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INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

Electroacoustics – Sound level meters – Part 2: Pattern evaluation tests

Electroacoustique – Sonomètres – Partie 2: Essais d'évaluation d'un modèle

IEC 61672-2:2013-09+AMD1:2017-04 CSV(en-fr)

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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ELECTROACOUSTICS – SOUND LEVEL METERS –

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FOREWORD

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This consolidated version of the official IEC Standard and its amendment has been prepared for user convenience.

IEC 61672-2 edition 2.1 contains the second edition (2013-09) [documents 29/813/FDIS and 29/824/RVD] and its amendment 1 (2017-04) [documents 29/914/CDV and 29/938/RVC].

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 61672-2 has been prepared by IEC technical committee 29, Electroacoustics, in cooperation with the International Organization of Legal Metrology (OIML).

This second edition constitutes a technical revision.

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

In this second edition, conformance to specifications is demonstrated when:

a) measured deviations from design goals do not exceed the applicable acceptance limits, and
b) the uncertainty of measurement does not exceed the corresponding maximum permitted uncertainty, with both uncertainties determined for a coverage probability of 95 %.

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

A list of all parts of the IEC 61672 series, published under the general title *Electroacoustics – Sound level meters*, 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

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- withdrawn,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

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ELECTROACOUSTICS – SOUND LEVEL METERS –

Part 2: Pattern-evaluation tests

1 Scope

This part of IEC 61672 provides details of the tests necessary to verify conformance to all mandatory specifications given in IEC 61672-1 for time-weighting sound level meters, integrating-averaging sound level meters, and integrating sound level meters. Pattern-evaluation tests apply for each channel of a multi-channel sound level meter, as necessary. Tests and test methods are applicable to class 1 and class 2 sound level meters. The aim is to ensure that all laboratories use consistent methods to perform pattern-evaluation tests.

NOTE 1 In this document, references to IEC 61672-1, IEC 61672-2, and IEC 61672-3 refer to the second editions unless stated otherwise.

NOTE 2 Procedures for the pattern-evaluation testing of sound level meters designed to conform to the specifications of IEC 61672-1:2002 were given in IEC 61672-2:2003.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60942, *Electroacoustics – Sound calibrators*

IEC 61000-4-2:2008, *Electromagnetic compatibility (EMC) – Part 4-2: Testing and measurement techniques – Electrostatic discharge immunity test*

IEC 61000-4-3:2010, *Electromagnetic compatibility (EMC) – Part 4-3: Testing and measurement techniques – Radiated, radio-frequency, electromagnetic-field immunity test*

IEC 61000-4-6:2008, *Electromagnetic compatibility (EMC) – Part 4-6: Testing and measurement techniques – Immunity to conducted disturbances, induced by radio-frequency fields*

IEC 61000-4-20:2010, *Electromagnetic compatibility (EMC) – Part 4-20: Testing and measurement techniques – Emission and immunity testing in transverse electromagnetic (TEM) waveguides*

IEC 61000-6-2:2005, *Electromagnetic compatibility (EMC) – Part 6-2: Generic standards – Immunity for industrial environments*

IEC 61094-1, *Measurement microphones – Part 1: Specifications for laboratory standard microphones*

IEC 61094-5, *Measurement microphones – Part 5: Methods for pressure calibration of working standard microphones by comparison*

IEC 61183, *Electroacoustics – Random-incidence and diffuse-field calibration of sound level meters*

IEC 61672-1, *Electroacoustics – Sound level meters – Part 1: Specifications*

IEC 62585, *Electroacoustics – Methods to determine corrections to obtain the free-field response of a sound level meter*

CISPR 16-1-1, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 1-1: Radio disturbance and immunity measuring apparatus – Measuring apparatus* [1]

CISPR 16-1-2:2006, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 1-2: Radio disturbance and immunity measuring apparatus – Ancillary equipment – Conducted disturbances*

CISPR 16-2-1:2010 (Ed. 2.1), *Specification for radio disturbance and immunity measuring apparatus and methods – Part 2-1: Methods of measurement of disturbances and immunity – Conducted disturbance measurements*

CISPR 16-2-3:2010 (Ed. 3.1), *Specification for radio disturbance and immunity measuring apparatus and methods – Part 2-3: Methods of measurement of disturbances and immunity – Radiated disturbance measurements*

CISPR 22:2008, *Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement*

ISO/IEC Guide 98-3, *Uncertainty of measurement – Part 3: Guide to the expression of uncertainty in measurement (GUM: 1995)*

ISO/IEC Guide 99, *International vocabulary of metrology – Basic and general concepts and associated terms (VIM)*

ISO 26101:2012, *Acoustics – Test methods for the qualification of free-field environments*

3 Terms and definitions

For the purposes of this document, in addition to the terms and definitions given in IEC 61672-1 and IEC 62585, the terms and definitions given in IEC 61000-4-2, IEC 61000-4-3, IEC 61000-4-6, ISO/IEC Guide 98-3, and ISO/IEC Guide 99 also apply.

