AS 60118.0—2007
IEC 60118-0 Ed. 2.0 (1983)
Includes Amendment 1:1994

AS 60118.0—2007

Australian Standard®

Hearing aids

Part 0: Measurement of electroacoustical characteristics

This Australian Standard® was prepared by Committee AV-003, Acoustics—Human Effects. It was approved on behalf of the Council of Standards Australia on 3 November 2006. This Standard was published on 20 February 2007.

The following are represented on Committee AV-003:

- Association of Accredited Certification Bodies
- Association of Australian Acoustical Consultants
- Association of Consulting Engineers Australia
- Audiological Society of Australia
- Australasian Faculty of Occupational Medicine
- Australian Acoustical Society
- Australian Chamber of Commerce and Industry
- Australian Council of Trade Unions
- Australian Industry Group
- Department of Consumer & Employment Protection, WorkSafe Division, WA
- Department of Labour, NZ
- National Acoustic Laboratories
- New South Wales Nurses, Association
- New Zealand Audiological Society
- Royal Institute of Naval Architects
- Safety Institute of Australia
- The Australian Society of Otolaryngological Head and Neck Surgery
- Victorian WorkCover Authority
- WorkCover New South Wales

This Standard was issued in draft form for comment as DR 06465.

Standards Australia wishes to acknowledge the participation of the expert individuals that contributed to the development of this Standard through their representation on the Committee and through public comment period.

Keeping Standards up-to-date

Australian Standards® are living documents that reflect progress in science, technology and systems. To maintain their currency, all Standards are periodically reviewed, and new editions are published. Between editions, amendments may be issued.

Standards may also be withdrawn. It is important that readers assure themselves they are using a current Standard, which should include any amendments that may have been published since the Standard was published.

Detailed information about Australian Standards, drafts, amendments and new projects can be found by visiting **www.standards.org.au**

Standards Australia welcomes suggestions for improvements, and encourages readers to notify us immediately of any apparent inaccuracies or ambiguities. Contact us via email at **mail@standards.org.au**, or write to Standards Australia, GPO Box 476, Sydney, NSW 2001.

Australian Standard®

Hearing aids

Part 0: Measurement of electroacoustical characteristics

Originated as part of AS 1088—1971.
Previous edition AS 1088.0—1987.
Revised and redesignated as AS 60118.0—2007.

Published by Standards Australia GPO Box 476, Sydney, NSW 2001, Australia

ISBN 0 7337 7913 1

PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee AV-003, Acoustics—Human Effects, to supersede AS 1088.0—1987.

After consultation with stakeholders in both countries, Standards Australia and Standards New Zealand decided to develop this Standard as an Australian Standard rather than an Australian/New Zealand Standard.

The objective of this revision is to update the Standard by adding the IEC amendment to the source text.

This Standard is identical with IEC 60118-0 Ed. 2.0 (1983), *Hearing aids – Part 0: Measurement of electroacoustical characteristics*, including its Amendment 1:1994, which has been incorporated into the source text.

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

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

Reference to International Standard		*Australian Standard*	
IEC		AS	
60068	Basic environment testing procedures	60068	Environmental testing
60118	Hearing aids	60118	Hearing aids
60118-1	Part 1: Hearing aids with induction pick-up coil	60118.1	Part 1: Hearing aids with induction pick-up coil input
60118-2	Part 2: Hearing aids with automatic gain control circuits	60118.2	Part 2: Hearing aids with automatic gain control circuits
60118-7	Part 7: Measurement of the performance characteristics of hearing aids for quality inspection for delivery purposes	60118.7	Part 7: Measurement of the performance characteristics of hearing aids for quality inspection for delivery purposes
60118-8	Part 8: Methods of measurement of performance characteristics of hearing aids under simulated in situ working conditions	60118.8	Part 8: Methods of measurement of performance characteristics of hearing aids under simulated in situ working conditions
60126	IEC reference coupler for the measurement of hearing aids using earphones coupled to the ear by means of ear inserts	—	
60225	Octave, half-octave and third-octave band filters intended for the analysis of sounds and vibrations	—	
60263	Scales and sizes for plotting frequency characteristics and polar diagrams	—	
60711	Occluded-ear simulator for the measurement of earphones coupled to the ear by ear inserts	2928	Occluded-ear simulator for the measurement of earphones coupled to the ear by ear inserts

