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Sound system equipment - Part 24: Headphones and earphones - active acoustic noise cancelling characteristics

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Equipements pour systèmes électroacoustiques - Partie 24: Casques et écouteurs - Caractéristiques d'annulation active du bruit acoustique

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TITLE:

SOUND SYSTEM EQUIPMENT – Part 24: Headphones and earphones – active acoustic noise cancelling characteristics

PROPOSED STABILITY DATE: 2026

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

SOUND SYSTEM EQUIPMENT –

Part 24: HEADPHONES AND EARPHONES -
ACTIVE ACOUSTIC NOISE CANCELLING CHARACTERISTICS

FOREWORD

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International Standard IEC 60268-24 has been prepared by Technical Area 20 Analogue and digital audio, of IEC technical committee 100: Audio, video and multimedia systems and equipment.

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

FDIS	Report on voting
XX/XX/FDIS	XX/XX/RVD

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Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

108 The committee has decided that the contents of this document will remain unchanged until the
109 stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to
110 the specific document. At this date, the document will be

- 111 • reconfirmed,
- 112 • withdrawn,
- 113 • replaced by a revised edition, or
- 114 • amended.

115

116 The National Committees are requested to note that for this document the stability date
117 is 20XX..

118 THIS TEXT IS INCLUDED FOR THE INFORMATION OF THE NATIONAL COMMITTEES AND WILL BE DELETED
119 AT THE PUBLICATION STAGE.

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121

INTRODUCTION

122 This document specifies both methods of measurement and reporting of data for noise
123 cancelling characteristics on active acoustic noise cancelling headphones and earphones.

124 Active acoustic noise cancelling headphones and earphones are commonly used to reduce the
125 environmental acoustic noise to which the ear is exposed.

126 However, to date, there is no international standard for evaluating the noise cancelling
127 performance of active acoustic noise cancelling headphones and earphones. Manufacturers
128 currently measuring noise cancelling performance use only proprietary methods, and the
129 resulting metrics are neither uniform nor comparable.

130 This standard provides measurement methods and metrics for the noise cancelling performance
131 of active acoustic noise cancelling headphones and earphones. The resulting measured and
132 calculated values enable comparison of performance data obtained in different locations.

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SOUND SYSTEM EQUIPMENT –

Part 24: HEADPHONES AND EARPHONES - ACTIVE ACOUSTIC NOISE CANCELLING CHARACTERISTICS

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141 **1 Scope**

142 This document is applicable to active acoustic noise cancelling headphones and earphones
143 which have the function of reducing the noise heard by the user by the output sound from the
144 transducer generated by the environment noise detection microphone and the noise reduction
145 signal processing circuit.

146 This document specifies the terms and definitions of this type of headphones or earphones, the
147 characteristics to be specified, and the measurement and evaluation methods.

148 The noise detection microphones are mounted in the body, on the surface, or on an accessory
149 of the headphones or earphones. Signal processing circuits are analogue and digital electronic
150 circuits.

151 This document does not deal with equipment intended for hearing protection.

152 The noise cancelling characteristic measurement methods may be applied to headphones and
153 earphones having no active noise cancelling function.

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155 **2 Normative references**

156 The following documents are referred to in the text in such a way that some or all of their content
157 constitutes requirements of this document. For dated references, only the edition cited applies.
158 For undated references, the latest edition of the referenced document (including any
159 amendments) applies.

160 IEC 60268-1:1985, *Sound system equipment. Part 1: General*

161 IEC 61672-1:2013, *Electroacoustics - Sound level meters - Part 1: Specifications*

162 IEC 61260-1:2014, *Electroacoustics - Octave-band and fractional-octave-band filters - Part 1:
163 Specifications*

164 IEC 60068-1:2013, *Environmental testing - Part 1: General and guidance*

165 IEC 60050-702:1992, *International Electrotechnical Vocabulary - Chapter 702: Oscillations,
166 signals and related devices*

167 IEC 60268-7:2010, *Sound system equipment - Part 7: Headphones and earphones*

168 IEC 60318-4:2010, *Electroacoustics – Simulators of human head and ear –Part4:
169 Occluded-ear simulator for the measurement of earphones coupled to the ear by means of ear
170 inserts*

171 ANSI/ASA S12.42:2010, *Methods for the Measurement of Insertion Loss of Hearing*
 172 *Protection Devices in Continuous or Impulsive Noise Using Microphone-in-Real-Ear or Acoustic*
 173 *Test Fixture Procedures*

174 IEC 60318-7:2022, *Electroacoustics – Simulators of human head and ear –Part 7: Head*
 175 *and torso simulator for the measurement of air-conduction hearing aids*

