SLOVENSKI STANDARD
SIST EN 61669:2002

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Electroacoustics - Equipment for the measurements of real-ear acoustical characteristics of hearing aids (IEC 61669:2001)

Electroacoustics - Equipment for the measurement of real-ear acoustical characteristics of hearing aids

Elektroakustik - Geräte zur Messung der Kenndaten von Hörgeräten am menschlichen Ohr

Electroacoustique - Appareillage pour la mesure des caractéristiques acoustiques des appareils de correction auditive sur l'oreille réelle

Ta slovenski standard je istoveten z: **EN 61669:2001**

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11.180.15	Pripomoļki za gluhe osebe in osebe z okvaro sluha	Aids for deaf and hearing impaired people
17.140.50	Elektroakustika	Electroacoustics

SIST EN 61669:2002 **en**

EUROPEAN STANDARD **EN 61669**

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ICS 17.140.50

English version

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

CENELEC members are the national electrotechnical committees of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CENELEC

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

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Foreword

The text of document 29/476/FDIS, future edition 1 of IEC 61669, prepared by IEC TC 29, Electroacoustics, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 61669 on 2001-03-01.

The following dates were fixed:

- latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2001-12-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2004-03-01

Annexes designated "normative" are part of the body of the standard.
In this standard, annex ZA is normative.
Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 61669:2001 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 60118-0 NOTE: Harmonized as HD 450.0 S1:1984 (not modified).

IEC 60118-7 NOTE: Harmonized as EN 60118-7:1993 (not modified).

CONTENTS

INTRODUCTION

The performance characteristics of hearing aids in actual use can differ significantly from those determined in accordance with standards such as IEC 60118-0, and IEC 60118-7, due to differing acoustic influence and coupling presented by individual ears. Measuring methods that take into account the acoustic coupling and the acoustic influence of the individual wearer on the performance of hearing aids are therefore important in the fitting of these devices. Such measuring methods have come to be known as "real-ear measurements" and are sometimes performed clinically in less than ideal acoustic environments. The accuracy and repeatability of measurements made under such conditions are complex functions of the sound field, the test environment, the nature of the test signal, the hearing aid under evaluation, the method of test signal control, the location of the sound source, the nature of the data acquisition, analysis and presentation as well as the degree of subject movement permitted.

This International Standard specifies performance requirements separate from the test requirements to show conformity. Conformance to the specifications in this International Standard is demonstrated only when the result of a measurement, extended by the actual expanded uncertainty of measurement of the testing laboratory, lies fully within the tolerances specified in this International Standard extended by the values for U_{max} given in table 1.

ELECTROACOUSTICS – EQUIPMENT FOR THE MEASUREMENT OF REAL-EAR ACOUSTICAL CHARACTERISTICS OF HEARING AIDS

1 Scope

This International Standard specifies the general requirements for test equipment designed for use in measuring the real-ear acoustical characteristics of hearing aids and describes the terminology used.

The purpose of this International Standard is to ensure that measurements of real-ear acoustical characteristics of a hearing aid on a given human ear, performed with different test equipment which comply with this International Standard using methods described in ISO 12124, shall give substantially the same results.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of the ISO/IEC Directives are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

IEC 60601-1, *Medical electrical equipment – Part 1: General requirements for safety*

IEC 60601-1-2, *Medical electrical equipment – Part 1: General requirements for safety – 2. Collateral standard: Electromagnetic compatibility – Requirements and tests*

IEC 60601-1-4, *Medical electrical equipment – Part 1: General requirements for safety – 4. Collateral standard: Programmable electrical medical systems*

IEC 60645-1, *Audiometers – Part 1: Pure tone audiometers*

IEC 60942, *Electroacoustics – Sound calibrators*

ISO 266, *Acoustics – Preferred frequencies*

3 Terms and definitions

For the purpose of this International Standard, the following terms and definitions apply:

3.1
test signal
acoustic signal at the field reference point

3.2
subject
person in whose ear the hearing aid performance is characterized

3.3
subject reference point
point bisecting the line joining the centres of the openings of the ear canals of the subject (at the junction between concha and ear canal)

NOTE In cases of severe head shape abnormality or asymmetry, it may not be easy to determine the reference point of the subject. The subject reference point used should then be stated.

