

INTERNATIONAL STANDARD

NORME INTERNATIONALE

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

**Essais d'environnement –
Partie 2-6: Essais – Essai Fc: Vibrations (sinusoïdales)**





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INTERNATIONAL ELECTROTECHNICAL COMMISSION

ENVIRONMENTAL TESTING –

Part 2: Tests – Test Fc: Vibration (sinusoidal)

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International Standard IEC 60068-2-6 has been prepared by IEC technical committee 104: Environmental conditions, classification and methods of test.

This seventh edition cancels and replaces the sixth edition, published in 1995. It constitutes a technical revision.

The major changes with regard to the previous edition concern:

- The agreed wording from IEC technical committee 104 meeting held in Stockholm:2000 on the testing of soft packages.
- Reference to the latest version of IEC 60068-2-47:Mounting
- Simplification of the layout of the standard by replacing some tables with text.
- Addition of the test report requirements (see Clause 13).

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

| FDIS | Report on voting |
|--------------|------------------|
| 104/439/FDIS | 104/449/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.

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- withdrawn,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.

INTRODUCTION

This part of IEC 60068 gives a method of test applicable to components, equipment and other articles which, during transportation or in service, may be subjected to conditions involving vibration of a harmonic pattern, generated primarily by rotating, pulsating or oscillating forces, such as occur in ships, aircraft, land vehicles, rotorcraft and space applications or are caused by machinery and seismic phenomena.

This standard consists basically of subjecting a specimen to sinusoidal vibration over a given frequency range or at discrete frequencies, for a given period of time. A vibration response investigation may be specified which aims at determining critical frequencies of the specimen.

The relevant specification shall indicate whether the specimen shall function during vibration or whether it suffices that it still works after having been submitted to vibration.

It is emphasized that vibration testing always demands a certain degree of engineering judgement, and both the supplier and purchaser should be fully aware of this fact. However, sinusoidal testing is deterministic and, therefore, relatively simple to perform. Thus it is readily applicable to both diagnostic and service life testing.

The main part of this standard deals primarily with the methods of controlling the test at specified points using either analogue or digital techniques, and gives, in detail, the testing procedure. The requirements for the vibration motion, choice of severities including frequency ranges, amplitudes and endurance times are also specified, these severities representing a rationalized series of parameters. The relevant specification writer is expected to choose the testing procedure and values appropriate to the specimen and its use.

Certain terms have been defined to facilitate a proper understanding of the text. These definitions are given in Clause 3.

Annex A gives general guidance for the test and Annexes B and C provide guidance on the selection of severities for components and equipment.

ENVIRONMENTAL TESTING –

Part 2: Tests – Test Fc: Vibration (sinusoidal)

1 Scope

This part of IEC 60068 gives a method of test which provides a standard procedure to determine the ability of components, equipment and other articles, hereinafter referred to as specimens, to withstand specified severities of sinusoidal vibration. If an item is to be tested in an unpackaged form, that is without its packaging, it is referred to as a test specimen. 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.

The purpose of this test is to determine any mechanical weakness and/or degradation in the specified performance of specimens and to use this information, in conjunction with the relevant specification, to decide upon the acceptability of the specimens. In some cases, the test method may also be used to demonstrate the mechanical robustness of specimens and/or to study their dynamic behaviour. Categorization of components can also be made on the basis of a selection from within the severities quoted in the test.

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

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

ISO 2041, *Vibration and shock – Vocabulary*

ISO/IEC 17025:2005, *General requirements for the competence of testing and calibration laboratories*

3 Terms and definitions

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

NOTE 1 The terms used are generally taken from ISO 2041 and IEC 60068-1. However, “sweep cycle” (3.4) and “signal tolerance” (3.5) have specific meanings in this standard.

Definitions in alphabetical order:

| | |
|-----------------------------|-------|
| Actual motion | 3.7 |
| Basic motion | 3.6 |
| Centred resonance frequency | 3.10 |
| Check point | 3.2.1 |

| | |
|-------------------------------|-------|
| Critical frequencies | 3.9 |
| Damping | 3.8 |
| Fictitious reference point | 3.2.3 |
| Fixing point | 3.1 |
| g_n | 3.12 |
| Measuring points | 3.2 |
| Multipoint control | 3.3.2 |
| Reference point | 3.2.2 |
| Restricted frequency sweeping | 3.11 |
| Signal tolerance | 3.5 |
| Single point control | 3.3.1 |
| Sweep cycle | 3.4 |

NOTE 2 Terms described below are either not identical to, or not defined in ISO 2041 or in IEC 60068-1.

3.1

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

NOTE 2 Where the specimen consists of a packaged product, fixing point may be interpreted as the surface of the specimen which is in contact with the vibration table.

3.2

measuring points

specific points at which data are gathered conducting the test

NOTE 1 These are of two main types, the definitions of which are given below.

NOTE 2 Measurements may be made at points within the specimen in order to assess its behaviour, but these are not considered as measuring points in the sense of this standard. For further details, see A.2.1.

3.2.1

check point

point located on the fixture, on the vibration table or on the specimen as close as possible to one of its fixing points, and in any case rigidly connected to it

NOTE 1 A number of check points are used as a means of ensuring that the test requirements are satisfied.

NOTE 2 If four or fewer fixing points exist, each is used as a check point. For packaged products, where a fixing point may be interpreted as the packaging surface in contact with the vibration table, one check point may be used, provided that there are no effects due to resonances of the vibration table or the mounting structure in the frequency range specified for the test. If this is the case, multipoint control may be necessary, but see also Note 3. If more than four fixing points exist, four representative fixing points will be defined in the relevant specification to be used as check points.

NOTE 3 In special cases, for example for large or complex specimens, the check points will be prescribed in the relevant specification if not close to the fixing points.

NOTE 4 Where a large number of small specimens are mounted on one fixture, or in the case of a small specimen where there are several fixing points, a single check point (i.e. the reference point) may be selected for the derivation of the control signal. This signal is then related to the fixture rather than to the fixing points of the specimen(s). This is only valid when the lowest resonance frequency of the loaded fixture is well above the upper frequency of the test.



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