



SLOVENSKI STANDARD
SIST EN 60068-2-65:2001
01-september-2001

Environmental testing - Part 2: Methods of test - Test Fg: Vibration, acoustically induced

Environmental testing -- Part 2: Methods of test - Test Fg: Vibration, acoustically induced

Umweltprüfungen -- Teil 2: Prüfverfahren - Prüfung Fg: Schwingen, akustisch angeregt

Essais d'environnement -- Partie 2: Méthodes d'essais - Essai Fg: Vibrations, induites acoustiquement

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19.040

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Environmental testing

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EUROPEAN STANDARD
NORME EUROPÉENNE
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English version

Environmental testing
Part 2: Methods of test
Test Fg: Vibration, acoustically induced
(IEC 68-2-65:1993)

Essais d'environnement
Partie 2: Méthodes d'essais
Essai Fg: Vibrations, induites
acoustiquement
(CEI 68-2-65:1993)

Umweltprüfungen
Teil 2: Prüfverfahren
Prüfung Fg: Schwingen, akustisch
angeregt
(IEC 68-2-65:1993)

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This European Standard was approved by CENELEC on 1994-09-01. 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 Central Secretariat 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 Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CENELEC

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

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Foreword

The text of the International Standard IEC 68-2-65:1993, prepared by SC 50A, Vibration impact and other dynamic tests, of IEC TC 50, Environmental testing, was submitted to the Unique Acceptance Procedure and was approved by CENELEC as EN 60068-2-65 on 1994-09-01 without any modification.

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) 1995-10-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 1995-10-01

Annexes designated "normative" are part of the body of the standard.
Annexes designated "informative" are given for information only.
In this standard, annex ZA is normative and annexes A and B are informative.
Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 68-2-65:1993 was approved by CENELEC as a European Standard without any modification.

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ANNEX ZA (normative)

OTHER INTERNATIONAL PUBLICATIONS QUOTED IN THIS STANDARD
WITH THE REFERENCES OF THE RELEVANT EUROPEAN PUBLICATIONS

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

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

IEC Publication	Date	Title	EN/HD	Date
50(151)	1978	International Electrotechnical Vocabulary (IEV) Chapter 151: Electrical and magnetic devices	-	-
50(801)	1984	Chapter 801: Acoustics and electro-acoustics	-	-
68-1	1988	Environmental testing - Part 1: General and guidance	EN 60068-1*	1994
651	1979	Sound level meters	EN 60651	1994

Other publications:

ISO 266:1975 - Acoustics - Preferred frequencies for measurements
ISO 2041:1990 - Vibration and shock - Vocabulary
ISO 2671:1982 - Environmental tests for aircraft equipment
Part 3.4: Acoustic vibration

* EN 60068-1 includes corrigendum Oct. 1988 and A1:1992 to IEC 68-1

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Essais d'environnement –

Partie 2:

Méthodes d'essais –

Essai Fg: Vibrations, induites acoustiquement

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Methods of test –

Test Fg: Vibration, acoustically induced

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International Electrotechnical Commission
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INTERNATIONAL ELECTROTECHNICAL COMMISSION

ENVIRONMENTAL TESTING –

Part 2: Methods of test –
Test Fg: Vibration, acoustically induced

FOREWORD

- 1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the IEC is to promote international cooperation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, the IEC publishes International Standards. 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. The IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of the IEC on technical matters, prepared by technical committees on which all the National Committees having a special interest therein are represented, express, as nearly as possible, an international consensus of opinion on the subjects dealt with.
- 3) They have the form of recommendations for international use published in the form of standards, technical reports or guides and they are accepted by the National Committees in that sense.
- 4) In order to promote international unification, IEC National Committees undertake to apply IEC International Standards transparently to the maximum extent possible in their national and regional standards. Any divergence between the IEC Standard and the corresponding national or regional standard shall be clearly indicated in the latter.

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International Standard IEC 68-2-65 has been prepared by sub-committee 50A: Vibration impact and other dynamic tests, of IEC technical committee 50: Environmental testing.

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

DIS	Report on voting
50A(CO)226	50A(CO)228

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

Annexes A and B are for information only.

INTRODUCTION

Acoustic noise may produce significant vibration in components and equipment. In the acoustic noise field, pressure fluctuations impinge directly on the specimen and the response may be different to that produced by mechanical excitation.

Items particularly sensitive to acoustic noise include relatively lightweight items whose dimensions are comparable to an acoustic wavelength in the frequency range of interest and whose mass per unit area is low, such as dish antennas and solar panels, electronic devices, printed circuit boards, wiring, optical elements, etc.

This test is applicable to components, equipment and other products, herein after referred to as "specimens", which are liable to be exposed to and/or required to function in conditions of high sound-pressure levels. It should be noted that, under service conditions, the specimen may be subjected to simultaneous mechanical and acoustical excitation.