CONTENTS

Page

1 Scope 1
2 Object 1
3 General conditions 1
4 Explanation of terms 2
4.1 Ear simulator 2
4.2 Substitution method 2
4.3 Comparison method 2
4.4 Pressure method 2
4.5 Simulated in situ method 2
4.6 Reference orientation (of a hearing aid) 2
4.7 Reference point (of a hearing aid) 2
4.8 Test point 2
4.9 Supply voltage 2
4.10 Acoustic gain — at a specified frequency and under specified operating conditions. 2
4.11 Full-on acoustic gain (frequency response curve) 3
4.12 Maximum acoustic gain at a specified frequency 3
4.13 *Saturation sound pressure level* (frequency response curve) 3
4.14 Maximum saturation sound pressure level 3
4.15 Output sound pressure level for an input sound pressure level of 90 dB ($OSPL_{90}$) at a specified frequency (or frequencies) 3
4.16 Reference test frequency 3
4.17 Reference test gain control position 3
4.18 Reference test gain 3
4.19 Frequency response 3
4.20 Comprehensive frequency response curves 3
4.21 Basic frequency response curve 4
4.22 Steady state input-output graph 4
5 Test equipment 4
5.1 Acoustical requirements for the test enclosure 4
5.2 Sound field at the test point 4
5.3 Ear simulator 4
5.4 Equipment for the measurement of sound pressure level in the ear simulator 4
5.5 Calibration of free-field sound pressure level 5
6 Test conditions 5
6.1 Choice of test point 5
6.2 Calibrating the sound field 6
6.3 Locating the hearing aid for tests 6
6.4 Normal operating conditions for the hearing aid 6
7 Measurements 7
7.1 Maximum saturation sound pressure level 8
7.2 Output sound pressure level frequency response for an input SPL of 90 dB 8
7.3 Full-on acoustic gain frequency response 8
7.4 Comprehensive frequency responses and basic frequency response 9
7.5 Effect of tone control position on the basic frequency response 9

Page

7.6 Effect of gain control position on frequency response 9
7.7 Characteristics of the gain control 9
7.8 Effect on the full-on acoustic gain of variation of battery or supply voltage 10
7.9 Effect on the full-on acoustic gain of variation of internal resistance of battery or supply 10
7.10 Effect on $OSPL_{90}$ of variation of battery or supply voltage 10
7.11 Battery current 10
7.12 Measurement of amplitude non-linearities in hearing aids 11
7.13 Effect on amplitude non-linearities of variation of battery or supply voltage and internal impedance 13
7.14 Internal noise generated in the hearing aid 13
7.15 Characteristics of hearing aids with induction pick-up coil input 14
7.16 Characteristics of hearing aids with automatic gain control circuits 15
8 Frequency response recording chart 15
Annex A Harmonic and intermodulation distortion 16

STANDARDS AUSTRALIA

Australian Standard

Hearing aids—Part 0: Measurement of electroacoustical characteristics

1 Scope

This standard describes the measurement of physical performance characteristics of air-conduction hearing aids based on a free-field technique and measured with an ear simulator.

2 Object

2.1 The object of this standard is to describe methods of measurement for the evaluation of the electroacoustical characteristics of hearing aids.

The methods are chosen first of all to be practical and reproducible, and consequently they are based on fixed parameters chosen, to a certain extent, arbitrarily. This should be taken into consideration when comparisons are being made between test results for hearing aids of different models and manufacture, and in each case it is advisable to examine to what extent the arbitrarily chosen parameters will influence the comparison of such test results.

2.2 The test results obtained by the methods specified in this standard express the performance under the conditions of the test and may deviate substantially from the performance of the hearing aid under practical conditions of use.

2.3 It is not the purpose of this standard to restrict the variety of hearing aid performance and characteristics available, nor to inhibit in any way advances in the state of the art.

2.4 The most significant change in this standard is the use of an ear simulator in accordance with IEC 60711: *Occluded-ear Simulator for the Measurement of Earphones Coupled to the Ear by Ear Inserts*, rather than an acoustic coupler, IEC 60126: *IEC Reference Coupler for the Measurement of Hearing Aids Using Earphones Coupled to the Ear by Means of Ear Inserts*. The effect of this change will be to give an apparent significant increase, at some frequencies, of both gain and saturation output levels over the results obtained when measurements are made with the acoustic coupler. Results obtained by using the methods described in this standard cannot therefore be directly compared with those previously obtained using the first edition of IEC 60118: *Recommended Methods for Measurement of the Electroacoustical Characteristics of Hearing Aids*, or IEC 60118-7: *Hearing Aids, Part 7: Measurement of Performance Characteristics of Hearing Aids for Quality Inspection for Delivery Purposes*, or IEC 60118-8: Part 8: *Methods of Measurement of Performance Characteristics of Hearing Aids under Simulated in situ Working Conditions*. (In preparation.)

3 General conditions

3.1 Throughout this standard all sound pressure levels specified are referred to 20 μPa. When appropriate, sound pressure level will be abbreviated to SPL.

3.2 Reference is made to IEC 60711 (1981): Occluded Ear Simulator for the Measurement of Earphones Coupled to the Ear by Ear Inserts.

3.3 Test results obtained by the substitution method using point-by-point measurement shall be considered basic and should be used as a reference when results from the comparison method and the pressure method are being interpreted (see Sub-clauses 4.2, 4.3 and 4.4).

