IEC 60268-7

Edition 4.0 2025-06

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Sound system equipment – Part 7: Headphones and earphones

Equipements pour systèmes électroacoustiques – Partie 7: Casques et écouteurs

ICS 33.160.50

ISBN 978-2-8327-0478-3

IEC 60268-7:2025-06(en-fr)

IEC Secretariat
3, rue de Varembé
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

About the IEC
The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications
The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigendum or an amendment might have been published.

IEC publications search - webstore.iec.ch/advsearchform
The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee, …). It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished
Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and once a month by email.

IEC Customer Service Centre - webstore.iec.ch/csc
If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: sales@iec.ch.

IEC Products & Services Portal - products.iec.ch
Discover our powerful search engine and read freely all the publications previews, graphical symbols and the glossary. With a subscription you will always have access to up to date content tailored to your needs.

Electropedia - www.electropedia.org
The world's leading online dictionary on electrotechnology, containing more than 22 500 terminological entries in English and French, with equivalent terms in 25 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

A propos de l'IEC
La Commission Electrotechnique Internationale (IEC) est la première organisation mondiale qui élabore et publie des Normes internationales pour tout ce qui a trait à l'électricité, à l'électronique et aux technologies apparentées.

A propos des publications IEC
Le contenu technique des publications IEC est constamment revu. Veuillez vous assurer que vous possédez l'édition la plus récente, un corrigendum ou amendement peut avoir été publié.

Recherche de publications IEC - webstore.iec.ch/advsearchform
La recherche avancée permet de trouver des publications IEC en utilisant différents critères (numéro de référence, texte, comité d'études, …). Elle donne aussi des informations sur les projets et les publications remplacées ou retirées.

IEC Just Published - webstore.iec.ch/justpublished
Restez informé sur les nouvelles publications IEC. Just Published détaille les nouvelles publications parues. Disponible en ligne et une fois par mois par email.

Service Clients - webstore.iec.ch/csc
Si vous désirez nous donner des commentaires sur cette publication ou si vous avez des questions contactez-nous: sales@iec.ch.

IEC Products & Services Portal - products.iec.ch
Découvrez notre puissant moteur de recherche et consultez gratuitement tous les aperçus des publications, symboles graphiques et le glossaire. Avec un abonnement, vous aurez toujours accès à un contenu à jour adapté à vos besoins.

Electropedia - www.electropedia.org
Le premier dictionnaire d'électrotechnologie en ligne au monde, avec plus de 22 500 articles terminologiques en anglais et en français, ainsi que les termes équivalents dans 25 langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International (IEV) en ligne.

Warning! Make sure that you obtained this publication from an authorized distributor.
Attention! Veuillez vous assurer que vous avez obtenu cette publication via un distributeur agréé.

CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

_____

Sound system equipment - Part 7: Headphones and earphones

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). 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. 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 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 IEC National Committees.
3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
6) All users should ensure that they have the latest edition of this publication.
7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
9) IEC draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). IEC takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, IEC had not received notice of (a) patent(s), which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at https://patents.iec.ch. IEC shall not be held responsible for identifying any or all such patent rights.

IEC 60268-7 has been prepared by technical area 20: Analog and digital audio, of IEC technical committee 100: Audio, video and multimedia systems and equipment. It is an International Standard.

This fourth edition cancels and replaces the third edition published in 2010, and Amendment 1 of 2020. This edition constitutes a technical revision.

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

- consolidated with IEC 60268-7:2010/AMD1:2020;
- clause/subclause/annex reconstruction and renumbering;
- addition of effective frequency range of the free-field / diffuse-field compensated frequency response;

- update of measurement methods of modulation distortion and difference-frequency distortion;
- addition of details of two-tone distortion measurements, see Annex I;
- addition of details of left-right tracking response for stereo headphones, see Annex J.

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

Draft	Report on voting
100/4303/FDIS	100/4341/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.

A list of all parts in the IEC 60268 series, published under the general title *Sound system equipment*, can be found on the IEC website.

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.

1 Scope

This part of IEC 60268 is applicable to headphones, earphones, headsets and earsets, intended to be used on, or in, the human ear. It also applies to equipment, such as pre-amplifiers, passive networks and power supplies which form an integral part of the headphone system.

