

Australian/New Zealand Standard™

Acoustics—Specifications for personal sound exposure meters

[IEC title: Electroacoustics—Specifications for personal sound exposure meters]

This Joint Australian/New Zealand Standard was prepared by Joint Technical Committee AV/2, Acoustics, Instrumentation and Measurement Techniques. It was approved on behalf of the Council of Standards Australia on 16 January 1998 and on behalf of the Council of Standards New Zealand on 13 April 1998. It was published on 5 June 1998.

The following interests are represented on Committee AV/2:

Acoustics consulting interests, New Zealand
AirServices Australia
The Association of Consulting Engineers, Australia
Australian Acoustical Society
Australian and New Zealand Environment and Conservation Council
Australian Hearing Services
CSIRO - Division of Telecommunications and Industrial Physics
CSIRO - Building, Construction and Engineering
Electroacoustic Calibration Services, New Zealand
Institute of Electrical & Electronics Engineers, Victorian Section
National Association of Testing Authorities, Australia
WorkCover New South Wales
WorkSafe Western Australia

Review of Standards. To keep abreast of progress in industry, Joint Australian/New Zealand Standards are subject to periodic review and are kept up to date by the issue of amendments or new editions as necessary. It is important therefore that Standards users ensure that they are in possession of the latest edition, and any amendments thereto.

Full details of all Joint Standards and related publications will be found in the Standards Australia and Standards New Zealand Catalogue of Publications; this information is supplemented each month by the magazines 'The Australian Standard' and 'Standards New Zealand', which subscribing members receive, and which give details of new publications, new editions and amendments, and of withdrawn Standards.

Suggestions for improvements to Joint Standards, addressed to the head office of either Standards Australia or Standards New Zealand, are welcomed. Notification of any inaccuracy or ambiguity found in a Joint Australian/New Zealand Standard should be made without delay in order that the matter may be investigated and appropriate action taken.

AS/NZS 2399:1998

Australian/New Zealand Standard™

**Acoustics—Specifications for
personal sound exposure meters**

Originated as AS 2399—1980.
Jointly revised and designated AS/NZS 2399:1998.

PUBLISHED JOINTLY BY:

STANDARDS AUSTRALIA
1 The Crescent,
Homebush NSW 2140 Australia

STANDARDS NEW ZEALAND
Level 10, Radio New Zealand House,
155 The Terrace,
Wellington 6001 New Zealand

PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee AV/2, Acoustics, Instrumentation and Measurement Techniques, to supersede AS 2399—1980, *Personal noise dosemeters*.

The objective of this Standard is to provide manufacturers of personal sound exposure meters with manufacturing specifications.

This Standard is technically equivalent to and has been reproduced from IEC 1252:1993, *Electroacoustics—Specifications for personal sound exposure meters*.

The term ‘informative’ has been used in this Standard to define the application of the annex to which it applies. An ‘informative’ annex is only for information and guidance.

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

- (a) Its number appears on the cover and title page while the International Standard number appears only on the cover.
- (b) In the source text, ‘this International Standard’ should read ‘this Australian/New Zealand Standard’.
- (c) A full point substitutes for a comma when referring to a decimal marker.
- (d) No adjustments for reference conditions are required when the prevailing environmental conditions are within +2.0 kPa to –4.0 kPa of the reference static pressure, within +5°C to –2°C of the reference air temperature, and within +5% RH to –25% RH of the reference relative humidity. The environmental conditions prevailing at the time of a test should be recorded.

References to international Standards should be replaced by Australian, New Zealand or Australian/New Zealand Standards, as follows:

<i>Reference to International Standard or other publication</i>		<i>Australian/New Zealand Standard</i>	
IEC		AS	
50	Advance edition of the International Electrotechnical Vocabulary	—	
50(801)	Chapter 801: Acoustics and electroacoustics	—	
651	Sound level meters	1259 1259.1	Acoustics—Sound level meters Part 1: Non-integrating
801	Electromagnetic compatibility for industrial-process measurement and control equipment	—	
801-2	Part 2: Electrostatic discharge requirements		
801-3	Part 3: Radiated electromagnetic field requirements	—	
804	Integrating-averaging sound level meters	1259.2	Part 2: Integrating—Averaging
942	Sound calibrators	—	

ISO		AS	
266	Acoustics—Preferred frequencies for measurements	2533	Acoustics—Preferred frequencies for measurements
1683	Acoustics—Preferred reference quantities for acoustic levels	—	
1999	Acoustics—Determination of occupational noise exposure and estimation of noise-induced hearing impairment	—	
		AS/NZS	
9612	Acoustics—Guidelines for the measurement and assessment of exposure to noise in the working environment	1269 1269.1	Occupational noise management Part 1: Measurement and assessment of noise immission and exposure

© Copyright — STANDARDS AUSTRALIA/STANDARDS NEW ZEALAND

Users of Standards are reminded that copyright subsists in all Standards Australia and Standards New Zealand publications and software. Except where the Copyright Act allows and except where provided for below no publications or software produced by Standards Australia or Standards New Zealand may be reproduced, stored in a retrieval system in any form or transmitted by any means without prior permission in writing from Standards Australia or Standards New Zealand. Permission may be conditional on an appropriate royalty payment. Australian requests for permission and information on commercial software royalties should be directed to the head office of Standards Australia. New Zealand requests should be directed to Standards New Zealand.

