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Interested committees:

Title: BS EN IEC 60268-7 Sound system equipment

Part 7: Headphones and earphones

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- iii) requires additional national guidance or information

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Introduction

This draft standard is based on national and international discussions. Your comments on this draft are invited and will assist in the preparation of the consequent standard.

For international standards, comments will be reviewed by the relevant UK national committee before sending the consensus UK vote and comments to the international committee, which will then decide appropriate action. If the international standard is approved, it is usual for the text to be published as a British Standard.

For national standards, comments will be reviewed by the relevant UK national committee and the resulting standards published as a British Standard.

UK Vote

Please indicate whether you consider the UK should submit a negative (with supporting technical reasons) or positive vote on this draft. Please indicate if you are aware of any reason why this draft standard should not be published as a British Standard.

Submission of Comments

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Template for comments and secretariat observations

Date: xx/xx/20xx	Document: ISO/DIS xxxx
------------------	------------------------

1	2	(3)	4	5	(6)	7
MB	Clause No./ Subclause No./Annex (e.g. 3.1)	Paragraph/Figure/ Table/Note	Type of comment	Commend (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
	3.1	Definition 1	ed	Definition is ambiguous and needs clarifying.	Amend to read '...so that the mains connector to which no connection...'	
	6.4	Paragraph 2	te	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK.	Delete reference to UV photometer.	

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2023-08-11

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2023-11-03

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100/3960A/RR

IEC TA 20 : ANALOGUE AND DIGITAL AUDIO

SECRETARIAT:

Japan

SECRETARY:

Mr Nobukazu Suzuki

OF INTEREST TO THE FOLLOWING COMMITTEES:

TC 100

PROPOSED HORIZONTAL STANDARD:

☐

Other TC/SCs are requested to indicate their interest, if any, in this CD to the secretary.

FUNCTIONS CONCERNED:

☐ EMC☐ ENVIRONMENT☐ QUALITY ASSURANCE☐ SAFETY

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Recipients of this document are invited to submit, with their comments, notification of any local regulations or technical reasons that may exist and should be considered should this proposal proceed, recognizing that failure to address such requirements could result in the need for new or existing "In Some Countries" clauses. (SEE [AC/22/2007](#) OR [NEW GUIDANCE DOC](#)).

TITLE:

Sound system equipment - Part 7: Headphones and earphones

NOTE FROM TC/SC OFFICERS:

CONTENTS

1			
2	FOREWORD.....		5
3	INTRODUCTION.....		7
4	1 Scope.....		8
5	2 Normative references		8
6	3 Terms and definitions		9
7	4 Classification, designation and coding		11
8	5 Marking of terminals, controls and polarity.....		14
9	6 User instructions		14
10	7 Conditions for specifications and measurements		15
11	7.1 Rated conditions		15
12	7.2 Standard conditions for measurement		15
13	7.3 Couplers and ear simulators		16
14	7.3.1 HATS.....		16
15	7.4 Measurement conditions for simulated programme signal		17
16	7.5 Loudness comparison conditions		17
17	7.5.1 General		17
18	7.5.2 Free-field comparison conditions		17
19	7.5.3 Diffuse-field comparison conditions		18
20	7.6 Ear canal sound pressure level measurement conditions		18
21	7.7 Graphical presentation of results		18
22	8 Characteristics to be specified and their methods of measurement.....		18
23	8.1 Power supply		18
24	8.2 Electrical impedance.....		18
25	8.2.1 Rated impedance.....		18
26	8.2.2 Impedance/frequency characteristic.....		19
27	8.2.3 Rated source impedance		19
28	8.3 Input voltage.....		19
29	8.3.1 Rated input voltage.....		19
30	8.3.2 Limiting values of input voltage.....		19
31	8.3.3 Characteristic voltage		20
32	8.3.4 Simulated programme signal characteristic voltage		20
33	8.3.5 Simulated programme signal characteristic voltage corrected by A- weighting characteristics and free-field response compensation		21
34			
35	8.3.6 Protective devices		21
36	8.4 Input power		22
37	8.5 Sound pressure (level).....		22
38	8.5.1 General		22
39	8.5.2 Characteristics to be specified.....		23
40	8.5.3 Method of measurement		23
41	8.6 Frequency response		23
42	8.6.1 Coupler or ear simulator (including HATS) frequency response		23
43	8.6.2 Free-field compensated frequency response.....		24
44	8.6.3 Diffuse-field compensated frequency response		25
45	8.6.4 Rated frequency range		26
46	8.7 Amplitude non-linearity		26
47	8.7.1 General		26

