Electroacoustics - Personal sound exposure meters

EESTI STANDARDIMIS- JA AKREDITEERIMISKESKUS
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NATIONAL FOREWORD

See Eesti standard EVS-EN IEC 61252:2025 sisaldab Euroopa standardi EN IEC 61252:2025 ingliskeelset teksti.	This Estonian standard EVS-EN IEC 61252:2025 consists of the English text of the European standard EN IEC 61252:2025.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas.	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation and Accreditation.
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Standard on kättesaadav Eesti Standardimis-ja Akrediteerimiskeskusest.	The standard is available from the Estonian Centre for Standardisation and Accreditation.

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ICS 13.140, 17.140.50

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN IEC 61252

November 2025

ICS 13.140; 17.140.50

Supersedes EN 61252:1995; EN 61252:1995/A1:2001;
EN 61252:1995/A2:2017

English Version

Electroacoustics - Personal sound exposure meters (IEC 61252:2025)

Électroacoustique - Exposimètres acoustiques individuels (IEC 61252:2025)

Elektroakustik - Anforderungen an Personenschallexposimeter (IEC 61252:2025)

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Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

Ref. No. EN IEC 61252:2025 E

European foreword

The text of document 29/1206/FDIS, future edition 2 of IEC 61252, prepared by TC 29 "Electroacoustics" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 61252:2025.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2026-11-30
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In the official version, for Bibliography, the following notes have to be added for the standard indicated:

IEC 61094-1	NOTE	Approved as EN 61094-1
IEC 61094-4	NOTE	Approved as EN 61094-4
IEC 61252:1993	NOTE	Approved as EN 61252:1995 (not modified)
ISO 9612	NOTE	Approved as EN ISO 9612

IEC 61252

Edition 2.0 2025-10

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Electroacoustics - Personal sound exposure meters

Électroacoustique - Exposimètres acoustiques individuels

ICS 13.140, 17.140.50

ISBN 978-2-8327-0674-9

IEC 61252:2025-10(en-fr)

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Electroacoustics - Personal sound exposure meters

FOREWORD

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IEC 61252 has been prepared by IEC technical committee 29: Electroacoustics. It is an International Standard.

This second edition cancels and replaces the first edition published in 1993, Amendment 1:2000, and Amendment 2:2017. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

a) personal sound exposure meters are required to provide indications of time-averaged sound level and peak sound level;
b) sound exposure is an optional quantity for indication;
c) specifications for physical quantities that do not follow the principle of equal-energy exchange rate have been added;
d) specifications for directional response have been added;

e) specifications for frequency weightings apply to the relative diffuse-field frequency response;

f) determination of conformance to specifications takes account of uncertainties of measurement;

g) detailed requirements for pattern-evaluation tests and periodic testing have been added.

The text of this International Standard is based on the following documents:

Draft	Report on voting
29/1206/FDIS	29/1218/RVD

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

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn, or
- revised.

INTRODUCTION

The principal application for a personal sound exposure meter is the measurement of sound immission in the vicinity of a person's head, for example for assessment of occupational noise exposure in accordance with International Standards such as ISO 1999 and ISO 9612.

The microphone of a personal sound exposure meter is typically worn on the shoulder, collar, or other location close to the ear. In many practical situations, the sound immission indicated by an instrument worn on a person is likely to be different from that which would be measured in the absence of a person. The influence of the person wearing a personal sound exposure meter should be considered when estimating the sound immission that would have been measured with the person absent.

The most common physical quantities for characterisation of sound immission are time-averaged sound levels and peak sound levels. For this reason, this document requires a personal sound exposure meter to provide indications of these sound levels.

Other quantities which are sometimes measured include sound exposure and sound exposure levels. Therefore, this document optionally allows a personal sound exposure meter to indicate these quantities.

Sound exposure is a physical measure that accounts for both the sound pressure and its duration, at a given location, through the time integral of the square of the instantaneous frequency-weighted sound pressure. A doubling (or halving) of the integration time of a constant sound level yields a doubling (or halving) of sound exposure. Similarly, an increase (or decrease) of 3 dB in a constant input sound level for a constant integration time yields a doubling (or halving) of the sound exposure. The same operating principle ("equal-energy exchange rate") underlies the measurement of sound exposure level.

The term "dose" is sometimes used to refer to a percentage of a predetermined criterion for exposure to noise in terms of a specified upper limit (often a legal limit) of a specified physical quantity. The physical quantity and the value of the limit vary between jurisdictions, and some jurisdictions specify quantities that are not based on the principle of equal-energy exchange. Therefore, this document allows a personal sound exposure meter to indicate these quantities and distinguishes between equal-energy-based and non-equal-energy-based quantities.

This document specifies performance requirements for personal sound exposure meters of one performance class. The specifications generally correspond to those for a class 2 integrating-averaging sound level meter as given in IEC 61672-1:2013 for an A-weighted sound pressure level range at least from 67 dB to 137 dB and a nominal frequency range from 20 Hz to 8 kHz. The design goals and the acceptance limits for deviations from the design goals are representative of the performance of practical instruments. Personal sound exposure meters are unlikely to be suitable for measurement of sound levels outside these ranges.

