

CONSOLIDATED VERSION

VERSION CONSOLIDÉE



Environmental testing –

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

Essais d'environnement –

Partie 2-64: Essais – Essai Fh: Vibrations aléatoires à large bande et guide



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

**Essais d'environnement –
Partie 2-64: Essais – Essai Fh: Vibrations aléatoires à large bande et guide**

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Environmental testing –

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

Essais d'environnement –

Partie 2-64: Essais – Essai Fh: Vibrations aléatoires à large bande et guide

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

ENVIRONMENTAL TESTING –

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

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This Consolidated version of IEC 60068-2-64 bears the edition number 2.1. It consists of the second edition (2008-04) [documents 104/456/FDIS and 104/459/RVD] and its amendment 1 (2019-10) [documents 104/848/FDIS and 104/855/RVD]. The technical content is identical to the base edition and its amendment.

In this Redline version, a vertical line in the margin shows where the technical content is modified by amendment 1. Additions are in green text, deletions are in strikethrough red text. A separate Final version with all changes accepted is available in this publication.

International Standard IEC 60068-2-64 has been prepared by IEC technical committee 104: Environmental conditions, classification and methods of test.

This second edition 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.

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 the base publication and its amendment will remain unchanged until the stability 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

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- amended.

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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