INTERNATIONAL STANDARD

ISO 389-4

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

Part 4:
Reference levels for narrow-band masking noise

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

Partie 4: Niveaux de référence pour bruit de masque en bande étroite

Reference number
ISO 389-4:1994(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 389-4 was prepared by Technical Committee ISO/TC 43, *Acoustics*.

This first edition of ISO 389-4 cancels and replaces ISO 8798:1987, of which it constitutes 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 and B of this part of ISO 389 are for information only.

Introduction

ISO 389:1991 (to be re-issued as ISO 389-1) and ISO 389-2 specify the reference zero for the calibration of pure-tone air-conduction audiometers. ISO 389-3 specifies the corresponding data for pure-tone bone-conduction audiometers.

For clinical diagnostic and other audiometric purposes, it is often necessary to prevent the test signal being heard through the ear not being tested. This masking is usually achieved by the presentation of a narrow band of noise, the centre frequency of which coincides with the frequency of the pure-tone signal, and which is delivered by means of the ordinary supra-aural or insert earphones of the audiometer.

IEC 645-1 specifies that masking levels for narrow-band noise be calibrated in terms of effective masking level and that the noise bandwidth be between one-third and one-half of an octave.

The noise level required to just mask a pure tone of a given hearing level has been calculated from known psychoacoustical data for ipsilateral masking, i.e. when the tone to be masked and the masking noise are presented through the same earphone to the same ear.

In most audiometric applications the masking noise is, however, applied by means of an earphone on the ear not being tested. The exact level of the tone reaching that ear from the transducer on the test side is influenced by skull attenuation and by the presence of the occlusion effect from the masker earphone. These phenomena have to be considered with regard to masking levels used in the audiometric procedure.

Acoustics — Reference zero for the calibration of audiometric equipment —

Part 4:
Reference levels for narrow-band masking noise

1 Scope

This part of ISO 389 specifies reference levels for narrow-band masking noise presented by air conduction from an earphone in pure-tone audiometry. The data are given in terms of levels to be added to the reference equivalent threshold sound pressure levels for the corresponding pure-tone frequencies as specified in ISO 389:1991 or ISO 389-2, respectively, when the masking earphone is placed on the appropriate acoustic coupler, ear simulator or artificial ear.

Data are given for noise bandwidths of one-third and one-half octaves.

NOTE 1 Some notes on the derivation of the reference levels are given in annex A.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 389. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 389 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 389:1991, *Acoustics — Standard reference zero for the calibration of pure-tone air conduction audiometers.*[1)]

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.*

IEC 126:1973, *IEC reference coupler for the measurement of hearing aids using earphones coupled to the ear by means of ear inserts.*

IEC 303:1970, *IEC provisional reference coupler for the calibration of earphones used in audiometry.*

IEC 318:1970, *An IEC artificial ear, of the wideband type, for the calibration of earphones used in audiometry.*

IEC 711:1981, *Occluded-ear simulator for the measurement of earphones coupled to the ear by ear inserts.*

3 Definitions

For the purposes of this part of ISO 389, the definitions given in ISO 389:1991 and ISO 389-2 and the following definitions apply.

3.1 bone conduction: Transmission of sound to the inner ear primarily by means of mechanical vibration of the cranial bones.

1) To be re-issued as ISO 389-1.