This document does not deal with:

a) safety, for which reference is made to IEC 62368-1 or another appropriate standard;
b) the characteristics of microphones of headsets, for which reference is made to IEC 60268-4;
c) earphones and other devices for hearing aids, for which reference is made to IEC 60118-0;
d) headphones for audiometry;
e) headphones and other devices which form part of an active ear-defender system, although some of the provisions of this document can be applicable;
f) active noise cancelation characteristics as covered by IEC 60268-24.

This document specifies the characteristics which are included by the manufacturer in specifications, and relevant methods of measurement. It includes a classification of the different types of earphones, mainly characterized by the way in which the transducer is coupled acoustically to the ear, and a classification code which can also be used for marking.

Rated conditions and characteristics in this document provided by the manufacturer are not generally intended for external verification. Measurement methods for rated characteristics are informative and are provided for the benefit of manufacturers for the purpose of test repeatability and data comparison. All other specifications and tests are provided for testing by the manufacturer and for external testing and verification.

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 60038, *IEC standard voltages*

IEC 60050-801, *International Electrotechnical Vocabulary – Part 801: Acoustics and electroacoustics*, available at https://www.electropedia.org

IEC 60086-1, *Primary batteries – Part 1: General*

IEC 60263, *Scales and sizes for plotting frequency characteristics and polar diagrams*

IEC 60268-1, *Sound system equipment – Part 1: General*

IEC 60268-2, *Sound system equipment – Part 2: Explanation of general terms and calculation methods*

IEC 60268-11, *Sound system equipment – Part 11: Application of connectors for the interconnection of sound system components*

IEC 60268-12, *Sound system equipment – Part 12: Application of connectors for broadcast and similar use*

IEC 60318-4, *Electroacoustics – Simulators of human head and ear – Part 4: Occluded-ear simulator for the measurement of earphones coupled to the ear by means of ear inserts*

IEC 60318-7, *Electroacoustics – Simulators of human head and ear – Part 7: Head and torso simulator for the measurement of sound sources close to the ear*

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

ISO 266:1997, *Acoustics – Preferred frequencies*

ISO 48-4:2018, *Rubber, vulcanized or thermoplastic – Determination of hardness – Part 4: Indentation hardness by durometer method (Shore hardness)*

ISO 3741, *Acoustics – Determination of sound power levels and sound energy levels of noise sources using sound pressure – Precision methods for reverberation test rooms*

ISO 4869-3, *Acoustics – Hearing protectors – Part 3: Measurement of insertion loss of ear-muff type protectors using an acoustic test fixture*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60050-801 (IEV) 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

Any device defined in 3.1 to 3.15 and their connector(s) for electrical input should be regarded as part of the transducer.

3.1
earphone
electroacoustic transducer intended to be closely coupled to the ear

[SOURCE: IEC 60050-801:1994, 801-27-18, modified – Reference to acoustical oscillations has been omitted from the definition.]

3.2
headphone
assembly of one or two earphones on a headband

Note 1 to entry: The use of a headband (or chin-band) can be optional, e.g. in the case of intra-concha or insert devices.

[SOURCE: IEC 60050-801:1994, 801-27-20, modified – Note to entry added.]

3.3
headset
headphones equipped with a microphone

3.4
earset
earphones equipped with a microphone

3.5
insert earphone
small earphone that is attached directly to a connecting element, for example an earmould, inserted into the ear canal

[SOURCE: IEC 60050-801:1994, 801-27-22, modified – Reference to outer ear has been omitted from the definition.]

3.6
intra-concha earphone
small earphone that fits in the concha cavity, with its acoustic exit close to the entrance of the ear canal

3.7
supra-aural earphone
earphone applied externally to the outer ear and intended to rest on the pinna

[SOURCE: IEC 60050-801:1994, 801-27-23, modified – The wording "and intended to rest on the pinna" has been added to the definition.]