48	8.7.2	Harmonic distortion.....	26
49	8.7.3	Modulation distortion	27
50	8.7.4	Difference-frequency distortion	28
51	8.8	Rated environmental conditions	28
52	8.9	External electric and/or magnetic field	28
53	8.9.1	Characteristics to be specified	28
54	8.9.2	Method of measurement	29
55	8.10	Unwanted sound radiation.....	29
56	8.10.1	Characteristic to be specified.....	29
57	8.10.2	Method of measurement	29
58	8.11	Sound attenuation.....	29
59	8.11.1	Characteristic to be specified.....	29
60	8.11.2	Method of measurement	29
61	8.12	Crosstalk attenuation for multi-channel headphones	29
62	8.12.1	Characteristic to be specified.....	29
63	8.12.2	Method of measurement	30
64	8.13	Application force	30
65	8.13.1	Characteristic to be specified.....	30
66	8.13.2	Method of measurement	30
67	8.14	Physical characteristics, cables and connectors.....	30
68	9	Classification of characteristics	31
69	Annex A (normative)	Pinna simulators for measurements of headphones and	
70		earphones	32
71	Annex B (normative)	Free-field comparison frequency response	41
72	Annex C		
73	(normative)		
74		Diffuse-field comparison frequency response.....	42
75	Annex D		
76	(normative)		
77		Free-field and diffuse-field ear canal sound pressure level frequency responses	43
78	Annex E		
79	(normative)		
80		Specification and conditions of use of a microphone for use inside the ear canal.....	45
81	Annex F (informative)	Practical details of free-field comparison conditions	46
82	Annex G (informative)	Practical details of diffuse-field comparison conditions.....	47
83	Annex H		
84	(informative)		
85		Practical details of the subjective comparison and ear canal sound pressure level	
86		conditions.....	48
87	Annex I		
88	(informative)		
89		Two-tone distortion measurements	49
90	I.1	Difference frequency distortion	49
91	I.2	Procedure for measuring difference frequency distortion	49
92	I.3	Intermodulation distortion	51
93	I.4	Procedure for measuring intermodulation distortion	52
94	Annex J		
95	(informative)		
96		Left-right tracking response for stereo headphones	55
97	Bibliography.....		56

98	Figure 1 – Diagrammatic horizontal sections showing types of earphones and their	
99	spatial relationships with the pinna and/or canal entrance	12
100	Figure 2 – Diagrams showing the four possible construction: acoustically open or	
101	closed, and closed- or open-back	14
102	Figure 3 – Measurement system using simulated programme signal	17
103	Figure 4 – Example of a setup for the measurement of free-field/ diffuse-field	
104	compensated frequency response.....	26
105		
106	Figure A. 1 – Shape of the recommended pinna simulator	33
107	Figure A. 2 – Coordinate for the recommended pinna simulator	34
108	Figure A. 3 – Cross sectional shapes and dimensions of the recommended pinna	
109	simulator, horizontal section	37
110	Figure A. 4 – Cross sectional shapes and dimensions of the recommended pinna	
111	simulator, vertical section	40
112		
113	Figure I. 1 – Definition of difference frequency distortion products and orders.	49
114	Figure I. 2 – Example of Difference Frequency Distortion of a headphone.....	50
115	Figure I. 3 – Example of Total Difference Frequency Distortion of a headphone.....	51
116	Figure I. 4 – Definition of intermodulation distortion products and orders.	52
117	Figure I. 5 – Example of intermodulation distortion of a headphone.	53
118	Figure I. 6 – Example of total Intermodulation distortion of a headphone.	54
119		
120	Figure J. 1 – Example of a left-right tracking response for a stereo headphone.....	55
121		
122	Table 1 – Classification of characteristics	31
123		