4 Submission for testing

4.1 At least three specimens of the same pattern of sound level meter shall be submitted for pattern-evaluation testing. As a minimum, the laboratory shall select two of the specimens for testing. At least one of the two specimens shall then be tested fully according to the procedures of this Standard. The laboratory shall decide whether the full tests shall also be performed on the second specimen or whether additional limited testing is adequate to approve the pattern.

4.2 An Instruction Manual and all items or accessories that are identified in the Instruction Manual as integral components for the normal mode of operation shall be submitted along with the three sound level meters. Examples of additional items or accessories include a microphone extension device or cable and peripheral equipment.

[1] In English, CISPR stands for International Special Committee on Radio Interference.

4.3 If the manufacturer of the sound level meter supplies devices that are to be connected to the sound level meter by cables, then the devices and cables shall be submitted with the sound level meter.

4.4 A calibrated sound calibrator of a model specified in the Instruction Manual for the sound level meter shall be supplied with the sound level meter. An Instruction Manual for the sound calibrator shall also be provided. As required by IEC 61672-1, the model of the calibrator shall conform to the relevant specifications of IEC 60942 for the class of sound calibrator.

5 Marking of the sound level meter and information in the Instruction Manual

5.1 It shall be verified that the sound level meter is marked according to the requirements of IEC 61672-1.

5.2 It shall be verified that the Instruction Manual contains all the information that is required by IEC 61672-1, as relevant to the facilities provided by the sound level meter.

5.3 If the sound level meter does not conform to the requirements of 5.1 and 5.2, no pattern-evaluation tests shall be performed.

5.4 After completion of all tests, the information shall be reviewed to ensure that it is correct and that no applicable acceptance limits are exceeded.

6 Mandatory facilities and general requirements

6.1 No test specified in this part of IEC 61672 shall be omitted unless the sound level meter does not possess the facility described for the test. When the design of a sound level meter, which has been pattern approved, is changed and a new pattern approval is requested, then, at the discretion of the laboratory, it is not necessary to repeat those tests for electroacoustical performance characteristics that are not affected by the design change.

6.2 A time-weighting sound level meter shall be verified to be able to display A-frequency-weighted, F-time-weighted sound level and to be able to indicate overload and under-range conditions.

6.3 An integrating-averaging sound level meter shall be verified to be able to display A-frequency-weighted, time-averaged sound level and to be able to indicate overload and under-range conditions.

6.4 An integrating sound level meter shall be verified to be able to display A-frequency-weighted sound exposure level and to be able to indicate overload and under-range conditions.

6.5 All display devices for the sound level meter shall be verified to be able to display sound levels or sound exposure levels with the resolution required by IEC 61672-1. The range of the display shall be at least the minimum specified in IEC 61672-1.

6.6 If a sound level meter is capable of measuring maximum or peak sound levels, or both, it shall be verified that a "hold" feature is provided.

6.7 A class 1 sound level meter shall be verified to have frequency-weighting C.

6.8 If the sound level meter is capable of indicating C-weighted peak sound levels, it shall be verified that the capability to display C-weighted, time-weighted sound level or C-weighted, time-averaged sound level is also provided.

6.9 For sound level meters with multiple level ranges, it shall be verified that overlap of the level ranges conforms to the specifications of IEC 61672-1.

6.10 For sound level meters that can display more than one measurement quantity, it shall be verified that there is a means to ascertain the quantity that is being displayed.

6.11 If the sound level meter does not possess the mandatory facilities listed in 6.2 through 6.10, as applicable, the sound level meter does not conform to the specifications of IEC 61672-1 and no pattern-evaluation tests shall be performed.

6.12 For all pattern-evaluation tests, the configuration of the sound level meter, or the multi-channel sound level meter system, shall be as specified in the Instruction Manual for one of the normal modes of operation, including all required accessories. The configuration shall include a windscreen if a windscreen is an integral component for the normal mode of operation, or if the Instruction Manual states that the sound level meter conforms to the specifications of IEC 61672-1 with a windscreen installed around the microphone. The model of the windscreen shall be as stated in the Instruction Manual for use with the sound level meter. All configurations of the sound level meter that are stated in the Instruction Manual as conforming to the requirements of IEC 61672-1 shall be tested.

