SLOVENSKI STANDARD
oSIST prEN IEC 60068-3-1:2022

01-september-2022

Okoljsko preskušanje - 3-1. del: Podporna dokumentacija in navodila - Preskus z mrazom in suho vročino

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

Essais d'environnement - Partie 3-1: Documentation d'accompagnement et recommandations - Essais de froid et de chaleur sèche

Ta slovenski standard je istoveten z: **prEN IEC 60068-3-1:2022**

ICS:

19.040	Preskušanje v zvezi z okoljem	Environmental testing

oSIST prEN IEC 60068-3-1:2022 **en**

104/932/CDV

COMMITTEE DRAFT FOR VOTE (CDV)

PROJECT NUMBER: **IEC 60068-3-1 ED3**	
DATE OF CIRCULATION: **2022-06-24**	CLOSING DATE FOR VOTING: **2022-09-16**
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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 CDV to the secretary.
FUNCTIONS CONCERNED: ☐ EMC ☐ ENVIRONMENT	☐ QUALITY ASSURANCE ☐ SAFETY
☒ SUBMITTED FOR CENELEC PARALLEL VOTING **Attention IEC-CENELEC parallel voting** The attention of IEC National Committees, members of CENELEC, is drawn to the fact that this Committee Draft for Vote (CDV) is submitted for parallel voting. The CENELEC members are invited to vote through the CENELEC online voting system.	☐ NOT SUBMITTED FOR CENELEC PARALLEL VOTING

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TITLE:

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

PROPOSED STABILITY DATE: 2027

NOTE FROM TC/SC OFFICERS:

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

ENVIRONMENTAL TESTING –

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

FOREWORD

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International Standard IEC 60068-3-1 has been prepared by IEC technical committee 104: Environmental conditions, classification and methods of test.

This fourth edition cancels and replaces the third edition, published in 2011, and constitutes a technical revision.

The main changes with regard to the previous edition are as follows:

– changes to some of the wording and editorial corrections made for clarification.

88 The text of this standard is based on the following documents:

FDIS	Report on voting
104/555/FDIS	104/558/RVD

89
90 Full information on the voting for the approval of this standard can be found in the report on
91 voting indicated in the above table.

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

93 A list of all parts in the IEC 60068 series, under the general title *Environmental testing* can be
94 found on the IEC website.

95 The committee has decided that the contents of this publication will remain unchanged until the
96 stability date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to
97 the specific publication. At this date, the publication will be

98 • reconfirmed,
99 • withdrawn,
100 • replaced by a revised edition, or
101 • amended.
102
103
104

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*

IEC 60068-2-14, *Environmental testing – Part 2-14: Tests – Test N: Change of temperature*

3 Terms and 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

For the purpose of this part of IEC 60068, the following 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 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 less than 5 K above the ambient temperature of the surrounding atmosphere after thermal stability has been reached.

3.3
free-air conditions
conditions within an infinite space where the movement of the air is affected only by the heat-dissipating specimen.

These conditions can apply to the laboratory environment, the conditions during the measurement should be stated in the test report (if not specified otherwise).

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 the specimen itself. In order to determine the level of influence that exists and to ensure that the specimen is designed appropriately, cold and/or dry heat tests are performed.

4.1.2 Ambient temperature

The maximum and minimum values of the ambient temperature where the specimen will be subjected to should be known. Preferred values for testing purposes are provided in IEC 60068-2-1 and/or IEC 60068-2-2.

Difficulties can arise due to the fact that heat transfer causes temperature variations in the area surrounding the specimen. Consequently, the effect from the transfer of heat to the ambient temperature of the surrounding atmosphere should be considered. Air flow related to spacing between specimens should also be considered when performing a test.

4.1.3 Specimen temperatures

The performance of the specimen can be affected by its own temperature in the case of heat-dissipating specimens. Because of this, when controlling the test environment, it may be necessary to measure the temperature of the specimen under test at different locations, both internally and externally.

The change of temperature at a point on the surface of a specimen follows approximately an exponential law. Inside large specimens, temperature equalization may be reached with significant delay.

In case of doubt, how the temperature change is reflected by the specimen, the monitoring of the temperature of the specimens at a representative point (or points) is recommended.

NOTE For further information on the influence of test temperatures on specimen IEC 60068-2-14 might be helpful.

4.1.4 Specimens without heat dissipation

If the ambient temperature is uniform and constant and there is no generation of heat within the specimen, heat will flow from the ambient atmosphere into the specimen if the ambient atmosphere is at a higher temperature. Conversely, heat will flow from the specimen into the ambient atmosphere if the specimen is at a higher temperature. This heat transfer will continue until the specimen has completely reached thermal equilibrium with the surrounding atmosphere. From that moment on, the heat transfer ceases and will not start again unless the ambient temperature changes.

4.1.5 Specimens with heat dissipation

If heat is generated within the specimen the temperature of the specimen will rise to a stabilization point above the ambient temperature. It follows that if a steady temperature is reached, heat will flow continuously from the specimen by convection, radiation, and/or conduction into the atmosphere whereby the specimen is cooled.

