BRITISH STANDARD

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352-8:2008

Hearing protectors — Safety requirements and testing —

Part 8: Entertainment audio ear-muffs

ICS 13.340.20

BSI
British Standards

National foreword

This British Standard is the UK implementation of EN 352-8:2008.

The UK participation in its preparation was entrusted to Technical Committee PH/7, Hearing protectors.

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

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Foreword

This document (EN 352-8:2008) has been prepared by Technical Committee CEN/TC 159 “Hearing protectors”, the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by October 2008, and conflicting national standards shall be withdrawn at the latest by October 2008.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with EU Directive(s), see informative annex ZA, which is an integral part of this document.

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Introduction

This European Standard “Hearing Protectors – Safety requirements and testing – Part 8: Entertainment audio ear-muffs”, specifies procedures for the testing of personal hearing protection devices in relation to Directive 89/686/EEC - Personal Protective Equipment. Entertainment audio ear-muffs provide hearing protection for the user but also provide a music or speech signal for entertainment purposes rather than for audio communications associated with the work duties of the wearer.

EN 352-1 deals with requirements for ear-muffs, EN 352-2 with ear-plugs, EN 352-3 with ear-muffs attached to industrial safety helmets. EN 13819 parts 1 and 2 deal with testing plans common to all types of hearing protectors covered by this series of European Standards.

Additional safety requirements and the associated test procedures for level-dependent ear-muffs are contained in EN 352-4, for active noise reduction ear-muffs in EN 352-5, for ear-muffs with safety-related electrical audio input in EN 352-6 and for level-dependent ear-plugs in EN 352-7. An associated standard EN 458 [2] covers selection, use, care and maintenance of hearing protection.

The particular requirement for hearing protectors in relation to their ability to reduce noise to below daily limit levels set by Directive 2003/10/EC "on the protection of workers from the risks related to exposure to noise at work" is addressed in the standard by means of a limitation of that sound pressure level effective to the ear which is generated by the entertainment audio equipment of the ear-muff. This limitation is to be tested and reported at full volume setting. The sound pressure level limit for the reproduced sound of the audio entertainment is limited to 82 dB(A). Completion of the information given on entertainment audio ear-muffs by the passive attenuation data reported within EN 352-1, which is required by this standard, enables the user to fulfil the particular requirement on daily limit levels set by Directive 2003/10/EC.

Entertainment audio ear-muffs are designed to provide not only sound attenuation to ambient sound but also to provide entertainment audio via built-in loudspeakers. The entertainment audio signal can be transmitted by radio (broadcast or local plant programmes) or by wire or other communication. The audio signal transmission is for entertainment and not for safety or work-related purposes.

This part of the standard is a specification intended for type approval purposes, for which four sets of specimen ear-muffs are tested (further samples may be required for testing under EN 352-1 or EN 352-3, as appropriate).

The requirements and tests of the standard are concerned primarily with the entertainment audio performance of the ear-muffs. The standard may be applied to ear-muffs for fitting to industrial safety helmets.

1 Scope

This part of the Standard is concerned with entertainment audio ear-muffs. It specifies constructional and design and performance requirements, methods of test, marking requirements and user information relating to the incorporation of the entertainment audio facility.

The requirements of this standard are intended to take account of the ergonomic interaction between the wearer, the device and, where possible, the working environment in which the device is likely to be used (see Annex ZA of this standard and EN 458 [2]).

2 Normative references

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

EN 352-1:2002, *Hearing protectors - General requirements - Part 1: Ear-Muffs*

EN 352-3, *Hearing protectors - General requirements - Part 3: Ear-muffs attached to an industrial safety helmet*

EN 352-6:2002, *Hearing protectors - Safety requirements and testing - Part 6: Ear-muffs with electrical audio input*

EN 13819-1, *Hearing protectors — Testing — Part 1: Physical test methods*

EN 13819-2, *Hearing protectors — Testing — Part 2: Acoustic test methods*

EN ISO 11904-1:2002, *Acoustics — Determination of sound immission from sound sources placed close to the ear — Part 1: Technique using a microphone in a real ear (MIRE technique) (ISO 11904-1:2002)*

3 Terms and definitions

For the purposes of this Standard, the terms and definitions given in EN 352-1:2002 or EN 352-6:2002, as appropriate, together with the following apply.

