
Electroacoustics - Sound level meters - Part 1: Specifications (IEC 61672-1:2002)

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NORME EUROPÉENNE

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February 2003

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Partly supersedes EN 60651:1994 + A1:1994 + A2:2001 & EN 60804:2000

English version

**Electroacoustics -
Sound level meters
Part 1: Specifications
(IEC 61672-1:2002)**

Electroacoustique -
Sonomètres
Partie 1: Spécifications
(CEI 61672-1:2002)

Elektroakustik -
Schallpegelmesser
Teil 1: Anforderungen
(IEC 61672-1:2002)

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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, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, 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 document 29/507/FDIS, future edition 1 of IEC 61672-1, prepared by IEC TC 29, Electroacoustics, in cooperation with the International Organization of Legal Metrology (OILM), was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 61672-1 on 2003-02-01.

This European Standard, in conjunction with EN 61672-2, supersedes EN 60651:1994 + A1:1994 + A2:2001 and EN 60804:2000.

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) 2003-11-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2006-02-01

Annexes designated "normative" are part of the body of the standard.

Annexes designated "informative" are given for information only.

In this standard, annexes A and ZA are normative and annexes B and C are informative.

Annex ZA has been added by CENELEC.

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The text of the International Standard IEC 61672-1:2002 was approved by CENELEC as a European Standard without any modification.

[SIST EN 61672-1:2004](https://standards.iteh.ai/sist-en-61672-1-2004)

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

IEC 61012	NOTE	Harmonized as EN 61012:1998 (not modified).
IEC 61252	NOTE	Harmonized as EN 61252:1995 (not modified).
IEC 60651	NOTE	Harmonized as EN 60651:1994 (not modified).
IEC 60804	NOTE	Harmonized as EN 60804:2000 (not modified).

Annex ZA (normative)

Normative references to international publications with their corresponding 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 (including amendments).

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

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
CISPR 16-1	1999	Specification for radio disturbance and immunity measuring apparatus and methods Part 1: Radio disturbance and immunity measuring apparatus	-	-
IEC 60050-801	- ¹⁾	International Electrotechnical Vocabulary (IEV) Chapter 801 Acoustics and electroacoustics	-	-
IEC 60942	- ¹⁾	Electroacoustics - Sound calibrators	-	-
IEC 61000-4-2	- ¹⁾	Electromagnetic compatibility (EMC) Part 4-2: Testing and measurement techniques - Electrostatic discharge immunity test	EN 61000-4-2	1995 ²⁾
IEC 61000-6-2 (mod)	1999	Part 6-2: Generic standards - Immunity for industrial environments	EN 61000-6-2	2001
ISO/IEC GUIDE EXPRES	1995	Guide to the expression of uncertainty in measurement (GUM)	-	-
ISO Publication ISBN 92-67-01075-1	- ¹⁾	International vocabulary of basic and general terms in metrology	-	-

1) Undated reference.

2) Valid edition at date of issue.

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**Electroacoustique –
Sonomètres –**

**Partie 1:
Spécifications**

iTeh STANDARD PREVIEW

**Electroacoustics –
Sound level meters –**

SIST EN 61672-1:2004

<https://standards.iteh.ai/catalog/standards/sist/ae04171c-c27b-4910-afa5-917c8493daf7/sist-en-61672-1-2004>

**Part 1:
Specifications**

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Международная Электротехническая Комиссия

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For price, see current catalogue*

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

ELECTROACOUSTICS – SOUND LEVEL METERS –

Part 1: Specifications

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 express, as nearly as possible, an international consensus of opinion on the relevant subjects since each Technical Committee has representation from all interested National Committees.
- 3) The documents produced have the form of recommendations for informational use and are published in the form of standards, technical specifications, 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.
- 5) The IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with one of its standards.
- 6) Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. The IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 61672-1 has been prepared by IEC technical committee 29: Electroacoustics, in cooperation with the International Organization of Legal Metrology (OIML).

This standard, in conjunction with IEC 61672-2, cancels and replaces IEC 60651, *Sound level meters*, and IEC 60804, *Integrating-averaging sound level meters*.

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

FDIS	Report on voting
29/507/FDIS	29/515/RVD

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

This publication has been drafted in accordance with the ISO/IEC Directives, Part 3.

Annex A forms an integral part of this standard.

Annexes B and C are for information only.

At the time of publication of this standard, the IEC 61672 series was scheduled to consist at least of the following parts: IEC 61672-1: *Specifications*, IEC 61672-2: *Pattern evaluation tests*, and IEC 61672-3: *Periodic tests*.

The committee has decided that the contents of IEC 61672-1 will remain unchanged until 2005. 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 1: Specifications

1 Scope

1.1 This standard gives electroacoustical performance specifications for three kinds of sound measuring instruments:

- a conventional sound level meter that measures exponential time-weighted sound level;
- an integrating-averaging sound level meter that measures time-average sound level; and
- an integrating sound level meter that measures sound exposure level.

A single instrument may make any, or all, of the three kinds of measurements. Additional performance specifications are given for the measurement of maximum time-weighted sound level and peak C sound level. Frequency-weighting A is mandatory for all sound level meters specified in this standard.

1.2 Sound level meters conforming to the requirements of this standard have a specified frequency response for sound incident on the microphone from one principal direction in an acoustic free field or from random directions.

