

Acoustics - Reference zero for the calibration of audiometric equipment - Part 1: Reference equivalent threshold sound pressure levels for pure tones and supra-aural earphones

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EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

<p>Käesolev Eesti standard EVS-EN ISO 389-1:2000 sisaldab Euroopa standardi EN ISO 389-1:2000 ingliskeelset teksti.</p> <p>Käesolev dokument on jõustatud 10.05.2000 ja selle kohta on avaldatud teade Eesti standardiorganisatsiooni ametlikus väljaandes.</p> <p>Standard on kättesaadav Eesti standardiorganisatsioonist.</p>	<p>This Estonian standard EVS-EN ISO 389-1:2000 consists of the English text of the European standard EN ISO 389-1:2000.</p> <p>This document is endorsed on 10.05.2000 with the notification being published in the official publication of the Estonian national standardisation organisation.</p> <p>The standard is available from Estonian standardisation organisation.</p>
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<p>Käsitlusala: The standard specifies a standard reference zero for the scale of hearing threshold level applicable to pure-tone air conduction audiometers in order to promote agreement and uniformity in the expression of hearing threshold level measurements throughout the world.</p>	<p>Scope: The standard specifies a standard reference zero for the scale of hearing threshold level applicable to pure-tone air conduction audiometers in order to promote agreement and uniformity in the expression of hearing threshold level measurements throughout the world.</p>
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ICS 13.140

Võtmesõnad:

English version

Acoustics

Reference zero for the calibration of audiometric equipment

Part 1: Reference equivalent threshold sound pressure levels for pure tones and supra-aural earphones
(ISO 389-1 : 1998)

Acoustique – Zéro de référence pour l'étalonnage d'équipements audiométriques – Partie 1: Niveaux de référence équivalents de pression acoustique liminaire pour les écouteurs à sons purs supra-auraux (ISO 389-1 : 1998)

Akustik – Standard-Bezugspegel für die Kalibrierung audiometrischer Geräte – Teil 1: Äquivalente Bezugsschwellenschalldruckpegel für reine Töne und supra-aurale Kopfhörer (ISO 389-1 : 1998)

This European Standard was approved by CEN on 2000-01-03.

CEN 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 Central Secretariat or to any CEN member.

The European Standards exist in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

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CEN

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

Central Secretariat: rue de Stassart 36, B-1050 Brussels

Foreword

International Standard

ISO 389-1 : 1998 Acoustics – Reference zero for the calibration of audiometric equipment – Part 1: Reference equivalent threshold sound pressure levels for pure tones and supra-aural earphones, which was prepared by ISO/TC 43 'Acoustics' of the International Organization for Standardization, has been adopted by Technical Committee CEN/TC 211 'Acoustics', the Secretariat of which is held by DS, as a European Standard.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, and conflicting national standards withdrawn, by August 2000 at the latest.

In accordance with the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard :

Austria, Belgium, the Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and the United Kingdom.

Endorsement notice

The text of the International Standard ISO 389-1 : 1998 was approved by CEN as a European Standard without any modification.

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Introduction

Each part of ISO 389 specifies a specific reference zero for the calibration of audiometric equipment. The present part 1 is applicable to audiometric equipment for the transmission of pure tones by air conduction and supra-aural earphones. ISO 389-2 is applicable to audiometric equipment for the transmission of pure tones by air conduction and insert earphones. ISO 389-3 is applicable to pure-tone bone-conduction audiometers, ISO 389-4 specifies reference levels for narrow-band masking noise, and ISO 389-7 specifies reference levels for presentation in free and diffuse sound fields.

The first edition of ISO 389 specified a standard reference zero for the scale of hearing threshold level applicable to pure-tone air conduction audiometers in terms of the response of certain models of earphone measured on an artificial ear or coupler of stated type. Five of these earphone-coupler combinations corresponded with those used at that time in standardizing laboratories in France, Germany, the United Kingdom, the USA and the USSR. In a second set of values, the corresponding reference equivalent threshold sound pressure levels (RETSPL) for eleven audiometric earphones were given, referred to a single type of coupler, the National Bureau of Standards, Washington, USA type 9A coupler, which was later specified in IEC 303:1970 (now IEC 60303).