6.13 If the Instruction Manual states that the sound level meter conforms to the specifications of IEC 61672-1 with optional facilities installed, the configuration with the optional facilities installed shall also be tested to verify conformance to the relevant specifications.

6.14 If an electrical output is provided on the sound level meter and the laboratory intends to utilize the electrical output instead of the display device, the laboratory shall verify that changes in the levels of applied acoustical or electrical input signals produce changes in the signal levels indicated on the display device and at the electrical output that are in accordance with the specifications of IEC 61672-1. This requirement applies to each channel of a multi-channel system. Where multiple outputs are present, if an output is specified in the Instruction Manual for testing, that output should be used for pattern-evaluation tests.

6.15 For all tests, the sound level meter shall be powered from its preferred supply.

6.16 The sound level meter shall be allowed to reach equilibrium with the prevailing environmental conditions before switching on the power to perform a test.

6.17 Tests for conformance to the specifications for the effects of changes in environmental conditions preferably should be conducted before tests for conformance to the specifications for electroacoustical performance.

6.18 If the sound level meter has more than one signal-processing channel, pattern-evaluation tests shall be performed for each channel that utilizes unique signal processing techniques. For multi-channel systems with the same functional equivalence in all channels, the number of channels to be tested may be less than the number of available channels, at the discretion of the laboratory. For a multi-channel system, the number of channels to be tested should be determined from consideration of a scenario for which there is an array of microphones supplying signals to each input with each channel processing the signals in an identical manner. Selection of how many and which channels to test should consider differences, as described in the Instruction Manual, in the implementation of signal-processing techniques in the various channels. If any special procedure for testing the channels for identical functionality is described in the Instruction Manual, that procedure should be followed.

NOTE If the sound level meter is a multi-channel device (for example, a sound level meter with two or more separate signal inputs with non-parallel processing of digitized data by time-sharing, but quasi-parallel display for the displayed signals), it is usually possible to test the channels for identical functionality either by setting the functions of the channels for identical processing and reading the display(s) or by allowing the channel functionality to rotate by a special test setting procedure thereby allowing comparison of display(s).

6.19 Conformance to a performance specification is demonstrated when the following criteria are both satisfied: (a) a measured deviation from a design goal does not exceed the applicable acceptance limit and (b) the corresponding uncertainty of measurement does not exceed the corresponding maximum-permitted uncertainty of measurement given in IEC 61672-1 for the same coverage probability of 95%. IEC 61672-1 gives example assessments of conformance using these criteria.

6.20 The laboratory shall use instruments with current calibrations for the appropriate quantities. The calibrations shall be traceable to national standards, as required.

6.21 Laboratories performing pattern evaluation tests shall calculate all uncertainties of measurements in accordance with the guidelines given in the ISO/IEC Guide 98-3. Actual measurement uncertainties shall be calculated for a coverage probability of 95 %. Calculation of the actual measurement uncertainty for a particular test should consider at least the following components, as applicable.

– The uncertainty attributed to calibration of the individual instruments and equipment used to perform the test, including the sound calibrator, where applicable;
– The uncertainty resulting from environmental effects or corrections;
– The uncertainty resulting from small errors that may be present in the applied signals;
– The uncertainty attributed to effects associated with the repeatability of the results of the measurements. When a laboratory is only required to perform a single measurement, it is necessary for the laboratory to make an estimate of the random contribution to the total measurement uncertainty. The estimate should be determined from an earlier evaluation of several measurements of the performance of similar sound level meters;
– The uncertainty associated with the resolution of the display device of the sound level meter under test. For digital display devices that indicate signal levels with a resolution of 0,1 dB, the uncertainty component should be taken as a rectangular distribution with semi-range of 0,05 dB;
– The uncertainty associated with the device used to mount the sound level meter in the free-field test facility;
– The uncertainty resulting from the deviation of the sound field in the free-field test facility from an ideal free sound field; and
– The uncertainty associated with each correction applied to the measurement data.

6.22 If the uncertainty of measurement exceeds the maximum-permitted uncertainty of measurement, the result of the test shall not be used to demonstrate conformance to a specification and pattern approval shall not be granted.

6.23 As appropriate, the laboratory shall utilize the recommendations given in the Instruction Manual for performing the pattern-evaluation tests.

7 Environmental, electrostatic, and radio-frequency tests

7.1 General

7.1.1 Before conducting, but not during, the tests described in the Clause 7, the indication of A-weighted sound level at the calibration check frequency shall be checked by application of the sound calibrator specified in 4.4. If necessary, the sound level meter shall be adjusted to indicate the required sound level under reference environmental conditions. For multi-channel devices, the corresponding indications shall be checked for all channels selected for testing.

7.1.2 Environmental conditions at the time of checking the indication shall be recorded.