3.1
diffuse field related sound pressure level
sound pressure level of a diffuse sound field which will give rise to the measured ear canal sound pressure level, when a subject is exposed to a diffuse field (EN ISO 11904-1:2002, Clause 3.6)

NOTE Ear canal sound pressure level is the equivalent continuous sound pressure level measured at the ear canal measurement position (EN ISO 11904-1:2002, Clause 3.2). Ear canal measurement position is the position in the ear canal where the sound pressure is measured (EN ISO 11904-1:2002, Clause 3.1).

3.2
entertainment audio ear-muffs
ear-muffs additionally providing reproduced sound for entertainment purposes

NOTE They may be designed with an electrical audio input or with built-in broadcast receivers. Or they may be part of a complete system composed of transmitters and receiving audio ear-muffs.

4 Requirements

4.1 General

Entertainment audio ear-muffs shall meet the requirements of EN 352-1 (or EN 352-3, as appropriate). Additional requirements are listed below.

4.2 Materials and construction

The electronic circuit of the entertainment audio ear-muff shall meet the electrical safety and EMC requirements appropriate to this class of equipment.

4.3 Performance

4.3.1 General

Entertainment audio ear-muffs shall meet all the performance requirements of EN 352-1 (or EN 352-3, as appropriate), including the minimum attenuation requirement in their passive mode. Additionally, the requirements specified in 4.3.2 shall be satisfied.

Specimens of ear-muffs shall be conditioned and tested as specified in 5.1.1 and 5.1.2. The scheme of testing shall be as specified in 5.1.3.

4.3.2 Maximum sound pressure levels generated by entertainment audio

The sound output levels of the four test samples shall be tested in accordance with 5.2 and reported in the test report. The four test samples shall be tested on 8 test subjects to obtain 16 results measured on 16 ears. The mean value of 16 measurements plus one standard deviation shall not exceed 82 dB(A). In cases where a manufacturer has designed left and right cups in a different way (especially in terms of sound pressure level effective to the ear), neither the mean value of 8 measurements of left cups plus one standard deviation nor the mean value of 8 measurements of right cups plus one standard deviation shall exceed 82 dB(A).

5 Testing

This scheme of testing is additional to that described in EN 13819-1 and EN 13819-2. It shall be carried out on additional samples. Estimates of uncertainty shall be presented with results, according to Annex A.

5.1 Specimens, Conditioning and Scheme of Testing

5.1.1 Specimens

Four pairs of ear-muffs shall be submitted for testing. The individual ear-muff cups shall be numbered 1 to 8. If batteries are present, fresh batteries shall be fitted for the tests.

5.1.2 Conditioning and testing atmosphere

All specimens shall be conditioned and tested in an atmosphere having a temperature of 22 ºC ± 5 ºC and a relative humidity of not more than 85 %.

5.1.3 Scheme of testing

The eight ear-muff cups shall be tested as described in 5.2.

5.2 Determination of maximum sound pressure levels generated by entertainment audio ear-muffs

5.2.1 Introduction

The A-weighted diffuse field related sound pressure level with the entertainment audio system operated at maximum settings is measured for speech- and music-like input signal.

5.2.2 Test signal

The test input signal shall be broadband noise having the overall spectrum shape of long-term speech and music as referenced in IEC 60268-1 [1].

5.2.3 Test method

EN ISO 11904-1 shall be used. The general test procedure is described in EN 13819-2. For the purposes of this Standard, the sound output level of the entertainment audio facility of the ear-muff shall be measured using the microphone in the real ear technique (MIRE) described in EN ISO 11904-1. Eight subjects shall be used, with measurements on both ears, giving sixteen data sets. Each one of the four ear-muff samples shall be used by two of these subjects. The measured levels shall be corrected for the diffuse-field frequency response of the subject's ear canal to give the A-weighted diffuse-field related sound pressure level produced by the entertainment audio facility.