The title of this document has been changed with respect to IEC 61252:1993 because this document includes requirements for pattern-evaluation tests and periodic testing in addition to performance specifications.

The purpose of pattern evaluation is to determine whether a model of personal sound exposure meter conforms to all the performance specifications given in this document.

The purpose of periodic testing is to assure the user that the individual personal sound exposure meter conforms to the applicable performance specifications for a limited set of key tests and for the environmental conditions under which the tests are performed. The extent of the periodic tests is deliberately restricted to the minimum considered necessary. Because of the limited extent of the periodic tests, evidence of pattern approval is necessary to state that the individual personal sound exposure meter conforms to the complete set of specifications of this document.

The aim is to ensure that pattern evaluation and periodic testing are performed in a consistent manner by all laboratories.

1 Scope

This document specifies

– performance specifications for personal sound exposure meters,
– details of the tests necessary to verify conformance to all mandatory specifications for the purpose of pattern evaluation, and
– procedures for periodic testing of a personal sound exposure meter.

Personal sound exposure meters conforming to the requirements of this document have a specified frequency response for sound incident on the microphone from all directions.

This document is applicable to instruments that are designed to be worn on a person in a configuration specified by the manufacturer for the measurement of sound immission resulting from steady, intermittent, fluctuating, irregular, or impulsive sounds. For reproducibility of results, specifications and tests for the response to sound waves apply without an operator present in the sound field.

Pattern evaluation tests and periodic tests described in this document apply to personal sound exposure meters for which the manufacturer claims conformance to the specifications given in this document.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 60942, *Electroacoustics - Sound calibrators*

IEC 61000-4-3:2020, *Electromagnetic compatibility (EMC) - Part 4-3: Testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test*

IEC 61094-6, *Measurement microphones - Part 6: Electrostatic actuators for determination of frequency response*

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

IEC 61672 (all parts), *Electroacoustics - Sound level meters*

IEC 61672-1:2013, *Electroacoustics - Sound level meters - Part 1: Specifications*

IEC 61672-2:2013, *Electroacoustics - Sound level meters - Part 2: Pattern evaluation tests*

IEC 61672-3:2013, *Electroacoustics - Sound level meters - Part 3: Periodic tests*

IEC 62585:2012, *Electroacoustics - Methods to determine corrections to obtain the free-field response of a sound level meter*

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

ISO/IEC Guide 98-4, *Uncertainty of measurement - Part 4: Role of measurement uncertainty in conformity assessment*

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

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 61000-4-3, IEC 61183, IEC 61672 (all parts), IEC 62585, ISO/IEC Guide 98-3, ISO/IEC Guide 98-4, ISO/IEC Guide 99, and the following apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- IEC Electropedia: available at https://www.electropedia.org/
- ISO Online browsing platform: available at https://www.iso.org/obp

3.1
sound exposure
time integral of the square of a frequency-weighted sound pressure signal over a stated time interval or event of stated duration

Note 1 to entry: Duration of integration is included implicitly in the time integral and is not always reported explicitly, although it is useful to state the nature of the event. For measurements of sound exposure over a specified time interval, duration of integration is usually reported and indicated by a suitable subscript to the letter symbol, for example as $E_{\mathrm{A,1\,h}}$.

Note 2 to entry: In symbols and as an example, A-weighted sound exposure $E_{\mathrm{A,T}}$ is represented by Formula (1):

$$E_{\mathrm{A},T} = \int_{t_1}^{t_2} p_{\mathrm{A}}^2(t)\mathrm{d}t \tag{1}$$

where $p_{\mathrm{A}}^2(t)$ is the square of the A-weighted sound-pressure signal during integration time T starting at t_1 and ending at t_2.

Note 3 to entry: The unit of sound exposure is pascal-squared seconds ($\mathrm{Pa^2s}$) if sound pressure is in pascals and running time is in seconds.

Note 4 to entry: For applications such as measurement of exposure to noise in the workplace, sound exposure in pascal-squared hours is more convenient than pascal-squared seconds.

[SOURCE: IEC 61672-1:2013, 3.11]

3.2
normalized 8 h-average sound level
level of the time-mean-square, A-weighted sound pressure during a normalization time period T_{n} of 8 h such that the sound exposure therefrom is equal to that of a time-varying sound at a place where total sound exposure occurs within a time period not necessarily 8 h

Note 1 to entry: The unit of normalized 8 h-average sound level is decibels.

Note 2 to entry: In symbols, a normalized 8 h-average sound level (letter symbol $L_{\mathrm{Aeq,8\,hn}}$), relative to the reference sound pressure p_0 and the 8 h normalization time period T_{n}, is related to sound exposure E in pascal-squared hours by Formula (2):

$$L_{\mathrm{Aeq,8\,hn}} = 10\lg\left[E \Big/ \left(p_0^2 T_{\mathrm{n}}\right)\right] \tag{2}$$

or, alternatively, by Formula (3):