SLOVENSKI STANDARD
SIST EN ISO 389-3:1999

01-november-1999

Akustika - Referenļ na niļ la za umerjanje avdiometrov - 3. del: Referenļ ne ekvivalentne ravni za prag sile za ļ iste tone in dajalnike za kostno prevodnost (ISO 389-3:1994)

Acoustics - Reference zero for the calibration of audiometric equipment - Part 3: Reference equivalent threshold force levels for pure tones and bone vibrators (ISO 389-3:1994)

Akustik - Standard-Bezugspegel für die Kalibrierung audiometrischer Geräte - Teil 3: Äquivalente Bezugs-Schwellenkraftpegel für reine Töne und Knochenleitungshöher (ISO 389-3:1994)

Acoustique - Zéro de référence pour l'étalonnage d'équipements audiométriques - Partie 3: Niveaux de référence équivalents de force liminaire pour les vibrateurs a sons purs et les ossivibrateurs (ISO 389-3:1994)

Ta slovenski standard je istoveten z: **EN ISO 389-3:1998**

ICS:

13.140	Vpliv hrupa na ljudi	Noise with respect to human beings

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EUROPEAN STANDARD
NORME EUROPÉENNE
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Supersedes EN 27566:1991

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English version

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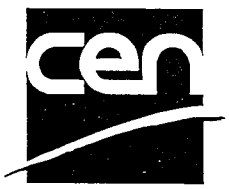
This European Standard was approved by CEN on 4 December 1998.

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.

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 CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

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



EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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

Foreword

The text of the International Standard from Technical Committee ISO/TC 43 "Acoustics" of the International Organization for Standardization (ISO) has been taken over as an European Standard by Technical Committee CEN/TC 211 "Acoustics", the secretariat of which is held by DS.

This European Standard supersedes EN 27566:1991.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by June 1999, and conflicting national standards shall be withdrawn at the latest by June 1999.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Endorsement notice

The text of the International Standard ISO 389-3:1994 has been approved by CEN as a European Standard without any modification.

NOTE: Normative references to International Standards are listed in annex ZA (normative).

Annex ZA (normative)
Normative references to international publications with their relevant European publications

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

Publication	Year	Title	EN	Year
ISO 389	1991	Acoustics - Standard reference zero for the calibration of pure-tone air conduction audiometers	EN ISO 389	1995
ISO 389-2	1994	Acoustics - Reference zero for the calibration of audiometric equipment - Part 2: Reference equivalent threshold sound pressure levels for pure tones and insert earphones	EN ISO 389-2	1996

INTERNATIONAL STANDARD

ISO 389-3

First edition
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Acoustics — Reference zero for the calibration of audiometric equipment —

Part 3:
Reference equivalent threshold force levels for pure tones and bone vibrators

Acoustique — Zéro de référence pour l'étalonnage d'équipements audiométriques —

Partie 3: Niveaux de référence équivalents de force liminaire pour les vibrateurs à sons purs et les ossivibrateurs

Reference number
ISO 389-3:1994(E)

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 389-3 was prepared by Technical Committee ISO/TC 43, *Acoustics*.

This first edition of ISO 389-3 cancels and replaces ISO 7566:1987, of which it is a minor revision.

ISO 389 consists of the following parts, under the general title *Acoustics — Reference zero for the calibration of audiometric equipment*:

— *Part 1: Reference equivalent threshold sound pressure levels for pure tones and supra-aural earphones*

— *Part 2: Reference equivalent threshold sound pressure levels for pure tones and insert earphones*

— *Part 3: Reference equivalent threshold force levels for pure tones and bone vibrators*

— *Part 4: Reference levels for narrow-band masking noise*

— *Part 5: Reference equivalent threshold sound pressure levels for pure tones in the frequency range 8 kHz to 16 kHz*

— *Part 6: Reference equivalent threshold sound pressure levels for acoustic test signals of short duration*

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— *Part 7: Reference threshold of hearing under free-field and diffuse-field listening conditions*

Part 1 will be a re-issue of ISO 389:1991.

Annexes A, B, C, D and E of this part of ISO 389 are for information only.

Introduction

Each part of ISO 389 specifies a specific reference zero for the calibration of audiometric equipment. ISO 389:1991 (to be re-issued as ISO 389-1) and ISO 389-2 are applicable to audiometric equipment for the transmission of pure tones by air conduction.

For clinical diagnostic and other audiometric purposes, it is often necessary to compare the measured hearing threshold levels of a person for sound transmitted to the inner ear by the air-conduction and bone-conduction pathways, respectively. Bone-conducted sound is provided for this purpose by an electromechanical vibrator applied to the mastoid prominence or to the forehead of the person under test.

The reference zero for the calibration of audiometric equipment for air conduction is defined in ISO 389:1991 and ISO 389-2 in terms of reference equivalent threshold sound pressure levels (RETSPLs), i.e. threshold sound pressure levels produced in a coupler, ear simulator or artificial ear of specified characteristics by supra-aural or insert earphones of various patterns, when excited electrically at a level corresponding to the threshold of hearing of young otologically normal persons. Similarly, this part of ISO 389 provides a reference zero for bone-conduction audiometry in terms of reference equivalent threshold force levels (RETFLs), i.e. the vibratory force levels produced by a bone vibrator on a specified mechanical coupler when the vibrator is excited electrically at a level corresponding to the threshold of hearing of young otologically normal persons. In some countries, the preferred location is the mastoid prominence; in other countries, the forehead location is used in addition to the mastoid prominence. Different RETFL values are valid for each of the two positions (see annex C).

For bone-conduction measurements, it is necessary to specify the static force of application of the vibrator to the skull of the test subject and to the mechanical coupler, as well as certain geometrical features of the vibrator tip. In addition, it is usually necessary to apply masking noise to the ear not under test, since excitation of the skull by the vibrator may be heard by that ear instead of (or in addition to) the ear intended for the test. An appropriate specification of the masking noise is, therefore, required as an adjunct to the reference equivalent threshold force levels, and such a specification is given in this part of ISO 389. Due to the so-called "occlusion effect" whereby the wearing of the transducer needed to provide the (air-conducted) masking noise causes a lowering of the bone-conduction threshold of hearing of the ear receiving the masking signal, it is necessary for the level of masking noise to be raised to cancel out the occlusion effect and provide adequate masking of the ear not under test. The specification of masking noise given in this part of ISO 389 is based on the procedures used in the experimental investigations from which the reference zero of this part of ISO 389 is derived.

Use of this reference zero to calibrate audiometers will ensure that measured bone-conduction hearing threshold levels of persons with un-

impaired hearing or with hearing losses of purely sensorineural type (i.e. having unimpaired outer and middle ear function) will be compatible with the air-conduction hearing threshold levels of the same persons when using the reference zero of ISO 389:1991 or ISO 389-2, respectively. Although exact equivalence of air-conduction and bone-conduction thresholds for any individual in these classes cannot be expected, due to biological variability of sound tansmission through the external and middle ear and through the skull, this part of ISO 389 will ensure that systematic deviations averaged over groups of such persons are reduced to a practical minimum.

This part of ISO 389 is based on an assessment of technical data provided by laboratories in three countries using methods of threshold testing which, in the respects described, were essentially uniform. Examination of the data showed that the experimental results were consistent. It has, therefore, been possible to standardize a reference zero by means of RETFL values which are to be used for all bone vibrators used in audiometry having similar characteristics to those used by the laboratories. The systematic uncertainties introduced by this deliberate simplification will be small in comparison to the usual step size of hearing level controls in clinical audiometers (5 dB).