3.8
supra-concha earphone
earphone intended to rest on the ridges of the concha cavity

3.9
circumaural earphone
earphone having a cavity large enough to cover the region of the head including the ear

[SOURCE: IEC 60050-801:1994, 801-27-24]

3.10
ear shell
circumaural type of earphone hanging on the ear

3.11
stethoscopic headphone
insert headphone by which the earphone or earphones are coupled to the ears by means of a pair of rigid tubes, so that the assembly resembles a stethoscope

3.12
acoustically open earphone
earphone which intentionally provides an acoustic path between the external environment and the ear canal

3.13
acoustically closed earphone
earphone which is intended to prevent acoustic coupling between the external environment and the ear canal

3.14
closed-back earphone
earphone which does not emit significant sound radiation from the back of the transducer to the external environment

3.15
open-back earphone
earphone which emits significant sound radiation from the back of the transducer to the external environment

3.16
simulated programme signal
signal whose mean power spectral density closely resembles the average of the mean power spectral densities of a wide range of programme material, in accordance with IEC 60268-1

Note 1 to entry: This signal is called a "wide band signal" in a few standards.

3.17
head and torso simulator
HATS
simulator of a median adult human head and part of the torso extending in total from the top of the head to the waist and designed to simulate the sound pick-up characteristics and acoustic diffraction

Note 1 to entry: The head and torso simulator includes two pinna simulators, and at least one occluded-ear simulator.

[SOURCE: IEC 60318-7:2022, 3.1, modified – The preferred term "manikin" has been omitted, and the abbreviated term "HATS" added.]

4 Classification, designation and coding

The following designations and classification codes shall be used:

60268-7 – IEC – XXXX – NNRN – N

where

60268-7-IEC is the standard form of prefix.

- X (first letter) gives the principle of the transducer:
  - D - electrodynamic (moving coil);
  - E - electret (self-polarizing);
  - F - piezoelectric (polymer);
  - M - electromagnetic (moving armature or diaphragm);
  - P - piezoelectric (ceramic);
  - S - electrostatic (externally polarized).
- X (second letter) gives the type of earphone:
  - C - circumaural;
  - E - intra-concha;
  - H - ear shell;
  - I - insert;
  - M - supra-concha;
  - S - supra-aural;
  - T - stethoscopic.

An illustration of the types of earphones, except "H", is given in Figure 1.

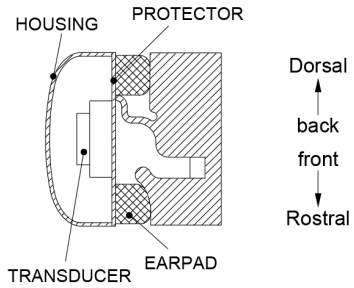
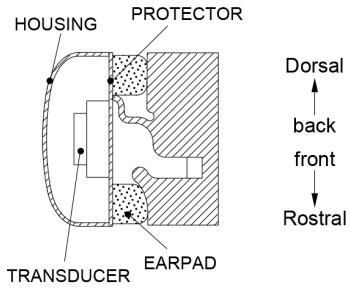
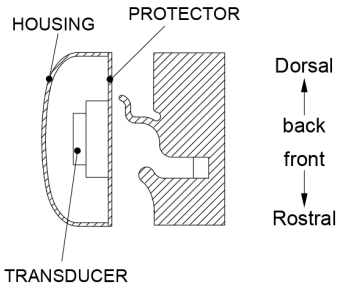
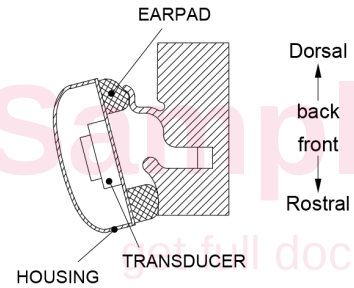
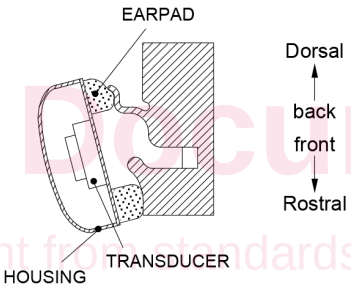
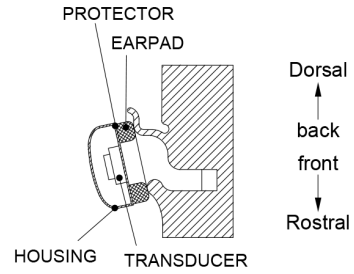
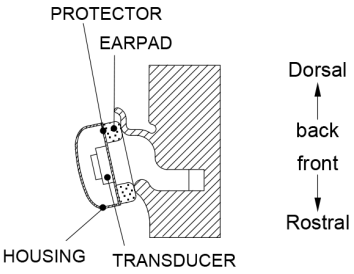
- X (third letter) gives the intended nature of the acoustic coupling to the ear canal:
  - L - acoustically open (controlled leakage);
  - S - acoustically closed (minimum leakage).
- X (fourth letter) gives the intended nature of the radiation to the external environment:
  - C - closed-back (see 3.14);

