AS ISO 389.7—2003
ISO 389-7:1996

Australian Standard™

Acoustics—Reference zero for the calibration of audiometric equipment

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

Standards Australia

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Association of Australian Acoustical Consultants

Association of Consulting Engineers Australia

Australian Acoustical Society

Australian Chamber of Commerce and Industry

Australian Hearing

Department of Consumer & Employment Protection, WorkSafe Division, W.A.

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PREFACE

This Standard was prepared by the Australian members of the Joint Standards Australia/Standards New Zealand Committee AV-003, Acoustics Human Effects. After consultation with stakeholders in both countries, Standards Australia and Standards New Zealand decided to develop this Standard as an Australian, rather than an Australian/New Zealand Standard.

This Standard is identical with and has been reproduced from ISO 389-7:1996, *Acoustics—Reference zero for the calibration of audiometric equipment—* Part 7: *Reference threshold of hearing under free-field and diffuse-field listening conditions.*

The objective of this Standard is to specify a reference threshold of hearing for the calibration of audiometric equipment used under certain conditions.

As this Standard is reproduced from an International Standard, the following applies:

(a) Its number does not appear on each page of text and its identity is shown only on the cover and title page.

(b) In the source text ‘this part of ISO 389’ should read ‘this Australian Standard’.

(c) A full point substitutes for a comma when referring to a decimal marker.

This Standard provides for the use of the following Australian Standard as in place of the particular International Standard referenced herein:

Reference to International Standard		*Australian Standard*	
ISO		AS	
266	Acoustics—Preferred frequencies	2533	Acoustics—Preferred frequencies and band centre frequencies

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 means of supra-aural or insert earphones, respectively. Corresponding audiometric test methods are specified in ISO 8253-1.

In some audiological applications it may, however, be desirable to deliver the test signals by means of loudspeakers, either in a free sound field or in a diffuse sound field. Corresponding audiometric test methods are specified in ISO 8253-2. This part of ISO 389 specifies the reference zero for the calibration of audiometric equipment used for sound field audiometry.

In common with other subjective phenomena, the threshold of hearing varies in detail from person to person but, for a group of otologically normal persons within a restricted age range, values for the central tendency can be determined to characterize the group. This and other parts of ISO 389 specify threshold data applicable to otologically normal persons in the age range from 18 to 25 years. Compared with ISO 226, a more stringent age criterion has been applied in order to define a population as homogeneous as practicable with respect to the relationship between the threshold of hearing and age.

The data specified in this part of ISO 389 relate to

a) pure tones heard under conditions of binaural listening in free progressive plane waves with the subject directly facing the source of sound (frontal incidence), and with the sound pressure level measured in the free progressive wave at the centre position of the listener's head with the listener absent;

b) one-third-octave bands of (white or pink) noise heard under conditions of binaural listening in a diffuse sound field with the sound pressure level measured in the sound field at the centre position of the listener's head with the listener absent.

For frequencies up to 8 kHz, each set of data may be equally applied to any other bands of (white or pink) noise for which the bandwidth is less than the critical bandwidth.

The data are based on an assessment of technical information provided by laboratories in different countries representing the most reliable data available at the time. For information, a note on the derivation of the reference values and the origin of the data is given in annex A and a bibliography is given in annex B.

NOTES

AUSTRALIAN STANDARD

Acoustics — Reference zero for the calibration of audiometric equipment —

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

1 Scope

This part of ISO 389 specifies a reference threshold of hearing for the calibration of audiometric equipment used under the following conditions.

a) The sound field in the absence of the listener consists of either a free progressive plane wave (free field) or a diffuse sound field. In the case of a free progressive plane wave, the source of sound is directly in front of the listener (frontal incidence).

   NOTE 1 Correction values for the threshold of hearing under free-field listening conditions and selected angles of sound incidence deviating from frontal incidence are given in ISO 8253-2 for information.

b) The sound signals are pure (sinusoidal) tones in the case of free-field conditions, and one-third-octave band of (white or pink) noise in the case of diffuse-field conditions.

c) The sound pressure level is measured in the absence of the listener at the position where the centre of the listener's head would be.

d) Listening is binaural.

e) The sound pressure levels corresponding to the reference threshold of hearing are determined by the median value of the thresholds of an adequately large group of listeners.

f) The listeners are otologically normal persons in the age range from 18 to 25 years inclusive.

   NOTE 2 The data given in this part of ISO 389 have been derived from listeners who have hearing threshold levels of 10 dB or less according to ISO 389:1991. This selection criterion is not identical with that used when data for ISO 389:1991 were derived.

g) The threshold of hearing is determined by means of the bracketing or ascending method, as specified in ISO 8253-1.

The data are given in numerical form for the preferred frequencies in the one-third-octave series from 20 Hz to 16 000 Hz inclusive, in accordance with ISO 266 and for intermediate audiometric frequencies.

Figure 1 gives a graphical presentation.

It should be emphasized that the threshold data differ from the audiometric zero specified in ISO 389:1991 and ISO 389-2, since the latter refer to monaural listening through earphones with sound pressure levels referred to