If more than one specimen is subjected to a dry heat test in the same chamber, it is necessary to ensure that all specimens are in the same ambient temperature and have identical mounting conditions. It might become necessary to differentiate between testing of single specimens and multiple specimens when the cold test is being performed.

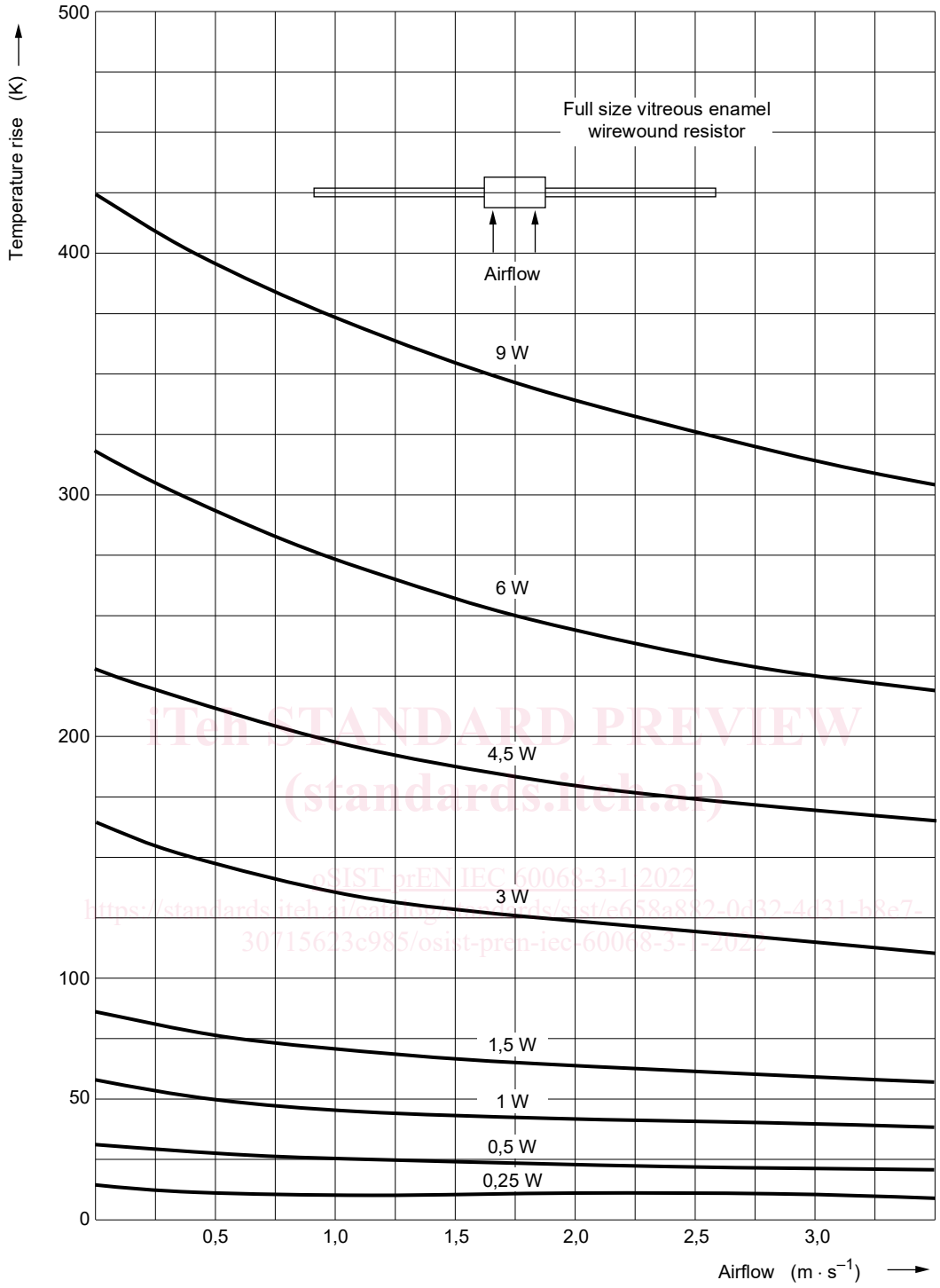
NOTE If more than one specimen is tested in the same test chamber, a uniform incoming airflow could be disturbed.

4.2 Mechanisms of heat transfer

4.2.1 Convection

Heat transfer through convection is an important factor when testing heat-dissipating specimens. The coefficient of heat transfer from the surface of the test specimen to the ambient air is affected by the velocity and density of the surrounding air. The greater the air velocity, the more efficient the heat transfer is. Therefore, the higher the air velocity, the lower the surface temperature of the test specimen will be with the same temperature of the ambient air. This effect is illustrated in Figures 1 and 2.

Air density also has a significant influence to heat transfer. Cold air is denser than warm air. Therefore, hot air causes a lower heat transfer than cold air.



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204 **Figure 1 – Experimental data on the effect of airflow on surface temperature**
205 **of a wire-wound resistor – Radial airflow**