

Electroacoustics — Hearing aids —

Part 7: Measurement of the performance characteristics of hearing aids for production, supply and delivery quality assurance purposes

The European Standard EN 60118-7:2005 has the status of a
British Standard

ICS 17.140.50

National foreword

This British Standard is the official English language version of EN 60118-7:2005. It is identical with IEC 60118-7:2005. It supersedes BS EN 60118-7:1993 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee EPL/29, Electroacoustics, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

A list of organizations represented on this committee can be obtained on request to its secretary.

Cross-references

The British Standards which implement international or European publications referred to in this document may be found in the *BSI Catalogue* under the section entitled “International Standards Correspondence Index”, or by using the “Search” facility of the *BSI Electronic Catalogue* or of British Standards Online.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 23 and a back cover.

The BSI copyright notice displayed in this document indicates when the document was last issued.

Amendments issued since publication

Amd. No.	Date	Comments

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 14 February 2006

© BSI 14 February 2006

English version

**Electroacoustics –
Hearing aids**
**Part 7: Measurement of the performance characteristics of hearing aids
for production, supply and delivery quality assurance purposes**
(IEC 60118-7:2005)

Electroacoustique –
Appareils de correction auditive
Partie 7: Mesure des caractéristiques
fonctionnelles des appareils de correction
auditive aux fins d'assurance de la qualité
de la production, de la livraison
et des approvisionnements
(CEI 60118-7:2005)

Akustik –
Hörgeräte
Teil 7: Messung der
Übertragungseigenschaften von
Hörgeräten zum Zwecke der
Qualitätssicherung in der Herstellung,
Versorgung und Lieferung
(IEC 60118-7:2005)

This European Standard was approved by CENELEC on 2005-12-01. CENELEC 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 CENELEC 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 CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Foreword

The text of document 29/585/FDIS + 29/587/INF, future edition 2 of IEC 60118-7, prepared by IEC TC 29, Electroacoustics, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 60118-7 on 2005-12-01.

This European Standard supersedes EN 60118-7:1993 + A1:1994.

This European Standard includes major changes, e.g. regarding the definition of reference test gain. In general this edition aligns IEC 60118-7 and the ANSI S3.22 (2003) standard.

The following dates were fixed:

- | | | |
|--|-------|------------|
| – latest date by which the EN has to be implemented
at national level by publication of an identical
national standard or by endorsement | (dop) | 2006-09-01 |
| – latest date by which the national standards conflicting
with the EN have to be withdrawn | (dow) | 2008-12-01 |

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 60118-7:2005 was approved by CENELEC as a European Standard without any modification.

CONTENTS

1	Scope	4
2	Normative references	4
3	Terms and definitions	4
4	General conditions.....	7
5	Nominal characteristics and tolerances	8
6	Test box and test equipment.....	8
7	Test conditions	10
8	Measurements, specifications and tolerances.....	14
9	Maximum permitted expanded uncertainty of measurements	21
	Bibliography	22
	Annex ZA (normative) Normative references to international publications with their corresponding European publications.....	23
	Figure 1 – Example of test arrangement for behind the ear hearing aid	11
	Figure 2 – Example of test arrangement for in-the-ear hearing aid	12
	Figure 3 – Example of OSPL90 and basic frequency response curves.....	15
	Figure 4 – Example of basic frequency response curve, its tolerances and determination of frequency range	17
	Table 1 – Resistance and open circuit voltages for battery simulator.....	13
	Table 2 – Tolerances of the frequency response.....	17
	Table 3 – Distortion test frequencies and input sound pressure levels	18
	Table 4 – Values of $U_{\max}$ for basic measurements.....	21

ELECTROACOUSTICS – HEARING AIDS –

Part 7: Measurement of the performance characteristics of hearing aids for production, supply and delivery quality assurance purposes

1 Scope

This part of IEC 60118 gives recommendations for the measurement of the performance characteristics of air-conduction hearing aids of a particular model for production, supply and delivery quality assurance purposes. The manufacturer will normally assign nominal values.

This standard does not relate to mechanical or environmental tests. It should not be used as the basis for the exchange of information about hearing aid characteristics in general, nor is it intended to be used as a predictor for real-ear performance.