1.3 Sound level meters specified in this standard are intended to measure sounds generally in the range of human hearing.

NOTE For measurement of audible sound in the presence of ultrasound, the AU weighting, specified in IEC 61012 [1], may be applied.¹

1.4 Two performance categories, class 1 and class 2, are specified in this standard. In general, specifications for class 1 and class 2 sound level meters have the same design goals and differ mainly in the tolerance limits and the range of operational temperatures. Tolerance limits for class 2 specifications are greater than, or equal to, those for class 1 specifications.

1.5 This standard is applicable to a range of designs for sound level meters. A sound level meter may be a self-contained hand-held instrument with an attached microphone and a built-in display device. A sound level meter may be comprised of separate components in one or more enclosures and may be capable of displaying a variety of acoustical signal levels. Sound level meters may include extensive analogue or digital signal processing, separately or in combination, with multiple analogue and digital outputs. Sound level meters may include general-purpose computers, recorders, printers, and other devices that form a necessary part of the complete instrument.

¹ Numbers in square brackets refer to the bibliography.

1.6 Sound level meters may be designed for use with an operator present or for automatic and continuous measurements of sound level without an operator present. Specifications in this standard for the response to sound waves apply without an operator present in the sound field.

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.

CISPR² 16-1:1999, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 1: Radio disturbance and immunity measuring apparatus*

IEC 60050(801), *International Electrotechnical Vocabulary – Chapter 801: Acoustics and electroacoustics*

IEC 60942, *Electroacoustics – Sound calibrators*

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

IEC 61000-6-2:1999, *Electromagnetic compatibility (EMC) – Part 6-2: Generic standards – Immunity for industrial environments*

ISO/IEC GUIDE EXPRES:1995, *Guide to the expression of uncertainty in measurement*

ISO Publication, ISBN 92-67-01075-4, *International vocabulary of basic and general terms in metrology*

3 Terms and definitions

For the purposes of this standard, the terms and definitions given in IEC 60050(801), the *International vocabulary of basic and general terms in metrology*, the *Guide to the expression of uncertainty in measurement*, and IEC 61000-6-2:1999, as well as the following apply. All quantities are expressed in SI units.

3.1 reference sound pressure

reference quantity conventionally chosen equal to 20 µPa for airborne sound

3.2 sound pressure level

twenty times the logarithm to the base ten of the ratio of the root-mean-square of a given sound pressure to the reference sound pressure

NOTE Sound pressure level is expressed in decibels (dB); symbol L_p .

² In English, CISPR stands for International Special Committee on Radio Interference.

3.3 frequency weighting

for a sound level meter, the difference between the level of the signal indicated on the display device and the corresponding level of a constant-amplitude steady-state sinusoidal input signal, specified in this standard as a function of frequency

NOTE The difference in level is expressed in decibels (dB).

3.4 time weighting

exponential function of time, of a specified time constant, that weights the square of the instantaneous sound pressure

3.5 time-weighted sound level

twenty times the logarithm to the base ten of the ratio of a given root-mean-square sound pressure to the reference sound pressure, root-mean-square sound pressure being obtained with a standard frequency weighting and standard time weighting

NOTE 1 Time-weighted sound level is expressed in decibels (dB).

NOTE 2 For time-weighted sound level, example letter symbols are L_{AF} , L_{AS} , L_{CF} , and L_{CS} for frequency weightings A and C and time weightings F and S.

NOTE 3 In symbols, A-weighted and time-weighted sound level, $L_{A\tau}(t)$, at any instant of time t is represented by

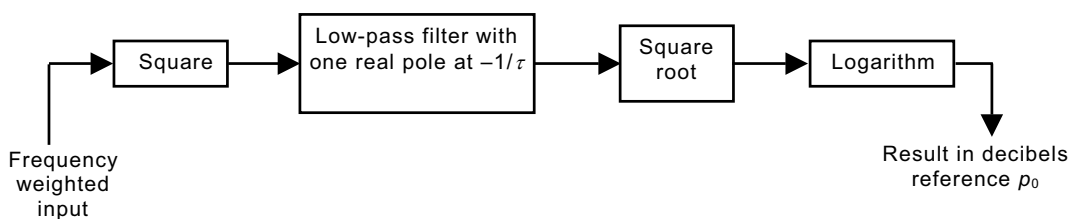
$$L_{A\tau}(t) = 20 \lg \left\{ \left[\frac{1}{\tau} \int_{-\infty}^t p_A^2(\xi) e^{-(t-\xi)/\tau} d\xi \right]^{1/2} / p_0 \right\} \quad (1)$$

where

- τ is the exponential time constant in seconds for time weighting F or S;
- ξ is a dummy variable of time integration from some time in the past, as indicated by $-\infty$ for the lower limit of the integral, to the time of observation t ;
- $p_A(\xi)$ is the A-weighted instantaneous sound pressure; and
- p_0 is the reference sound pressure.

In equation (1), the numerator of the argument of the logarithm is the exponential-time-weighted, root-mean-square, frequency-weighted sound pressure at observation time t .

NOTE 4 The sketch in figure 1 illustrates the process indicated by equation (1).



IEC 1082/02

Figure 1 – Principal steps involved in forming an exponential-time-weighted sound level