INTERNATIONAL ELECTROTECHNICAL COMMISSION

SOUND SYSTEM EQUIPMENT –

Part 7: Headphones and earphones

FOREWORD

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IEC 60268-7 has been prepared by technical area 20: Analog and digital audio, of IEC technical committee 100: Audio, video and multimedia systems and equipment. It is an International Standard.

This fourth edition cancels and replaces the third edition published in 2010, Amendment 1: 2020. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) ...;
- b)

The text of this International Standard is based on the following documents:

Draft	Report on voting
100/XX/FDIS	100/XX/RVD

175
176 Full information on the voting for its approval can be found in the report on voting indicated in
177 the above table.

178 The language used for the development of this International Standard is English.

179 This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in
180 accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available
181 at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are
182 described in greater detail at www.iec.ch/publications.

183 The committee has decided that the contents of this document will remain unchanged until the
184 stability date indicated on the IEC website under webstore.iec.ch in the data related to the
185 specific document. At this date, the document will be

- 186 • reconfirmed,
- 187 • withdrawn,
- 188 • replaced by a revised edition, or
- 189 • amended.

INTRODUCTION

190

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192 that compliance with this document may involve the use of a patent. IEC takes no position
193 concerning the evidence, validity, and scope of this patent right.

194 The holder of this patent right has assured IEC that s/he is willing to negotiate licences under
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201

SOUND SYSTEM EQUIPMENT –

Part 7: Headphones and earphones

1 Scope

This part of IEC 60268, is applicable to headphones, earphones, headsets, and earsets, intended to be used on, or in, the human ear. It also applies to equipment, such as pre-amplifiers, passive networks and power supplies which form an integral part of the headphone system.

It does not deal with:

- a) safety, for which reference should be made to IEC 62368-1 or another appropriate standard;
- b) the characteristics of microphones of headsets, for which reference should be made to IEC 60268-4;
- c) earphones and other devices for hearing aids, for which reference should be made to IEC 60118-0;
- d) headphones for audiometry;
- e) headphones and other devices which form part of an active ear-defender system, although some of its provisions may be applicable.
- f) active noise cancelation characteristics as covered by IEC 60268-24.

This standard specifies the characteristics which should be included by the manufacturer in specifications, and relevant methods of measurement. It includes a classification of the different types of earphones, mainly characterized by the way in which the transducer is coupled acoustically to the ear, and a classification code which may also be used for marking.

Rated conditions and characteristics in this standard are not strictly subject to measurement, except by the manufacturer. Measurement methods for rated characteristics are provided for the benefit of manufacturers for the purpose of test repeatability and data comparison. External test houses may then use the same method for verification of manufacturers' specifications.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 60038, *IEC standard voltages*

IEC 60050(801):1994, *International Electrotechnical Vocabulary – Chapter 801: Acoustics and electroacoustics*

IEC 60086-1, *Primary batteries. – Part 1: General*

IEC 60263, *Scales and sizes for plotting frequency characteristics and polar diagrams*

IEC 60268-1, *Sound system equipment – Part 1: General*

IEC 60268-2, *Sound system equipment – Part 2: Explanation of general terms and calculation methods*

242 IEC 60268-11, *Sound system equipment – Part 11: Application of connectors for the*
243 *interconnection of sound system components*

244 IEC 60268-12, *Sound system equipment – Part 12: Application of connectors for broadcast and*
245 *similar use*

246 IEC 60318-4, *Electroacoustics – Simulators of human head and ear – Part 4:*
247 *Occluded-ear simulator for the measurement of earphones coupled to the ear by means of ear*
248 *inserts*

