

STN	Elektroakustika Simulátory ľudskej hlavy a ucha Časť 7: Simulátor ucha a trupu na meranie zdrojov zvuku v blízkosti ucha	STN EN IEC 60318-7 36 8820
------------	---------------------------------------------------------------------------------------------------------------------------------------------------------------	----------------------------------------------------

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

Táto norma obsahuje anglickú verziu európskej normy.
This standard includes the English version of the European Standard.

Táto norma bola oznámená vo Vestníku ÚNMS SR č. 11/22

Obsahuje: EN IEC 60318-7:2022, IEC 60318-7:2022

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN IEC 60318-7

August 2022

ICS 17.140.50

English Version

**Electroacoustics - Simulators of human head and ear - Part 7:
Head and torso simulator for the measurement of sound sources
close to the ear
(IEC 60318-7:2022)**

Électroacoustique - Simulateurs de tête et d'oreille
humaines - Partie 7: Simulateur de tête et de torse pour le
mesurage des sources sonores à proximité de l'oreille
(IEC 60318-7:2022)

Akustik - Simulatoren des menschliches Kopfes und Ohres
- Teil 7: Kopf- und Rumpfsimulator für Messungen an
ohnahen Schallquellen
(IEC 60318-7:2022)

This European Standard was approved by CENELEC on 2022-07-19. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre 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 CEN-CENELEC Management Centre has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.



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

EN IEC 60318-7:2022 (E)**European foreword**

The text of document 29/1118/FDIS, future edition 1 of IEC 60318-7, prepared by IEC/TC 29 "Electroacoustics" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 60318-7:2022.

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) 2023-04-19
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2025-07-19

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC shall not be held responsible for identifying any or all such patent rights.

Any feedback and questions on this document should be directed to the users' national committee. A complete listing of these bodies can be found on the CENELEC website.

Endorsement notice

The text of the International Standard IEC 60318-7:2022 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 60268-7 NOTE Harmonized as EN 60268-7

ISO 11904-2 NOTE Harmonized as EN ISO 11904-2

IEC 61094-4 NOTE Harmonized as EN 61094-4

ISO 4869-1 NOTE Harmonized as EN ISO 4869-1

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

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.

NOTE 1 Where an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cenelec.eu.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60118-8	-	Electroacoustics - Hearing aids - Part 8: Methods of measurement of performance characteristics of hearing aids under simulated in situ working conditions	EN 60118-8	-
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	EN 60318-4	-
IEC 61260-1	-	Electroacoustics - Octave-band and fractional-octave-band filters - Part 1: Specifications	EN 61260-1	-
ISO 3	-	Preferred numbers - Series of preferred numbers	-	-



IEC 60318-7

Edition 1.0 2022-06

INTERNATIONAL STANDARD

NORME INTERNATIONALE



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

**Électroacoustique – Simulateurs de tête et d'oreille humaines –
Partie 7: Simulateur de tête et de torse pour le mesurage des sources sonores à
proximité de l'oreille**



THIS PUBLICATION IS COPYRIGHT PROTECTED
Copyright © 2022 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester. If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

Droits de reproduction réservés. Sauf indication contraire, aucune partie de cette publication ne peut être reproduite ni utilisée sous quelque forme que ce soit et par aucun procédé, électronique ou mécanique, y compris la photocopie et les microfilms, sans l'accord écrit de l'IEC ou du Comité national de l'IEC du pays du demandeur. Si vous avez des questions sur le copyright de l'IEC ou si vous désirez obtenir des droits supplémentaires sur cette publication, utilisez les coordonnées ci-après ou contactez le Comité national de l'IEC de votre pays de résidence.

IEC Secretariat
3, rue de Varembe
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. 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 22 300 terminological entries in English and French, with equivalent terms in 19 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. 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 22 300 articles terminologiques en anglais et en français, ainsi que les termes équivalents dans 19 langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International (IEV) en ligne.



IEC 60318-7

Edition 1.0 2022-06

INTERNATIONAL STANDARD

NORME INTERNATIONALE



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

**Électroacoustique – Simulateurs de tête et d'oreille humaines –
Partie 7: Simulateur de tête et de torse pour le mesurage des sources sonores à
proximité de l'oreille**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