3.4
test axis
line joining the subject reference point to the sound source passing along the axis of the sound source

3.5
working distance
distance from the subject reference point to the plane of the mounting ring or protective grille of the sound source measured along the test axis

3.6
sound pressure level (SPL)
twenty times the logarithm to the base 10 of the ratio of a given root-mean-square sound pressure to the reference sound pressure

(IEV 801-22-07, modified)

NOTE Throughout this International Standard all sound pressure levels refer to 20 µPa.

3.7
band sound pressure level
sound pressure level measurement for a defined band

3.8
test signal level
level of the test signal expressed as a sound pressure level in decibels (dB)

NOTE For broad-band signals, the frequency spectrum should be specified and stated.

3.9
equalization
process of controlling the test signal level as a function of frequency such that it does not vary from the desired level

3.10
reference microphone
controlling microphone
microphone used to measure the test signal level in the measurement process and/or to control it in the equalization process

3.11
sound inlet
aperture through which sound enters a microphone and at which the microphone is calibrated

NOTE In the case of a probe microphone (see 3.13) which includes an extension tube, this will be the open end of the probe tube.

3.12
field reference point
point at which the sound inlet of the reference microphone is located during equalization and/or measurement

3.13
probe microphone
microphone adapted to determine the sound pressure level in the ear canal

NOTE The probe microphone may include an extension tube.

3.14
test ear
ear of the subject in which the sound inlet of the probe microphone is placed

3.15
measurement point
point in the ear canal of the test ear at which the sound inlet of the probe microphone is placed

3.16
test signal type
identification of the test signal in terms of its frequency spectrum and/or temporal properties

3.17
concurrent equalization
real time equalization

equalization performed at the time of measurement based on the monitoring of the test signal level

3.18
stored equalization
equalization performed at the time of measurement based on data recorded during a prior measurement of the sound field

3.19
substitution method
method of measurement using stored equalization with the reference microphone located at the subject reference point and the subject absent during the recording of the sound field data

3.20
modified pressure method
method of measurement using stored or concurrent equalization with the field reference point near the surface of the head close to the test ear, but outside the acoustic influence of the pinna and the hearing aid

NOTE The exact location of the field reference point should be specified by its perpendicular distance from the surface of the head and its distance (in millimetres) forward of and above or below the centre of the ear canal entrance.

3.21
differential comparison
measurement in which the test signal level is subtracted from the SPL at the measurement point

NOTE When using broad-band signals, band sound pressure levels should be used.

3.22
real-ear unaided response (REUR)
SPL as a function of frequency at the measurement point for a specified test signal level with the ear canal unoccluded

3.23
real-ear unaided gain (REUG)
difference, in decibels, between the SPL at the measurement point and the test signal level, as a function of frequency, with the ear canal unoccluded

NOTE When using broad-band signals, band sound pressure levels should be used.

3.24
real-ear occluded response (REOR)
SPL as a function of frequency at the measurement point for a specified test signal level with the hearing aid in place and turned off

3.25
real-ear occluded gain (REOG)
difference, in decibels, between the SPL at the measurement point and the test signal level, as a function of frequency, with the hearing aid in place and turned off

NOTE When using broad-band signals, band sound pressure levels should be used.

3.26
real-ear aided response (REAR)
SPL as a function of frequency at the measurement point for a specified test signal level, with the hearing aid in place and turned on

3.27
real-ear aided gain (REAG)
difference, in decibels, between the SPL at the measurement point and the test signal level, as a function of frequency, with the hearing aid in place and turned on

NOTE When using broad-band signals, band sound pressure levels should be used.

3.28
real-ear insertion gain (REIG)
difference, in decibels, between aided response and unaided response (REIG = REAR – REUR), or between aided gain and unaided gain (REIG = REAG – REUG), expressed as a function of frequency

NOTE Definitions 3.26 and 3.22 are derived using the same test signal level.

3.29
curve
real-ear acoustical characteristics (definitions 3.22 to 3.28) expressed and graphically displayed as a function of frequency

EXAMPLE Real-ear aided response curve.