

**Environmental testing - Part 3-1: Supporting  
documentation and guidance - Cold and dry heat tests**

This document is a preview generated by EVS

## EESTI STANDARDI EESSÕNA

## NATIONAL FOREWORD

See Eesti standard EVS-EN 60068-3-1:2011 sisaldab Euroopa standardi EN 60068-3-1:2011 ingliskeelset teksti.	This Estonian standard EVS-EN 60068-3-1:2011 consists of the English text of the European standard EN 60068-3-1:2011.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas.	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation.
Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 18.11.2011.	Date of Availability of the European standard is 18.11.2011.
Standard on kättesaadav Eesti Standardikeskusest.	The standard is available from the Estonian Centre for Standardisation.

Tagasisidet standardi sisu kohta on võimalik edastada, kasutades EVS-i veebilehel asuvat tagasiside vormi või saates e-kirja meiliaadressile [standardiosakond@evs.ee](mailto:standardiosakond@evs.ee).

ICS 19.040

Võtmesõnad: electronic equ, electrotechnical products, environment, environmental testing, guide books, heat, materials testing, products, specimens, stress, suitability, temperature, test atmospheres, test chamber, testing, testing devices, thermal-cycling tests,

### Standardite reprodutseerimise ja levitamise õigus kuulub Eesti Standardikeskusele

Andmete paljundamine, taastekitamine, kopeerimine, salvestamine elektroonsesse süsteemi või edastamine ükskõik millises vormis või millisel teel ilma Eesti Standardikeskuse kirjaliku loata on keelatud.

Kui Teil on küsimusi standardite autorikaitse kohta, võtke palun ühendust Eesti Standardikeskusega:  
Aru 10, 10317 Tallinn, Eesti; [www.evs.ee](http://www.evs.ee); telefon 605 5050; e-post [info@evs.ee](mailto:info@evs.ee)

### The right to reproduce and distribute standards belongs to the Estonian Centre for Standardisation

No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying, without a written permission from the Estonian Centre for Standardisation.

If you have any questions about copyright, please contact Estonian Centre for Standardisation:  
Aru 10, 10317 Tallinn, Estonia; [www.evs.ee](http://www.evs.ee); phone 605 5050; e-mail [info@evs.ee](mailto:info@evs.ee)

English version

**Environmental testing -  
Part 3-1: Supporting documentation and guidance -  
Cold and dry heat tests  
(IEC 60068-3-1:2011)**

Essais d'environnement -  
Partie 3-1: Documentation  
d'accompagnement et guide -  
Essais de froid et de chaleur sèche  
(CEI 60068-3-1:2011)

Umgebungseinflüsse -  
Teil 3-1: Unterstützende Dokumentation  
und Leitfaden -  
Prüfverfahren Kälte und trockene Wärme  
(IEC 60068-3-1:2011)

This European Standard was approved by CENELEC on 2011-09-23. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

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

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

**CENELEC**

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

**Management Centre: Avenue Marnix 17, B - 1000 Brussels**

## Foreword

The text of document 104/555/FDIS, future edition 2 of IEC 60068-3-1, prepared by IEC TC 104, "Environmental conditions, classification and methods of test", was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 60068-3-1:2011.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2012-06-23
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2014-09-23

This document supersedes EN 60068-3-1:1999.

The main changes with regard to EN 60068-3-1:1999 are as follows:

- removal of guidance regarding thermal characteristics of chamber walls;
- revision of sections that address environmental chambers that do not use movement of air for temperature control.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC [and/or CEN] shall not be held responsible for identifying any or all such patent rights.

## Endorsement notice

The text of the International Standard IEC 60068-3-1:2011 was approved by CENELEC as a European Standard without any modification.

**Annex ZA**  
(normative)

**Normative references to international publications  
with their corresponding European publications**

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.

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

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60068-1	-	Environmental testing - Part 1: General and guidance	EN 60068-1	-
IEC 60068-2-1	-	Environmental testing - Part 2-1: Tests - Test A: Cold	EN 60068-2-1	-
IEC 60068-2-2	-	Environmental testing - Part 2-2: Tests - Test B: Dry heat	EN 60068-2-2	-

## CONTENTS

FOREWORD.....	3
1 Scope.....	5
2 Normative references .....	5
3 Terms and definitions .....	5
4 Selection of test procedures .....	5
4.1 General background .....	5
4.1.1 General .....	5
4.1.2 Ambient temperature .....	6
4.1.3 Specimen temperatures .....	6
4.1.4 Specimens without heat dissipation .....	6
4.1.5 Specimens with heat dissipation .....	6
4.2 Mechanisms of heat transfer .....	6
4.2.1 Convection .....	6
4.2.2 Radiation .....	9
4.2.3 Thermal conduction .....	10
4.2.4 Forced air circulation .....	10
4.3 Test chambers .....	10
4.3.1 General .....	10
4.3.2 Methods of achieving the required conditions in the test chamber.....	11
4.4 Measurements.....	11
4.4.1 Temperature.....	11
4.4.2 Air velocity .....	11
Annex A (informative) Effect of airflow on chamber conditions and on surface temperatures of test specimens .....	12
Figure 1 – Experimental data on the effect of airflow on surface temperature of a wire- wound resistor – Radial airflow .....	7
Figure 2 – Experimental data on the effect of airflow on surface temperature of a wire- wound resistor – Axial airflow .....	8
Figure 3 – Temperature distribution on a cylinder with homogeneous heat generation in airflow of velocities 0,5, 1 and 2 m·s <sup>-1</sup> .....	9
Table 1 – Influence parameters when testing heat-dissipating specimens.....	11

## ENVIRONMENTAL TESTING –

### Part 3-1: Supporting documentation and guidance – Cold and dry heat tests

#### 1 Scope

This part of IEC 60068 provides guidance regarding the performance of cold and dry heat tests.

#### 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 60068-1, *Environmental testing – Part 1: General and guidance*

IEC 60068-2-1, *Environmental testing – Part 2-1: Tests – Test A: Cold*

IEC 60068-2-2, *Environmental testing – Part 2-2: Tests – Test B: Dry heat*

#### 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

##### 3.1

##### **heat-dissipating specimen**

specimen on which the hottest point on its surface, measured in free-air conditions and under the air pressure as specified in IEC 60068-1, is more than 5 K above the ambient temperature of the surrounding atmosphere after thermal stability has been reached

##### 3.2

##### **non heat-dissipating specimen**

specimen that does not produce heat to a level that can affect the air temperature surrounding the specimen or those specimens located nearby

##### 3.3

##### **free-air conditions**

conditions within an infinite space where the movement of the air is affected only by the heat-dissipating specimen

#### 4 Selection of test procedures

##### 4.1 General background

##### 4.1.1 General

Specimen performance may be influenced or limited by the temperatures in which the specimen is operated. The level of influence may be affected by test gradients that exist within the test system (climatic or environmental chamber) and internal temperatures within