ICS 17.140.50

ISBN 978-2-8322-0857-1

**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

FOREWORD.....	4
1 Scope.....	6
2 Normative references	6
3 Terms and definitions	6
4 Construction	11
4.1 General.....	11
4.2 Geometrical dimensions of the manikin	11
4.2.1 Head and torso	11
4.2.2 Pinna simulators for hearing aid measurements.....	13
4.2.3 Ear canal extension	14
4.2.4 Ear simulator	16
4.2.5 Materials	16
4.3 Acoustical characteristics of the manikin	17
4.3.1 Free-field frequency response	17
4.3.2 Diffuse-field frequency response.....	19
4.3.3 Acceptance intervals	20
4.3.4 Openings.....	20
5 Calibration.....	21
5.1 Reference environmental conditions	21
5.2 Calibration method.....	21
5.2.1 General	21
5.2.2 Test signal, test space and measurement equipment.....	21
5.2.3 Measurement of sound pressure level.....	22
5.2.4 Alignment of manikin azimuth and elevation	23
5.2.5 Test for sound leakage	23
6 Marking and instruction manual	23
6.1 Markings of the manikin	23
6.2 Instruction manual	24
7 Maximum permitted uncertainty of measurements	24
Annex A (informative) Design example of an anatomically shaped manikin	26
Annex B (informative) Design examples of a geometrically shaped manikin	27
Annex C (informative) Relationship between tolerance interval, corresponding acceptance interval and the maximum permitted uncertainty of measurement.....	29
Annex D (informative) 3D representation of example pinna simulators	30
D.1 Background.....	30
D.2 Scanning technique	30
D.3 Examples of pinna simulator shape.....	30
D.4 Verification of conformance.....	31
Bibliography.....	32
Figure 1 – Manikin geometrical references.....	8
Figure 2 – Coordinate scheme for azimuth and elevation angles.....	9
Figure 3 – Illustration of manikin head and torso dimensions	12
Figure 4 – Illustration of manikin pinna simulator dimensions	15
Figure A.1 – Example of an anatomically shaped manikin	26

Figure B.1 – Example 1 of a geometrically shaped manikin.....	27
Figure B.2 – Example 2 of a geometrically shaped manikin.....	28
Figure C.1 – Relationship between tolerance interval, corresponding acceptance interval and the maximum permitted uncertainty of measurement	29
Figure D.1 – Example of a pinna simulator (embedded 3D PDFs)	31
Table 1 – Manikin head and torso dimensions.....	13
Table 2 – Dimensions of the pinna simulator and the cylindrical ear canal extension of the manikin	15
Table 3 – Dimensions of the pinna simulator and the tapered ear canal extension of the manikin	16
Table 4 – Free-field frequency response of the manikin (right ear) for an azimuth angle of 0° in one-twelfth-octave bands.....	18
Table 5 – Free-field frequency responses of the manikin (right ear) for azimuth angles of 90°, 180° and 270° in one-twelfth-octave bands	19
Table 6 – Diffuse-field frequency response of the manikin (right ear) in one-third-octave bands	20
Table 7 – Maximum permitted uncertainty U_{\max} for type approval measurements	25

INTERNATIONAL ELECTROTECHNICAL COMMISSION

ELECTROACOUSTICS – SIMULATORS OF HUMAN HEAD AND EAR –

Part 7: Head and torso simulator for the measurement of sound sources close to the ear

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) 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.

IEC 60318-7 has been prepared by IEC technical committee 29: Electroacoustics. It is an International Standard.

This publication contains attached files in the form of 3D PDF files. These files are intended to be used as a complement and do not form an integral part of the publication.

This edition cancels and replaces IEC TS 60318-7:2017. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to IEC TS 60318-7:2017:

- a) changing the title;
- b) extending the scope to sound sources close to the ear.

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

Draft	Report on voting
29/1118/FDIS	29/1121/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.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

ELECTROACOUSTICS – SIMULATORS OF HUMAN HEAD AND EAR –

Part 7: Head and torso simulator for the measurement of sound sources close to the ear

1 Scope

This part of IEC 60318 describes a head and torso simulator, or manikin, intended for the measurement of sound sources placed close to the ear in the frequency range from 100 Hz to 16 000 Hz.

The manikin described in this document is intended for airborne acoustic measurements only. It is not suitable for measurements which depend upon vibration transmission paths such as bone conduction, or for measurements requiring the simulation of bone or tissue.

This document specifies the manikin in terms of both its geometrical dimensions and its acoustical properties. Only manikins compliant with both sets of specifications are in conformance with 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 60118-8, *Electroacoustics – Hearing aids – Part 8: Methods of measurement of performance characteristics of hearing aids under simulated in situ working conditions*

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 61260-1, *Electroacoustics – Octave-band and fractional-octave-band filters – Part 1: Specifications*

ISO 3, *Preferred numbers – Series of preferred numbers*

koniec náhľadu – text ďalej pokračuje v platenej verzii STN