Environmental testing -- Part 2-64: Tests - Test Fh: Vibration, broadband random and guidance

EESTI STANDARDIKESKUS
ESTONIAN CENTRE FOR STANDARDISATION

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

See Eesti standard EVS-EN 60068-2-64:2008 +A1:2019 sisaldab Euroopa standardi EN 60068-2-64:2008 ingliskeelset teksti ja selle muudatuse A1:2019 ingliskeelset teksti.	This Estonian standard EVS-EN 60068-2-64 :2008+A1:2019 consists of the English text of the European standard EN 60068-2-64:2008 and its amendment A1:2019.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas. Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 12.09.2008, muudatus A1 29.11.2019.	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation. Date of Availability of the European standard is 12.09.2008, for A1 29.11.2019.
Sellesse standardisse on muudatus A1 sisse viidud ja tehtud muudatused tähistatud topeltpüstkriipsuga lehe välisveerisel. Selles standardis on rahvusvahelise standardi ühismuudatused tähistatud püstkriipsuga teksti välimisel veerisel. Standard on kättesaadav Eesti Standardi-keskusest.	The amendment A1 has been incorporated into this standard and changes have been marked by a double vertical line on the outer row of the page. Common modifications has been incorporated into this international standard and changes have been marked by a vertical line on the outer row of the page. 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.

ICS 19.040

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 60068-2-64 + A1

September 2008, November 2019

ICS 19.040

Supersedes EN 60068-2-64:1994

English Version

Environmental testing - Part 2-64: Tests - Test Fh: Vibration, broadband random and guidance (IEC 60068-2-64:2008 + IEC 60068-2-64:2008/A1:2019)

Essais d'environnement - Partie 2-64: Essais - Essai Fh: Vibrations aléatoires à large bande et guide
(CEI 60068-2-64:2008 + IEC 60068-2-64:2008/A1:2019)

Umgebungseinflüsse - Teil 2-64: Prüfverfahren - Prüfung Fh: Schwingen, Breitbandrauschen (digital geregelt) und Leitfaden
(IEC 60068-2-64:2008 + IEC 60068-2-64:2008/A1:2019)

This European Standard was approved by CENELEC on 2008-07-01. The amendment A1 was approved by CENELEC on 2019-11-13. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this amendment 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 and its amendment 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, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

Ref. No. EN 60068-2-64:2008 E + EN 60068-2-64:2008/A1:2019 E

Foreword

The text of document 104/456/FDIS, future edition 2 of IEC 60068-2-64, 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 60068-2-64 on 2008-07-01.

This European Standard supersedes EN 60068-2-64:1994.

The major changes with regard to EN 60068-2-64:1994 concern the removal of Method 1 and Method 2, replaced by a single method, and replacement of Annex A with suggested test spectra and removal of Annex C.

Also included in this revision is the testing of soft packed specimens.

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) 2009-04-01

– latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2011-07-01

Annex ZA has been added by CENELEC.

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Endorsement notice

The text of the International Standard IEC 60068-2-64:2008 was approved by CENELEC as a European Standard without any modification.

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Amendment 1 European foreword

The text of document 104/848/FDIS, future IEC 60068-2-64/A1, 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 60068-2-64:2008/A1:2019.

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)	2020-08-13
• latest date by which the national standards conflicting with the document have to be withdrawn	(dow)	2022-11-13

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

Endorsement notice

The text of the International Standard IEC 60068-2-64:2008/A1:2019 was approved by CENELEC as a European Standard without any modification.

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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ENVIRONMENTAL TESTING –

Part 2-64: Tests – Test Fh: Vibration, broadband random and guidance

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.
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International Standard IEC 60068-2-64 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 1993, and constitutes a technical revision.

The major changes with regard to the previous edition concern the removal of Method 1 and Method 2, replaced by a single method, and replacement of Annex A with suggested test spectra and removal of Annex C.

Also included in this revision is the testing of soft packed specimens.

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

FDIS	Report on voting
104/456/FDIS	104/459/RVD

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

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

It has the status of a basic safety publication in accordance with IEC Guide 104.

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

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

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

AMENDMENT 1 FOREWORD

This amendment has been prepared by IEC technical committee 104: Environmental conditions, classification and methods of test.

The text of this amendment is based on the following documents:

FDIS	Report on voting
104/848/FDIS	104/855/RVD

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

The committee has decided that the contents of this amendment and the base publication will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication 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 document using a colour printer.

INTRODUCTION

This part of IEC 60068 deals with broadband random vibration testing intended for general application to components, equipment and other products, hereinafter referred to as ”specimens”, that may be subjected to vibrations of a stochastic nature. The methods and techniques in this standard are based on digital control of random vibration. It permits the introduction of variations to suit individual cases if these are prescribed by the relevant specification.

