SLOVENSKI STANDARD
SIST EN IEC 60318-8:2022

01-julij-2022

Elektroakustika - Simulatorji človeške glave in ušes - 8. del: Akustični spojnik za visokofrekvenčne meritve slušnih pripomočkov in slušalk, ki so na ušesa pritrjeni z ušesnimi vstavki (IEC 60318-8:2022)

Electroacoustics - Simulators of human head and ear - Part 8: Acoustic coupler for highfrequency measurements of hearing aids and earphones coupled to the ear by means of ear inserts (IEC 60318-8:2022)

Akustik - Simulatoren des menschlichen Kopfes und Ohres - Teil 8: Akustischer Kuppler zur Hochfrequenzmessung von Hörgeräten und Kopfhörern die mit dem Ohr mittels Ohreinsätzen gekoppelt sind (IEC 60318-8:2022)

Electroacoustique - Simulateurs de tête et d'oreille humaines - Partie 8: Coupleur acoustique pour les mesurages à hautes fréquences des appareils de correction auditive et des écouteurs couplés à l'oreille par des embouts (IEC 60318-8:2022)

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13.140	Vpliv hrupa na ljudi	Noise with respect to human beings
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SIST EN IEC 60318-8:2022 **en**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN IEC 60318-8

May 2022

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English Version

Electroacoustics - Simulators of human head and ear - Part 8: Acoustic coupler for high-frequency measurements of hearing aids and earphones coupled to the ear by means of ear inserts (IEC 60318-8:2022)

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(IEC 60318-8:2022)

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European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

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

European foreword

The text of document 29/1111/FDIS, future edition 1 of IEC 60318-8, prepared by IEC/TC 29 "Electroacoustics" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 60318-8:2022.

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) 2023-02-12
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2025-05-12

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The text of the International Standard IEC 60318-8:2022 was approved by CENELEC as a European Standard without any modification.

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

IEC 60318-5	NOTE Harmonized as EN 60318-5
IEC 60318-4	NOTE Harmonized as EN 60318-4
IEC 60118-0	NOTE Harmonized as EN 60118-0
IEC 61094-4	NOTE Harmonized as EN 61094-4
IEC 61094-2:2009	NOTE Harmonized as EN 61094-2:2009 (not modified)
IEC 60318-1:2009	NOTE Harmonized as EN 60318-1:2009 (not modified)
IEC 61094-6	NOTE Harmonized as EN 61094-6

IEC 60318-8

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INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

Electroacoustics – Simulators of human head and ear – Part 8: Acoustic coupler for high-frequency measurements of hearing aids and earphones coupled to the ear by means of ear inserts

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ELECTROACOUSTICS – SIMULATORS OF HUMAN HEAD AND EAR –

Part 8: Acoustic coupler for high-frequency measurements of hearing aids and earphones coupled to the ear by means of ear inserts

FOREWORD

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IEC 60318-8 has been prepared by IEC technical committee 29: Electroacoustics. It is an International Standard.

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

Draft	Report on voting
29/1111/FDIS	29/1117/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/standardsdev/publications.

A list of all parts in the IEC 60318 series, published under the general title *Electroacoustics – Simulators of human head and ear*, can be found on the IEC website.

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

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INTRODUCTION

Advancement in hearing aid design makes it possible to increase the bandwidth of hearing aids up to 16 kHz.

The 2 cm^3 coupler as described in IEC 60318-5 [1][1] is suitable for measurements up to 8 kHz. At frequencies above 8 kHz, high measurement uncertainty will occur in earphone responses, due to acoustic resonances in the coupler.

The occluded-ear simulator as described in IEC 60318-4 [2] simulates the human external ear up to 10 kHz and can be used as an acoustic coupler up to 16 kHz. It is designed with a principal cavity length which produces a half-wavelength resonance of the sound pressure at approximately 13,5 kHz. This resonance, which is also present in a person's ear canal but more controlled by the tympanic membrane, can also cause measurement uncertainty in earphone responses above 10 kHz.

Accordingly, there is a need for a well-defined and robust acoustic coupler to be used by designers of transducers (receiver, earphone), and by the designer and dispensers of hearing aids when making measurements on earphones in the frequency range 8 kHz to 16 kHz.