249 IEC 60318-7, *Electroacoustics – Simulators of human head and ear – Part 7:*
250 *Head and torso simulator for the measurement of sound sources close to the ear*

251 ISO 7619-1, *Rubber, vulcanized and thermoplastic – Determination of indentation hardness –*
252 *Part 1: Durometer method (Shore hardness)*

253 **3 Terms and definitions**

254 For the purposes of this document, the following terms and definitions apply.

255 ISO and IEC maintain terminology databases for use in standardization at the following
256 addresses:

- 257 • IEC Electropedia: available at <https://www.electropedia.org/>
- 258 • ISO Online browsing platform: available at <https://www.iso.org/obp>

259 NOTE Any device included between a transducer as defined in 3.1 to 3.15 and the connector(s) for electrical input
260 should be regarded as part of the transducer.

261 **3.1**

262 **earphone**

263 electroacoustic transducer intended to be closely coupled to the ear

264 [IEV 801-27-18, modified]

265 **3.2**

266 **headphone**

267 assembly of one or two earphones on a headband

268 Note 1 to entry: The use of a headband (or chin-band) may be optional, e.g. in the case of intra-concha or insert
269 devices.

270 [IEV 801-27-20]

271 **3.3**

272 **headset**

273 headphones equipped with a microphone

274 **3.4**

275 **earset**

276 earphones equipped with a microphone

277 Note 2 to entry: This definition is included because the term appears in the catalogue of IEC publications

278 **3.5**

279 **insert earphone**

280 small earphone that is attached directly to a connecting element, for example an earmould,
281 inserted into the ear canal

282 [IEV 801-27-22, modified]

283 **3.6**

284 **intra-concha earphone**

285 small earphone that fits in the concha cavity, with its acoustic exit close to the entrance of the
286 ear canal

287 **3.7**

288 **supra-aural earphone**

289 earphone applied externally to the outer ear and intended to rest on the pinna

290 [IEV 801-27-23, modified]

291 **3.8**

292 **supra-concha earphone**

293 earphone intended to rest on the ridges of the concha cavity

294 **3.9**

295 **circumaural earphone**

296 earphone having a cavity large enough to cover the region of the head including the ear

297 [IEV 801-27-24]

298 **3.10**

299 **ear shell**

300 circumaural type of earphone hanging on the ear

301 [IEC 60914]

302 **3.11**

303 **stethoscopic headphone**

304 insert headphone by which the earphone(s) is/are coupled to the ears by means of a pair of
305 rigid tubes, so that the assembly resembles a stethoscope

306 **3.12**

307 **acoustically open earphone**

308 earphone which intentionally provides an acoustic path between the external environment and
309 the ear canal

310 **3.13**

311 **acoustically closed earphone**

312 earphone which is intended to prevent acoustic coupling between the external environment
313 and the ear canal

314 **3.14**

315 **closed-back earphone**

316 earphone which does not emit significant sound radiation from the back of the transducer to
317 the external environment

318 **3.15**

319 **open-back earphone**

320 earphone which emits significant sound radiation from the back of the transducer to the
321 external environment

322 **3.16**

323 **simulated programme signal**

324 signal whose mean power spectral density closely resembles the average of the mean power
325 spectral densities of a wide range of programme material, in accordance with IEC 60268

326 Note 3 to entry: This signal is called as “wide band signal” in a few standards.

327 **3.17**

328 **head and torso simulator**

329 **HATS**

330 simulator of a median adult human head and part of the torso extending in total from the top of
331 the head to the waist and designed to simulate the sound pick-up characteristics and acoustic
332 diffraction

333 Note 3 to entry: The head simulator includes two pinna simulators, and at least one occluded-ear simulator.

334 [SOURCE: IEC 60318-7, 3.1, modified – The preferred term “manikin” has been omitted.]

