

FINAL VERSION

**Sound system equipment –
Part 7: Headphones and earphones**



CONTENTS

FOREWORD 5

INTRODUCTION to Amendment 1 7

1 Scope 8

2 Normative references 8

3 Terms and definitions 9

4 Classification, designation and coding 11

5 Marking of terminals, controls and polarity 15

6 User instructions 15

7 Conditions for specifications and measurements 16

 7.1 Rated conditions 16

 7.2 Standard conditions for measurement 17

 7.3 Couplers and ear simulators 17

 7.4 Measurement conditions for simulated programme signal 17

 7.5 Loudness comparison conditions 18

 7.5.1 General 18

 7.5.2 Free-field comparison conditions 18

 7.5.3 Diffuse-field comparison conditions 19

 7.6 Ear canal sound pressure level measurement conditions 19

8 Characteristics to be specified and their methods of measurement 19

 8.1 Power supply 19

 8.2 Electrical impedance 19

 8.2.1 Rated impedance 19

 8.2.2 Impedance/frequency characteristic 20

 8.2.3 Rated source impedance 20

 8.3 Input voltage 20

 8.3.1 Rated source e.m.f. 20

 8.3.2 Limiting value of input voltage 20

 8.3.3 Characteristic voltage 21

 8.3.4 Simulated programme signal characteristic voltage 22

 8.3.5 Simulated programme signal characteristic voltage corrected by A-weighting characteristics and free-field response compensation 22

 8.3.6 Protective devices 23

 8.4 Input power 23

 8.5 Sound pressure (level) 24

 8.5.1 General 24

 8.5.2 Characteristics to be specified 24

 8.5.3 Method of measurement 24

 8.6 Frequency response 25

 8.6.1 General 25

 8.6.2 Coupler or ear simulator (including HATS) frequency response 25

 8.6.3 Free-field comparison frequency response 26

 8.6.4 Diffuse-field comparison frequency response 27

 8.6.5 Free-field and diffuse-field ear canal sound pressure level frequency responses 27

 8.6.6 Rated frequency range 29

 8.6.7 Free-field compensated frequency response 29

8.6.8	Diffuse-field compensated frequency response	30
8.7	Amplitude non-linearity	31
8.7.1	General	31
8.7.2	Harmonic distortion	31
8.7.3	Modulation distortion	32
8.7.4	Difference-frequency distortion	32
8.8	Rated climatic conditions	33
8.9	External electric and/or magnetic field	33
8.9.1	Characteristics to be specified	33
8.9.2	Method of measurement	33
8.10	Unwanted sound radiation	34
8.10.1	Characteristic to be specified	34
8.10.2	Method of measurement	34
8.11	Sound attenuation	34
8.11.1	Characteristic to be specified	34
8.11.2	Method of measurement	34
8.12	Crosstalk attenuation for multi-channel headphones	34
8.12.1	Characteristic to be specified	34
8.12.2	Method of measurement	34
8.13	Application force	34
8.13.1	Characteristic to be specified	35
8.13.2	Method of measurement	35
8.14	Physical characteristics, cables and connectors	35
8.14.1	Characteristics to be specified	35
9	Classification of characteristics	36
Annex A (normative) Pinna simulators for measurements of headphones and earphones		37
Annex B (normative) Specification and conditions of use of a microphone for use inside the ear canal		46
Annex C (informative) Practical details of free-field comparison conditions		47
Annex D (informative) Practical details of diffuse-field comparison conditions		48
Annex E (informative) Practical details of the subjective comparison and ear canal sound pressure level conditions		49
Bibliography		50
Figure 1 – Diagrammatic horizontal sections showing types of earphones and their spatial relationships with the pinna and/or canal entrance		13
Figure 2 – Diagrams showing the four possible construction: acoustically open or closed, and closed- or open-back		15
Figure 3 – Illustrated measurement diagram by simulated programme signal		18
Figure 4 – Example of a setup for the measurement of free-field/ diffuse-field compensated frequency response		31
Figure A.1 – Shape of the recommended pinna simulator		38
Figure A.2 – Coordinate for the recommended pinna simulator		39
Figure A.3 – Cross-sectional shapes and dimensions of the recommended pinna simulator, horizontal section		42
Figure A.4 – Cross-sectional shapes and dimensions of the recommended pinna simulator, vertical section		45

Table 1 – Classification of characteristics 36

Currently in preview, click buy full version

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 Publications"). 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) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

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

IEC 60268-7 edition 3.1 contains the third edition (2010-01) [documents 100/1621/FDIS and 100/1641/RVD] and its corrigendum (2012-11), and its amendment 1 (2020-09) [documents 100/3316/CDV and 100/1641/RVD].

This Final version does not show where the technical content is modified by amendment 1. A separate Redline version with all changes highlighted is available in this publication.

International Standard IEC 60268-7 has been prepared by IEC technical committee TC 100: Audio, video and multimedia systems and equipment.

This third edition constitutes a technical revision. This edition contains the following changes:

- clause/subclause renumbering in accordance with ISO/IEC Directives, Part 2;
- addition of a measurement system using HATS;
- addition of details on pinna simulators for high measurement reproducibility, see Annex A.

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

A list of all parts of IEC 60268 series, published under the general title *Sound system equipment*, 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.

A bilingual version of this publication may be issued at a later date.

INTRODUCTION to Amendment 1

This Amendment 1 contains the following significant technical changes with respect to IEC 60268-7:2010:

- evaluation of free-field compensated frequency response has been added;
- evaluation of diffuse-field compensated frequency response has been added;
- the Bibliography has been updated;
- some normative references have been updated;
- the term "HATS" and its definition has been added.

Currently in preview, click buy full version

SOUND SYSTEM EQUIPMENT –

Part 7: Headphones and earphones

1 Scope

This part of IEC 60268, is applicable to headphones, headsets, earphones 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.

It does not deal with:

- a) safety, for which reference should be made to IEC 62368-1 or another appropriate standard;
- b) the characteristics of microphones of headsets, for which reference should be made to IEC 60268-4;
- c) earphones and other devices for hearing aids, for which reference should be made to IEC 60118-0;
- d) headphones for audiometry;
- e) headphones and other devices which form part of an active noise defender system, although some of its provisions may be applicable.

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

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.

IEC 60038, *IEC standard voltages*

IEC 60050(801):1996, *International Electrotechnical Vocabulary – Chapter 801: Acoustics and electroacoustics*

IEC 60068-1, *Environmental testing – Part 1: General and guidance*

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

IEC Guide 106, *Guide for specifying environmental conditions for equipment performance testing*

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*