The sound pressure developed by an earphone is, in general, not the same in an acoustic coupler as in a person's ear. However, results obtained with an acoustic coupler can be used as a simple and ready means for the exchange of specifications and test data on hearing aids and insert earphones used in audiometry.

This document describes an acoustic coupler for loading a hearing aid or insert earphone with a specified acoustic impedance when testing acoustic performance, in the frequency range up to 16 kHz, as required in IEC 60118-0 [3].

[1] Numbers in square brackets refer to the Bibliography.

ELECTROACOUSTICS – SIMULATORS OF HUMAN HEAD AND EAR –

Part 8: Acoustic coupler for high-frequency measurements of hearing aids and earphones coupled to the ear by means of ear inserts

1 Scope

This part of IEC 60318 describes an acoustic coupler for loading a hearing aid or insert earphone with a specified acoustic impedance when testing its acoustic performance, in the frequency range up to 16 kHz. It is suitable for air-conduction hearing aids and earphones, coupled to the ear by means of ear inserts, earmoulds or similar devices.

The acoustic coupler does not simulate the human ear. However, it has an effective volume of only 0,4 cm^3, which is small enough not to produce significant resonances in the coupler in the frequency range below 16 kHz. Therefore, it will load the earphone with a known acoustic impedance, which allows repeatable measurements with low uncertainty to be obtained on earphones used in extended high-frequency audiometry.

2 Normative references

There are no normative references in this document.

3 Terms, definitions and abbreviated terms

For the purposes of this document, the following terms and definitions apply.

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

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

3.1 Terms and definitions

3.1.1
acoustic coupler
device for measuring the acoustic output of sound sources where the sound pressure is measured by a calibrated microphone coupled to the source by a cavity of predetermined shape and volume which does not necessarily approximate the acoustic impedance of the normal human ear

3.1.2
earmould simulator
ear insert simulator
insert which terminates the entrance of the acoustic coupler and provides for passage of sound into the acoustic coupler through an opening on its axis

3.1.3
reference plane
plane perpendicular to the axis of the cavity of the acoustic coupler, chosen to pass through the position normally occupied by the tip of an earmould

3.1.4
acoustic transfer impedance
quotient of sound pressure at the diaphragm of the acoustic coupler's microphone by the volume velocity through the reference plane

3.1.5
reference cavity
cylindrical cavity with the same nominal diameter and volume as the acoustic coupler under test, establishing a volume that can be measured using precision dimensional measurements

3.1.6
effective coupler volume
equivalent volume of air of the acoustic compliance of the coupler formed by the cavity and the microphone at a frequency of 250 Hz

3.1.7
effective length of coupling tubing
length of the coupling tubing that extends from the output of the receiver or BTE ear hook to the coupler reference plane

Note 1 to entry: The actual length of tubing used can deviate from the effective length of coupling tubing, for example, (a) the overlap resulting from the connection to the ear hook or hearing aid receiver can increase the actual length of tubing used, whereas (b) connection to the nipple of the coupling plate or earmould simulator, which is considered part of the effective length of coupling tubing, can reduce the actual length of tubing used accordingly. See Figure 1, Figure 4 and Figure 5.

3.2 Abbreviated terms

CIC completely-in-the-canal
ITC in-the-canal
IIC invisible-in-the-canal
ITE in-the-ear
BTE behind-the-ear
RIC receiver-in-the-canal
SPL sound pressure level

4 Mechanical design of the 0,4 cm^3 coupler

4.1 General

4.1.1 Overall design guidelines

The coupler consists essentially of a cylindrical cavity whose effective coupler volume is nominally 400 mm^3. A microphone with a diaphragm having high acoustic impedance is located in the base of the cylindrical cavity. A protection grid can be fitted but it is not required. The microphone measures the sound pressure level (SPL) in the coupler.

The coupler shall be made of a material that has no negative influences on its performance. For example, it should be acoustically hard and dimensionally stable. The general construction of the coupler and mounting of the microphone shall be designed to reduce the response to vibration of any earphone or to sound outside the cavity.

The external diameter of the coupler should be kept as small as possible in order to minimise diffraction errors which can affect the measurements when the coupler is placed in a sound field. See Annex C.