335 **4 Classification, designation and coding**

336 The following designations and classification codes shall be used:

337 60268-7 - IEC - XXXX - NNRN - N

338 where

339 60268-7-IEC is the standard form of prefix;

- 340 • X (first letter) gives the principle of the transducer:

341 D - electrodynamic (moving coil);

342 E - electret (self-polarizing);

343 F - piezo-electric (polymer);

344 M - electromagnetic (moving armature or diaphragm);

345 P - piezo-electric (ceramic);

346 S - electrostatic (externally polarized);

- 347 • X (second letter) gives the type of earphone:

348 C - circumaural;

349 E - intra-concha;

350 H - earshell;

351 I - insert;

352 M - supra-concha;

353 S - supra-aural;

354 T - stethoscopic;

355 An illustration of the types, except “H”, is given in Figure 1.

- 356 • X (third letter) gives the intended nature of the acoustic coupling to the ear canal:

357 L - acoustically open (controlled leakage);

358 S - acoustically closed (minimum leakage);

- 359 • X (fourth letter) gives the intended nature of the radiation to the external environment:

360 C - closed-back (see 3.14);

361 O - open-back (see 3.15);

362 An illustration of the four possibilities defined in 3.12 to 3.15, and indicated by the third and
363 fourth classification letters, is given in Figure 2;

- 364
- 365
- 366
- 367
- NNRN (first number) gives the impedance in ohms in "mantissa and exponent" form. (For example, 8 Ω as "08R0", 32 Ω as "32R0" and 600 Ω as "06R2");
 - N (second number) gives the number of channels.
- The code, compiled in accordance with the above rules, may be used for marking.

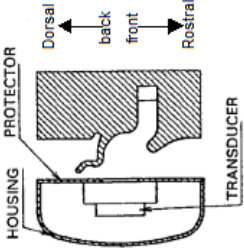
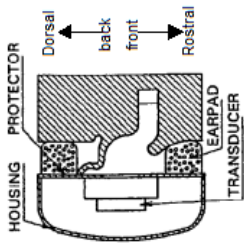
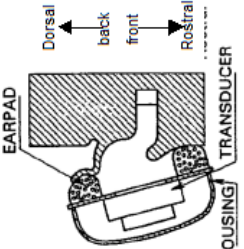
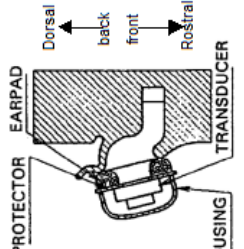
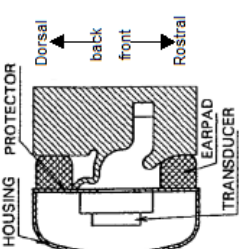
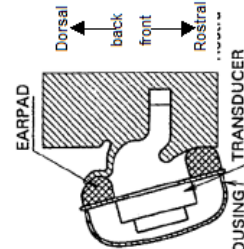
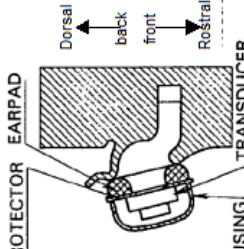
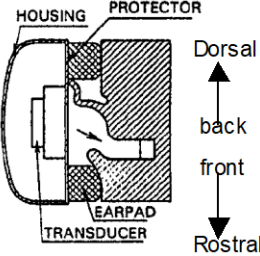
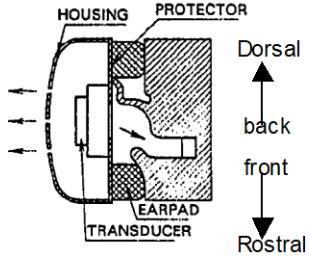
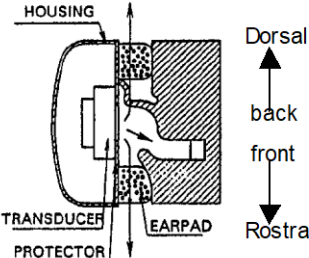
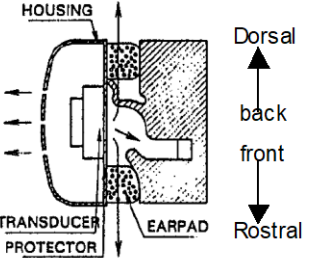
Ear loudspeaker			
Acoustically open earphone (controlled leakage)			
Acoustically closed earphone (minimum leakage)			
Type of earphone	Circumaural	Supra-aural	Supra-concha