O - open-back (see 3.15).

An illustration of the four possibilities defined in 3.12 to 3.15, and indicated by the third and fourth classification letters, is given in Figure 2:

- NNRN (first number) gives the impedance in ohms in "mantissa and exponent" form. (For example, 8 Ω as "08R0", 32 Ω as "32R0" and 600 Ω as "06R2".);
- N (second number) gives the number of channels.

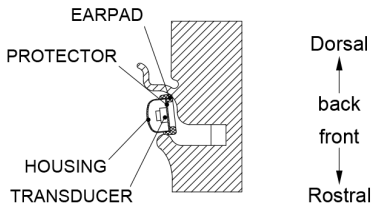
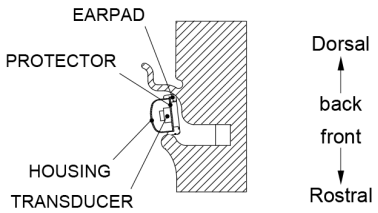
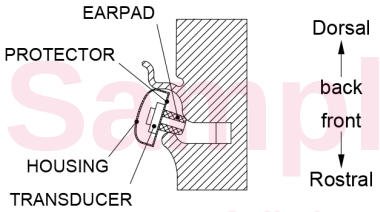
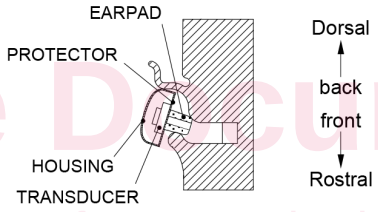
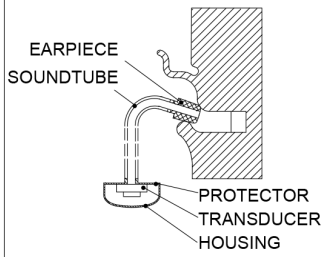
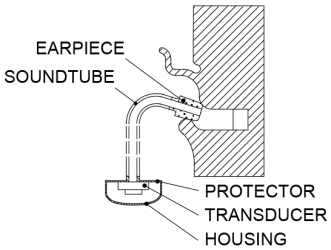
The code, compiled in accordance with the above rules, may be used for marking.

Type of earphone	Acoustically closed earphone (minimum leakage)	Acoustically open earphone (controlled leakage)	Ear loudspeaker
Circumaural			
Supra-aural			
Supra-concha			

IEC

NOTE The transducers shown in the schematics are not necessarily positioned in the centre of the housings or concentric to the ear canal.