176 ISO 532-1:2017, *Acoustics - Method for calculating loudness - Part1:Zwicker method*

177 ISO 3741:2010, *Acoustics - Determination of sound power levels and sound energy levels of*
 178 *noise sources using sound pressure - Precision methods for reverberation test rooms*

179 ISO 4869-1:2018, *Acoustics - Hearing protectors - Part 1: Subjective method for the*
 180 *measurement of sound attenuation*

181 ISO TR 4869-3:1989, *Acoustics - Hearing protectors - Part 3: Simplified method for the*
 182 *measurement of insertion loss of ear-muff type protectors for quality inspection purpose*

183

184 3 Terms and definitions

185 For the purposes of this document, the following terms and definitions including those of IEC
 186 60268-7, IEC 60318-4 and IEC 60318-7 apply.

187 ISO and IEC maintain terminological databases for use in standardization at the following
 188 addresses:

- 189 • IEC Electropedia: available at <http://www.electropedia.org/>
- 190 • ISO Online browsing platform: available at <http://www.iso.org/obp>

191 .

192 3.1

193 active noise cancelation

194 characteristics of reducing the noise level in the user's ear canal by the output sound from the
 195 driver generated by the noise detection microphone and the signal processing circuit
 196 (hereinafter referred to as ANC).

197 3.2

198 noise cancelling headphones

199 headphones or earphones that have the characteristics of active noise cancelling (hereinafter
 200 referred to as ANC headphones).

201 3.3

202 head and torso simulator

203 HATS

204 simulator of a median adult human head and part of the torso extending in total from the top of
 205 the head to the waist and designed to simulate the sound pick-up characteristics and acoustic
 206 diffraction.

207 Note 1 to entry: The head simulator includes two pinna simulators, and at least one occluded-ear simulator.
 208 [SOURCE: IEC TS 60318-7:2017]

209 **3.4**
 210 **acoustic test fixture**
 211 **ATF**
 212 inanimate device that approximates certain physical characteristics and dimensions of a
 213 representative human head, pinnae, and ear canal and is used for measuring the insertion loss
 214 of environmental noise by a headphone

215 [Source: ANSI/ASA S12.42, modified by replacing 'of a hearing protection device' by 'of
 216 environmental noise by a headphone']

217 **3.5**
 218 **passive insertion loss (dB)**
 219 the insertion loss determined from the difference between the sound pressure levels with and
 220 without the ANC headphones attached to the HATS or ATF, measured in the condition of ANC
 221 function turned off.

222 **3.6**
 223 **active insertion loss (dB)**
 224 the insertion loss determined from the difference between the sound pressure levels with and
 225 without the ANC function on where ANC headphones attached to the HATS or ATF.

226 **3.7**
 227 **total insertion loss (dB)**
 228 the insertion loss determined from the difference between the sound pressure levels with and
 229 without the ANC headphones attached to the HATS or ATF, measured in the condition of ANC
 230 function turned on.

231 **3.8**
 232 **perceptual passive noise attenuation ratio**
 233 the single ratio value of loudness with the ANC headphones attached to the HATS or ATF to
 234 that without the ANC headphones attached to the HATS or ATF, measured in the condition of
 235 ANC function turned off.

236 **3.9**
 237 **perceptual active noise cancellation ratio**
 238 the single ratio value of loudness when the ANC function is on to that when the ANC function
 239 is off, where ANC headphones attached to the HATS or ATF.

240 **3.10**
 241 **perceptual total noise suppression ratio**
 242 the single ratio value of loudness with the ANC headphones attached to the HATS or ATF to
 243 that without the ANC headphones attached to the HATS or ATF, measured in the condition of
 244 ANC function turned on.

245

246 **4 Measurement method for noise cancelling characteristics**

247 **4.1 Characteristics to be specified**

248 The noise cancelling characteristics are specified by measuring: the sound pressure level for
 249 the open ear of the HATS or ATF, without the headphone fitted, $L_{\text{OPEN}}(f)$ (dB); the sound
 250 pressure level of the HATS or ATF ear simulator with the headphones fitted to the HATS or ATF,
 251 but with the ANC turned OFF, $L_{\text{ANC-OFF}}(f)$ (dB); and the sound pressure level of the HATS or
 252 ATF ear simulator with the headphones fitted to the HATS or ATF, but with the ANC turned ON,
 253 $L_{\text{ANC-ON}}(f)$ (dB). All three quantities measured in the same sound field at the same specified
 254 sound pressure level.