Figure 1 – Diagrammatic horizontal sections showing types of earphones and their spatial relationships with the pinna and/or canal entrance

Type of earphone	Acoustically closed earphone (minimum leakage)	Acoustically open earphone (controlled leakage)	
Intra-concha			
Insert			
Insert with sound tube between transducer and earpiece (for example, stethoscopic type of earphone for hearing aid)			NOTE: - Cross hatching shows acoustically closed earpad to accomplish minimum leakage - Spotted by small circle shows porous material earpad to accomplish controlled leakage

Figure 1 (continued)

Type of earphone	Closed-back (does not emit significant sound radiation from the back of the transducer to the external environment)	Open-back (emits significant sound radiation from the back of the transducer to the external environment)
Acoustically closed (intended to prevent acoustic coupling between the external environment and the ear canal)		
Acoustically open (intentionally provides an acoustic path between the external environment and the ear canal)		
Note: Arrows show sound flow or sound leakage		

NOTE The transducers shown in the schematics are not necessarily positioned in the centre of the housings or concentric to the ear canal.

**Figure 2 – Diagrams showing the four possible construction:
acoustically open or closed, and closed- or open-back**

5 Marking of terminals, controls and polarity

Requirements for marking terminals and controls are given in IEC 60268-1, and for polarity in IEC 60268-2. In addition, headphones which are intended to be worn with a particular earphone on each ear shall be marked to indicate the "left" and "right" earphones. If a colour marking is used, the "right" earphone shall be indicated by a red marking. For the sake of visually-impaired persons, it is recommended to indicate the left earphone by a projection of at least 1,5 mm diameter and 0,3 to 0,5 mm height.

6 User instructions

The user instructions shall include information on:

- connector contact assignments (see IEC 60268-11);
- controls and switches (if any);
- microphone (if any);
- diagram of the interconnections of the earphones (if more than one);
- classification code (see Clause 4);

- description of the type of headphone.

Information shall also be provided on the safe use of the headphone, using wording similar to:

"To prevent possible hearing damage, do not listen at high volume levels for long periods, do not use the headphones while driving or cycling, or in any situation where you should be able to hear other sounds. As a guide to setting the volume level, check that you can still hear your own voice, when speaking normally while listening with the headphones."

If the headphone is supplied with auxiliary equipment, information shall also be provided on:

- pre-amplifiers and/or passive networks;
- receivers (for cordless systems);
- power supplies;
- other parts, such as magnetic pick-up devices.

7 Conditions for specifications and measurements

7.1 Rated conditions

For an explanation of the meaning of "rated conditions" and "rated value of a characteristic", reference shall be made to IEC 60268-2.

The rated conditions for a headphone are:

- rated impedance;
- rated input voltage (or power, see 8.4);
- rated noise voltage (or power, see 8.4);
- rated source impedance (see note);
- rated frequency range;
- rated long-term maximum input voltage (or power);
- rated maximum permanent noise voltage (or power);
- rated power supply voltage (if any);
- rated climatic conditions (temperature, humidity, air pressure);
- rated damage limited input voltage;
- rated application force.

These values are taken from the manufacturer's specification and are not subject to measurement; they constitute the basis for measuring the other characteristics.

For climatic conditions, reference is made to IEC 60268-1, and further information is given in IEC 60068-1 and IEC Guide 106.