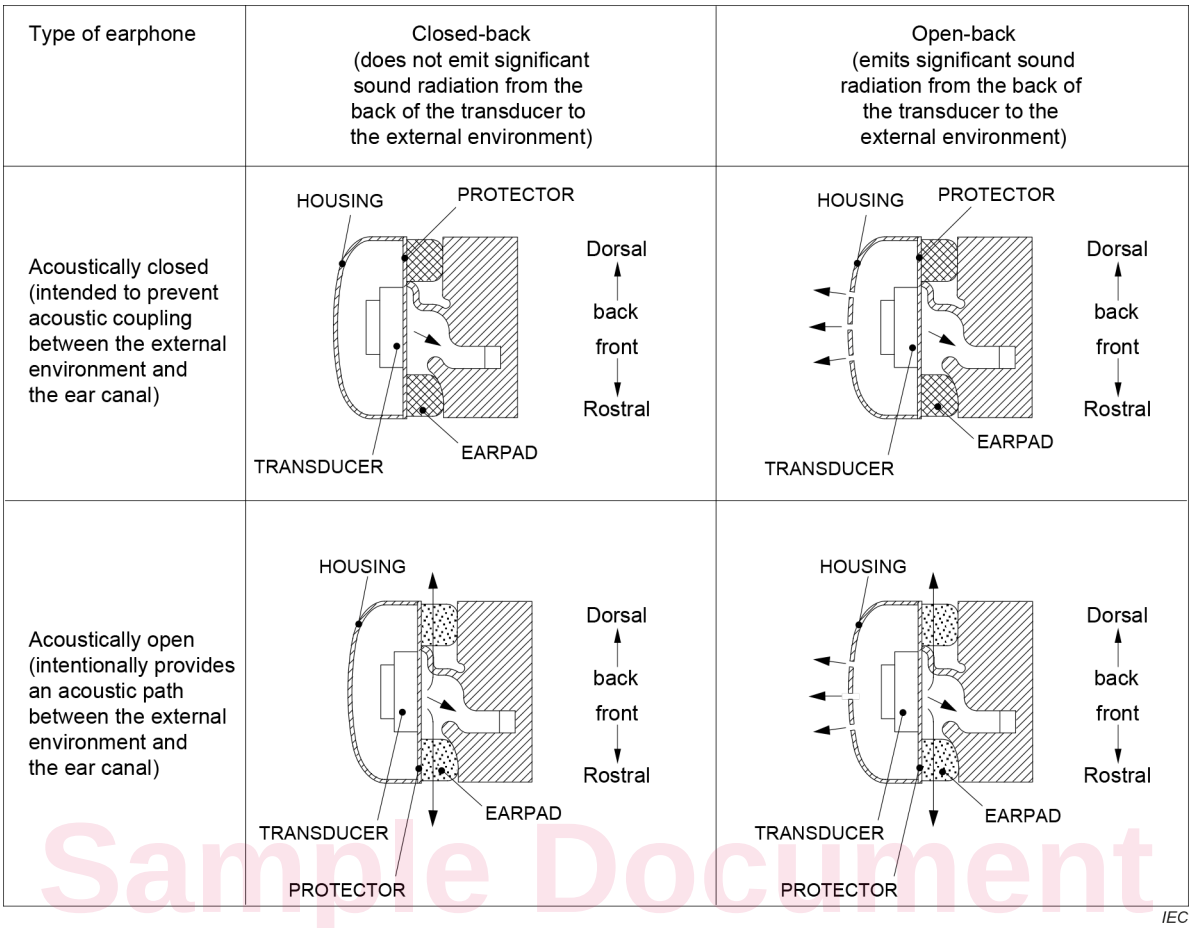
a) Circumaural, supra-aural and supra-concha type earphone

Type of earphone	Acoustically closed earphone (minimum leakage)	Acoustically open earphone (controlled leakage)	
Intra-concha			
Insert			
Insert with sound tube between transducer and earpiece (for example, stethoscopic type of earphone for hearing aid)			Key Cross hatching shows acoustically closed earpad to accomplish minimum leakage. Spotted by small circle shows porous material earpad to accomplish controlled leakage.

IEC

b) Intra-concha, insert and insert with sound tube between transducer and earpiece type earphone

Figure 1 – Diagrammatic horizontal sections showing types of earphones and their spatial relationships with the pinna and/or canal entrance



NOTE 1 Arrows show sound flow or sound leakage.

NOTE 2 The transducers shown in the schematics are not necessarily positioned in the centre of the housings or concentric to the ear canal.

Figure 2 – Diagrams showing the four possible constructions: Acoustically open or closed, and closed- or open-back earphones

5 Marking of terminals, controls and polarity

Requirements for marking terminals and controls are given in IEC 60268-1, and for polarity in IEC 60268-2. In addition, headphones which are intended to be worn with a particular earphone on each ear shall be marked to indicate the "left" and "right" earphones. If a colour marking is used, the "right" earphone shall be indicated by a red marking. For the sake of visually-impaired persons, it is recommended to indicate the left earphone by a projection of at least 1,5 mm diameter and 0,3 mm to 0,5 mm height.