Compared with most other tests, test Fh is not based on deterministic but on statistical techniques. Broad-band random vibration testing is therefore described in terms of probability and statistical averages.

It is emphasized that random testing always demands a certain degree of engineering judgement, and both supplier and purchaser should be fully aware of this fact. The writer of the relevant specification is expected to select the testing procedure and the values of severity appropriate to the specimen and its use.

The test method is based primarily on the use of an electrodynamic or a servo-hydraulic vibration generator with an associated computer based control system used as a vibration testing system.

The traditional general purpose broad-band random vibration test utilizes waveforms with a Gaussian distribution of amplitudes. However, when so specified, this test procedure can also be utilized with random vibration tests with a non-Gaussian distribution of amplitudes. Such tests are sometimes alternatively known as high kurtosis tests.

Annexes A and B are informative annexes giving examples of test spectra for different environmental conditions, a list of details to be considered for inclusion in specifications and guidance.

Annex C is an informative annex giving information on non-Gaussian distribution/high kurtosis tests.

ENVIRONMENTAL TESTING –

Part 2-64: Tests-Test Fh: Vibration, broadband random and guidance

1 Scope

This part of IEC 60068 demonstrates the adequacy of specimens to resist dynamic loads without unacceptable degradation of its functional and/or structural integrity when subjected to the specified random vibration test requirements.

Broadband random vibration may be used to identify accumulated stress effects and the resulting mechanical weakness and degradation in the specified performance. This information, in conjunction with the relevant specification, may be used to assess the acceptability of specimens.

This standard is applicable to specimens which may be subjected to vibration of a stochastic nature resulting from transportation or operational environments, for example in aircraft, space vehicles and land vehicles. It is primarily intended for unpackaged specimens, and for items in their transportation container when the latter may be considered as part of the specimen itself. However, if the item is packaged, then the item itself is referred to as a product and the item and its packaging together are referred to as a test specimen. This standard may be used in conjunction with IEC 60068-2-47:2005, for testing packaged products.

If the specimens are subjected to vibration of a combination of random and deterministic nature resulting from transportation or real life environments, for example in aircraft, space vehicles and for items in their transportation container, testing with pure random may not be sufficient. See IEC 60068-3-8:2003 for estimating the dynamic vibration environment of the specimen and based on that, selecting the appropriate test method.

Although primarily intended for electrotechnical specimens, this standard is not restricted to them and may be used in other fields where desired (see Annex A).

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 60050-300: *International Electrotechnical Vocabulary – Electrical and electronic measurements and measuring instruments – Part 311: General terms relating to measurements – Part 312: General terms relating to electrical measurements – Part 313: Types of electrical measuring instruments – Part 314: Specific terms according to the type of instrument*

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

IEC 60068-2-6: *Environmental testing – Part 2-6: Tests – Test Fc: Vibration (sinusoidal)*

IEC 60068-2-47:2005, *Environmental testing – Part 2-47: Tests – Mounting of specimens for vibration, impact and similar dynamic tests*

IEC 60068-3-8:2003, *Environmental testing – Part 3-8: Supporting documentation and guidance – Selecting amongst vibration tests*

IEC 60068-5-2: *Environmental testing – Part 5-2: Guide to drafting of test methods – Terms and definitions*

IEC 60721-3 (all parts), *Classification of environmental conditions – Part 3: Classification of groups of environmental parameters and their severities*

IEC Guide 104, *The preparation of safety publications and the use of basic safety publications and group safety publications*

ISO 2041: *Vibration and shock – Vocabulary*

3 Terms and definitions

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

NOTE The terms used are generally defined in IEC 60050-300, IEC 60068-1, IEC 60068-2-6, and IEC 60068-5-2 and ISO 2041. If a definition from one of those sources is included here, the derivation is indicated and departures from the definitions in those sources are also indicated.

3.1
cross-axis motion
motion not in the direction of the stimulus; generally specified in the two axes orthogonal to the direction of the stimulus

NOTE The cross-axis motion should be measured close to the fixing points.

3.2
actual motion
motion represented by the wideband signal returned from the reference point transducer

3.3
fixing point
part of the specimen in contact with the fixture or vibration table at a point where the specimen is normally fastened in service

NOTE If a part of the real mounting structure is used as the fixture, the fixing points are taken as those of the mounting structure and not of the specimen.

3.4
control methods

3.4.1
single point control
control method using the signal from the transducer at the reference point in order to maintain this point at the specified vibration level

3.4.2
multipoint control
control method using the signals from each of the transducers at the checkpoints

NOTE The signals are either continuously averaged arithmetically or processed by using comparison techniques, depending upon the relevant specification. See also 3.13.

3.5
g_n
standard acceleration due to the earth's gravity, which itself varies with altitude and geographical latitude

NOTE For the purposes of this standard, the value of g_n is rounded up to the nearest whole number, that is 10 m/s^2.