NOTE The performance of most types of headphones depends very little on the source impedance. However, in order to allow headphones of widely different impedances to be reasonably well-matched, in terms of the sound pressure level produced, to a single headphone output on other equipment, IEC 61938 at present specifies a source impedance of 120 Ω , intermediate between the lowest and highest likely impedances of available headphones.

7.2 Standard conditions for measurement

A headphone is working under standard conditions for measurement when all of the following conditions are fulfilled:

- a) at least one earphone is applied to the appropriate coupler or ear simulator, with the rated application force;

b) a sinusoidal voltage at the standard measuring frequency is applied, in series with the rated source impedance. The voltage shall be such that a sound pressure level of 94 dB (ref. 20 μ Pa) is generated in the coupler or ear simulator. Unless otherwise stated, the standard measuring frequency shall be 500 Hz. The input signal shall be applied at the point where the signal from an amplifier or other equipment is applied when the headphone is in use. This point may be the input of a piece of auxiliary equipment, such as a preamplifier.

As an alternative, the manufacturer may specify this condition as being a signal voltage which dissipates a power of 1 mW in a pure resistance equal to the rated impedance of the earphone being measured. The output impedance of the amplifier used for headphones measurement shall be 2 Ω or less in order to keep the output voltage constant;

NOTE Electrostatic, piezo-electric, electret condenser and cordless headphones are within the scope of this standard. The signal may be sent to the headphone by infra-red, radio, light or magnetic induction (either directly to the transducers or to a magnetic pick-up device and amplifier). These types of headphone are more easily dealt with by specifying the sound pressure level to be generated (the input signal being applied to the transmitter unit), rather than by specifying the power in the rated impedance.

c) unless otherwise specified by the manufacturer, volume controls are set at minimum attenuation. For headphones supplied with a preamplifier, and for cordless headphones, the manufacturer shall specify a reference position of the gain control for use in measurements. Other controls shall be set at the designated "normal" positions, or at stated positions, preferably those giving the greatest range of frequency response. Balance controls shall be set for equal voltages at the terminals of the channels. Crosstalk controls shall be set for minimum crosstalk;

d) if the headphone requires a power supply, the rated supply voltage and frequency are applied.

7.3 Couplers and ear simulators

The manufacturer should use the coupler or ear simulator which is specified in the international standard for the measurement of the headphone or earphone, for which results are to be published. The manufacturer shall state the type of coupler, ear simulator, or HATS used in the results.

NOTE Examples of the international standards specifying the couplers and ear simulators are IEC 60318-1, IEC 60318-2, IEC 60318-3, IEC 60318-5, IEC 60318-4, ITU-T P.57, 4.3 and the ear part of HATS (Head and torso simulator) in IEC 60318-7.

If a different coupler or ear simulator not specified in the international standards was used, the manufacturer shall state its physical parameters, shape, dimension, volume of the cavity, etc., to maintain repeatability of measurement.

7.3.1 HATS

The HATS used for measurement shall comply with IEC 60318-7. The pinna simulator specified in normative Annex A is preferred. If a different pinna simulator is used, this shall be stated with the measurement results. 

NOTE Use of HATS for measurements above 10 kHz is outside the scope of IEC 60318-7. For this, IEC 60318-7 recommends that a statistical analysis of the measurement data be carried out to determine the level of repeatability that can be achieved. This is especially necessary for measurements at frequencies higher than 16 kHz. Detailed requirements for these are under consideration.

For the measurements using only the pinna and ear simulator of the HATS, the manufacturer should use the pinna specified in IEC 60318-7 or equivalent, see ITU recommendation P.58. The shore hardness of the rubber pinna used shall be stated in the results, see ISO 7619-1 (2004).

Information for the pinna simulator suitable for measurements of headphones is given in Annex A.

If the coupler or ear simulator except specified in the international standards was used, the manufacturer shall state its physical parameters, shape, dimension, volume of the cavity, etc., to maintain repeatability of measurement.