Up to 10 percent of the technical content pages of a Standard may be copied for use exclusively in-house by purchasers of the Standard without payment of a royalty or advice to Standards Australia or Standards New Zealand.

Inclusion of copyright material in computer software programs is also permitted without royalty payment provided such programs are used exclusively in-house by the creators of the programs.

Care should be taken to ensure that material used is from the current edition of the Standard and that it is updated whenever the Standard is amended or revised. The number and date of the Standard should therefore be clearly identified.

The use of material in print form or in computer software programs to be used commercially, with or without payment, or in commercial contracts is subject to the payment of a royalty. This policy may be varied by Standards Australia or Standards New Zealand at any time.

CONTENTS

Clause	<i>Page</i>
1 Scope	1
2 Normative references	1
3 Definitions	2
4 General performance requirements	4
5 Reference conditions	6
6 Absolute acoustical sensitivity	6
7 Frequency weighting	6
8 Linearity of response to steady signals	8
9 Response to short-duration signals	8
10 Response to unipolar pulses	9
11 Latching overload indicator	9
12 Sensitivity to various environments	10
13 Instrument marking	11
14 Instruction Manual	11
Table 1 Design-goal A-frequency weighting relative to response at 1 kHz and the tolerances ΔA that apply to the performance of a complete personal sound exposure meter	7
Figure 1 Functional elements of a personal sound exposure meter	4
Annexes	
A Sound exposures and corresponding normalized 8-h-average sound levels	14
B Recommended tests to verify the performance of a personal sound exposure meter	15
Tables	
A.1 Sound exposures and corresponding normalized 8-h-average sound levels	14
B.1 Minimum set of target conditions for 1 kHz steady-signal linearity tests	16
B.2 Conditions for testing response to short-duration signals	18

AUSTRALIAN/NEW ZEALAND STANDARD

Acoustics—Specifications for personal sound exposure meters**1 Scope**

1.1 Sound exposure is a physical measure that accounts for both the sound pressure and its duration, at a given location, through an integral-over-time of the square of instantaneous frequency-weighted sound pressure.

1.2 This International Standard is applicable to instruments for measurement of A-frequency-weighted sound exposure resulting from steady, intermittent, fluctuating, irregular, or impulsive sounds. Instruments complying with the specifications of this International Standard are intended to be worn on a person to measure sound exposure. Measurements of sound exposure in the workplace may be useful for determinations of occupational noise exposure, in accordance with ISO 1999 and ISO 9612.

1.3 This International Standard specifies acoustical and electrical performance requirements for personal sound exposure meters of one accuracy grade. The accuracy grade corresponds to that for an integrating sound level meter which complies with the Type 2 requirements of IEC 804 for an A-weighted sound pressure level range from 80 dB to 130 dB and a nominal frequency range from 63 Hz to 8 kHz.

1.4 Tolerances on deviations of an instrument's performance from specified design goals represent the performance capabilities of practical instruments. Personal sound exposure meters are required to operate within the tolerances of this International Standard over specified ranges of environmental conditions.

2 Normative references

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

IEC 50(801): 1984, *Advance edition of the International Electrotechnical Vocabulary, Chapter 801, Acoustics and electroacoustics*

IEC 651: 1979, *Sound level meters*

IEC 801-2: 1984, *Electromagnetic compatibility for industrial-process measurement and control equipment — Part 2: Electrostatic discharge requirements*

IEC 801-3: 1984, *Electromagnetic compatibility for industrial-process measurement and control equipment — Part 3: Radiated electromagnetic field requirements*

IEC 804: 1985, *Integrating-averaging sound level meters*

IEC 942: 1988, *Sound calibrators*

ISO 266: 1975, *Acoustics — Preferred frequencies for measurements*

ISO 1683: 1983, *Acoustics — Preferred reference quantities for acoustic levels*

ISO 1999: 1990, *Acoustics — Determination of occupational noise exposure and estimation of noise-induced hearing impairment*

ISO 9612: 199X, *Acoustics — Guidelines for the measurement and assessment of exposure to noise in the working environment*.*

3 Definitions

For the purposes of this International Standard, the following definitions apply. Definitions are consistent with corresponding definitions in IEC 50(801).

3.1 sound exposure: Time integral of squared, instantaneous A-frequency-weighted sound pressure over a specified event, for example, a working day.

NOTES

1 Although the primary SI unit for sound exposure is the pascal-squared second, for measurements of sound exposure in the workplace, the more-convenient derived unit, the pascal-squared hour, is used in this International Standard.

2 In symbols, (A-weighted) sound exposure is

$$E = \int_{t_1}^{t_2} p_A^2(t) dt \quad (1)$$

where $p_A^2(t)$ is the square of instantaneous A-frequency-weighted sound pressure as a function of time t for an integration time period starting at t_1 and ending at t_2 . The unit of sound exposure E is pascal-squared hours if A-weighted sound pressure p_A is in pascals and the running time t in hours.

3.2 equivalent-continuous A-weighted sound pressure level; time-average sound level: In decibels, ten times the logarithm to the base ten of the ratio of the time-mean-square, A-frequency-weighted sound pressure, during an averaging time period T , to the square of the standard reference sound pressure.

* At present, at the stage of draft.