NOTE Terms such as "manufacturer" and "purchaser" are used in this standard. These terms may be understood, however, to refer to the supplier and recipient respectively in any arrangement for the supply of hearing aids in which the use of this standard is called for.

Though the number of measurements covered by this standard is limited, it is not intended that all measurements described herein shall be made in every case.

This second edition now specifies performance requirements. Conformance to the specifications in this standard is demonstrated only when the result of a measurement, extended by the actual expanded uncertainty of measurement of the testing laboratory, lies fully within the tolerances specified in this standard extended by the values for $U_{\max}$ given in Table 4.

In case of custom-made in-the-ear instruments, the data supplied by the manufacturer applies only to the particular hearing aid being tested.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60318-5, *Electroacoustics – Simulators of human head and ear – Part 5: 2 cm³ coupler for the measurement of hearing aids and earphones coupled to the ear by means of ear inserts*¹⁾

3 Terms and definitions

For the purpose of this document, the following terms and definitions apply:

¹⁾ To be published. IEC 60318-5 is a revision of IEC 60126:1973, *IEC reference coupler for the measurement of hearing aids using earphones coupled to the ear by means of ear inserts*.

3.1
sound pressure level
SPL

all sound pressure levels specified are measured in decibels (dB) referenced to 20 μ Pa

3.2
high-frequency average
HFA

average of gain or SPL in decibels at 1 000 Hz, 1 600 Hz and 2 500 Hz

3.3
special purpose hearing aid

hearing aid whose full-on gain at any frequency exceeds its full-on gain at 1 000 Hz, or at 1 600 Hz or at 2 500 Hz by more than 15 dB. If the requirements for being a special purpose hearing aid are met, the manufacturer may substitute the SPA for the HFA

NOTE The frequencies used for the SPA should be specified by the manufacturer and used for all measurements.

3.4
special purpose average
SPA

average of gain or SPL in dB at 3 special purpose frequencies for a special purpose hearing aid. The manufacturer shall specify and state three special purpose one-third-octave-band frequencies each separated by two-third octave

NOTE Throughout this standard, wherever the term HFA appears, SPA may be substituted for these aids.

3.5
acoustic gain

at each test frequency, the difference in decibels obtained by subtracting the input SPL to the hearing aid microphone from the SPL developed by the output from the hearing aid in the acoustic coupler

3.6
gain control

manually or electronically operated control for the adjustment of overall gain

3.7
output SPL for 90-dB input SPL
OSPL90

SPL developed in the acoustic coupler with an input SPL of 90 dB with the gain control of the hearing aid full-on

NOTE It is recognized that the maximum output level may occur with more, or occasionally with less, input SPL than 90 dB. However, the differences are usually small over the frequency range of interest and the single input SPL of 90 dB makes automatic recording of the OSPL90 curve very convenient.

3.8**high-frequency average OSPL90
HFA-OSPL90**

high-frequency average of the OSPL90 SPL levels

3.9**high-frequency average full-on gain
HFA-FOG**

HFA gain for an input SPL of 50 dB when the gain control of the hearing aid is at its full-on position

3.10**reference test setting of the gain control
RTS**

for an input SPL of 60 dB, the setting of the gain control required to produce an HFA-gain within $\pm 1,5$ dB of the HFA-OSPL90 minus 77 dB. If the full-on HFA gain for an input SPL of 60 dB is less than the HFA-OSPL90 minus 77 dB, the RTS is the full-on position of the gain control

NOTE For linear hearing aids, the use of an input SPL of 60 dB and a 17 dB gain control setback from the OSPL90 helps to ensure that, for an overall speech level of 65 dB SPL, peaks should not exceed the OSPL90.

3.11**reference test gain
RTG**

HFA gain for an input SPL of 60 dB with the gain control at RTS

3.12**input-output function**

single frequency plot of acoustic coupler SPL on the ordinate as a function of input SPL on the abscissa with equal decibel scale divisions on each axis

3.13**automatic gain control
AGC**

means (other than peak clipping) by which the gain is automatically controlled as a function of the level of the signal being amplified

3.14**AGC hearing aid**

hearing aid incorporating automatic gain control (AGC)

3.15**directional hearing aid**

hearing aid for which the gain is dependent on the direction of sound incidence when measured under free-field conditions