High sound-pressure levels may be generated by jet engines and other aircraft propulsion systems, rocket motors, high-powered gas circulators, etc. This standard deals with acoustic testing in compressible gases and can also be used to simulate the excitation response caused by turbulence resulting from high velocity separated gas flows.

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Testing for the effects of vibration caused by acoustic noise demands a certain degree of engineering judgment and this should be recognized both by the manufacturer/supplier and the purchaser of the specimen. Based on the guidance provided in this part of IEC 68 the writer of the relevant specification is expected to select the most appropriate method of test and values of severity, taking account of the nature of the specimen and its intended use.

Since the acoustic levels occurring during testing are high enough to be potentially damaging to human hearing, appropriate measures need to be taken to reduce preparatory operation and the noise exposure of operators performing the test, to a level regarded as permissible from the standpoint of hearing conservation.

ENVIRONMENTAL TESTING

Part 2: Methods of test – Test Fg: Vibration, acoustically induced

1 Object

To provide standard procedures and guidance for conducting acoustic tests in order to determine the ability of a specimen to withstand vibration caused by a specified sound-pressure level environment to which it is, or is liable to be, subjected. For sound-pressure level environments of less than 120 dB acoustic tests are not normally required.

To determine mechanical weakness and/or degradation in the performance of specimens and to use this information, in conjunction with the relevant specification, to decide their acceptability. In some cases, the methods of test may also be used as a means of establishing the mechanical robustness or fatigue resistance of specimens.

This part of IEC 68 describes the procedures for conducting tests and for measurement of the sound-pressure levels within the acoustic noise field and considers the need for measurement of the vibration responses at specified points on the specimen. It also gives guidance for the selection of the acoustic noise environment, spectrum, sound-pressure level and duration of exposure.

[SIST EN 60068-2-65:2001](https://standards.iteh.ai/catalog/standards/sist/e264ddc0-cd28-4d50-869e-d8fade0a6fbc/sist-en-60068-2-65-2001)

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2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of IEC 68. At the time of publication, the editions indicated were valid. All normative documents are subject to revision, and parties to agreements based on this part of IEC 68 are encouraged to investigate the possibility of applying the most recent editions of the normative documents listed below. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 50(151): 1978, *International Electrotechnical Vocabulary (IEV) – Chapter 151: Electrical and magnetic devices*

IEC 50(801): 1984, *International Electrotechnical Vocabulary (IEV) – Chapter 801: Acoustics and electro-acoustics*

IEC 68-1: 1988, *Environmental testing – Part 1: General and guidance*

IEC 651: 1979, *Sound level meters*

ISO 266: 1975, *Acoustics – Preferred frequencies for measurements*

ISO 2041: 1990, *Vibration and shock – Vocabulary*

ISO 2671: 1982, *Environmental tests for aircraft equipment – Part 3.4: Acoustic vibration*

3 Definitions, symbols and abbreviations

The terms used are generally defined in ISO 2041, IEC 68-1 and IEC 50(801). Where, for the convenience of the reader, a definition from one of those sources is included here, the derivation is indicated. Departures from the definitions in those sources are also indicated (see also 3.2). The additional terms and definitions that follow are applicable for the purposes of this standard.

3.1 Definitions

3.1.1 acoustic horn (not identical to 801-07-12): Tube of generally exponentially varying section, larger at one end than at the other, used to couple an acoustic source to the test volume, for example the inside of a reverberation room, thus achieving the maximum transfer of energy.

NOTE - Each acoustic horn has individual transfer characteristics which affect the sound spectrum.

3.1.2 analysis integration time: Time duration over which a signal is averaged (see A.8).

3.1.3 bandwidth (identical to B.19 of ISO 2041): Difference between the nominal upper and lower cut-off frequencies.

NOTE - It may be expressed

- in hertz;
- as a percentage of the pass-band centre frequency; or
- as the interval between the upper and lower nominal cut-off frequencies in octaves.

3.1.4 overall sound-pressure level (OASPL): Value computed from the third-octave or octave band sound-pressure levels L_i

$$L_G = 10 \log_{10} \sum_{i=1}^m 10^{L_i/10}$$

where

L_G is the overall sound-pressure level in dB

L_i is the sound-pressure level in the i th third-octave or octave band and

m is the number of third-octave or octave bands.

3.1.5 centre frequency (identical to B.31 of ISO 2041): Geometric mean of the nominal cut-off frequencies of a pass-band.

NOTES

1 ISO 2041 defines the nominal upper and lower cut-off frequencies of a filter pass-band as those frequencies above and below the frequency of maximum response of a filter at which the response to a sinusoidal signal is 3 dB below the maximum response.

2 The geometric mean is equal to $(f_1 \cdot f_2)^{1/2}$, where f_1 and f_2 are the cut-off frequencies.