2)]

1) Undated reference.

2) Valid edition at date of issue.

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IEC
60068-3-7:2001

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