Most of the earphone-coupler combinations mentioned in the first edition of ISO 389 are now no longer in use. The ISO member bodies of the countries primarily concerned with those types of standard earphones and artificial ears agreed to eliminate obsolete data. This was done in the second edition of ISO 389. It contained only RETSPL values for two earphone models still widely in use for audiometric purposes, namely Telephonics type TDH 39 with cushion type MX 41/AR (or model 51) and Beyer type DT 48, both in conjunction with an acoustic coupler complying with IEC 303:1970.

The two remaining sets of data differ mainly as a consequence of differences between the acoustical properties of the coupler and those of the average human ear.

For the same reason, the RETSPL for an earphone of a model not covered by ISO 389 could not be inferred from the data given in that International Standard. Until then it had been necessary to obtain the appropriate values by subjective comparison with one of the specified models of earphone.

In principle, RETSPL values would be rendered independent of earphone model if they were referred to an artificial ear having acoustical properties exactly simulating those of the average human ear. A device designed with this aim in view was standardized in 1970 in IEC 318:1970 (now IEC 60318).

Addendum 1 to ISO 389:1985 was therefore prepared, based on an assessment of technical data provided by laboratories listed in annex A on RETSPL values relative to the IEC artificial ear, covering a variety of earphone models.

These data were analysed to produce a set of RETSPL values which, within an acceptable tolerance, provide a standard audiometric reference zero for earphones of any model within a broadly defined class. A note on the derivation of the standard values and the origin of the data input is given in annex A for information.

Use of the standard reference zero specified in Addendum 1 obviated the need for subjective calibration of supra-aural audiometric earphones which meet the broad requirements specified, and thus promoted agreement and uniformity in the expression of hearing threshold levels throughout the world, without inhibiting the development of improved models of supra-aural earphone.

The data of Addendum 1 were incorporated in ISO 389:1991.

In both ISO 389 and ISO 389/Add. 1, the RETSPL values were specified for pure tones in octave steps from 125 Hz to 8 000 Hz and for the intermediate audiometric frequencies 1 500 Hz, 3 000 Hz and 6 000 Hz. However, in addition, 750 Hz is sometimes used as an intermediate audiometric frequency, and Addendum 2 to ISO 389:1985 therefore specified RETSPL values for that frequency.

Moreover, it had been considered desirable to harmonize intermediate frequencies used in pure-tone audiometry with the preferred frequencies in acoustics as specified in ISO 266. Addendum 2 therefore specified RETSPL values at all preferred frequencies in one-third-octave steps in the frequency range from 125 Hz to 8 000 Hz. Details of the derivation of the RETSPL values are given in annex A for further information. The data of Addendum 2 were also incorporated in ISO 389:1991.

The RETSPL value specified at 750 Hz is intended for calibration of audiometers providing pure tones of a fixed frequency of 750 Hz. The other RETSPL values specified are primarily intended for calibration of pure-tone audiometers having a continuously variable frequency, but they may also be used in other applications, for example for establishing reference levels for masking noise. The frequencies given in ISO 389:1985 and Addendum 2 are consistent with the frequencies used in ISO 389-3 for the specification of the standard reference zero for the calibration of bone conduction audiometers. Three sets of RETSPL values were specified. Two of these concern the same earphone models as in ISO 389:1985. The third set of RETSPL values were specified for supra-aural earphones other than those covered by ISO 389:1985 but which fulfil the requirements specified in ISO 389/Add. 1.

1 Scope

This part of ISO 389 specifies a standard reference zero for the scale of hearing threshold level applicable to pure-tone air conduction audiometers, in order to promote agreement and uniformity in the expression of hearing threshold level measurements throughout the world.

It states the information in a form suitable for direct application to the calibration of audiometers, that is, in terms of the response of two different standard models of earphone measured on a coupler complying with IEC 60303 and in terms of other supra-aural earphones of models specified in 4.3 measured on an artificial ear complying with IEC 60318.

It is based on an assessment of the information available from the various standardizing laboratories responsible for audiometric standards and from scientific publications.

Some notes on the derivation and application of the recommended reference levels are given in annex A.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of ISO 389. 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 ISO 389 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 60303, *IEC provisional reference coupler for the calibration of earphones used in audiometry.*¹⁾

IEC 60318, *An IEC artificial ear, of the wide band type, for the calibration of earphones used in audiometry.*²⁾

1) Now revised as IEC 60318-3.

2) Now revised as IEC 60318-1.