For safety, the blocked ear canal procedure of EN ISO 11904-1 shall be used.

a) Entertainment audio ear-muffs with an electrical audio input:

Use the method described in EN 352-6, but in addition to the requirements of EN 352-6 the requirement 4.3.2 of this standard shall be fulfilled for all electrical input levels up to the maximum specified by the manufacturer/supplier.

b) Complete systems composed of transmitters and entertainment audio ear-muffs:

The transmitting, receiving and amplifying devices shall be adjusted to maximum setting.

c) Ear-muffs with built-in broadcast receivers:

An FM RF signal generator shall be used. The input voltage r.m.s. level of the signal specified in 5.2.2 shall result in maximum possible frequency modulation (as specified by the manufacturer or supplier).

NOTE Extract from EN 50332-1 [4] "Sound system equipment: Headphone and earphones associated with portable audio equipment - Maximum sound pressure level measurement methodology and limit considerations - Part 1. The use of the general method for 'one package equipment'" is proposed. Clause 5.4 "Test signal level for FM radio" quotes "Measurements on receivers for frequency modulated sound broadcasting emissions", as defined in EN 60315-4 [5].

“The signal to peak level at the receiver's output is directly proportional to the peak frequency deviation of the RF carrier. In order to comply with definition of maximum peak frequency deviation (determined with a sinusoidal modulating waveform), and to take into account pre-emphasis influence, the test signal applied at the input of the RF generator shall be set at an RMS value of - 6 dB related to the amplitude of a sinusoidal waveform at 250 Hz, producing a peak deviation of ± 75 kHz."

The A-weighted diffuse-field related sound pressure level shall be calculated. This procedure shall be followed, using the same electrical input levels, the same settings of the generation, transmitting and receiving equipment under test, for each subject.

The mean A-weighted diffuse-field related sound pressure level and its standard deviation shall be calculated for all cups and subjects tested. In cases where a manufacturer has designed left and right cup in a different way (especially in terms of sound pressure level effective to the ear), the means of the A-weighted diffuse-field related sound pressure level of right and left cups and their standard deviations shall be calculated separately.

5.2.4 Report

Report the A-weighted diffuse-field related sound pressure level for each cup and subject. Report the mean and standard deviation of these data. In case where a manufacturer designed left and right cup in a different way (especially in terms of sound pressure level effective to the ear), report the mean and standard deviation of left and right cups separately.

6 Information supplied by the manufacturer

6.1 General

Information according with 6.2 and 6.3 shall be provided at least in the official language(s) of the European state of destination.

6.2 Wearer Information

The following information for the wearer (in addition to that required by EN 352-1 or EN 352-3) shall be supplied with the ear-muffs:

(a) number of this standard, EN 352-8;

(b) statement that the hearing protector provides an entertainment audio facility;

(c) statement that the ear-muff provides audio signal sound pressure level limitation and that the ear-muff limits the entertainment audio signal to 82 dB(A) effective to the ear;

(d) other than for broadcast signal receivers, the range of input signal levels for which this limitation is maintained;

(e) recommended storage conditions before and after use;

(f) method of checking, charging and changing batteries;

(g) statement "The audibility of warning signals at a specific workplace may be impaired while using the entertainment facility";

(h) address from which additional information can be obtained.

6.3 Additional information

The following information shall be available from the manufacturer on request:

(a) results of tests performed in accordance with this Standard;

(b) name and country of the test laboratory which performed the tests specified and the date of the tests.

7 Marking

The requirements for marking given in EN 352-1 (or EN 352-3, as appropriate) shall be used. The generic mark “EN 352” as specified in EN 352-1 is used, since a product may meet the requirements of EN 352-1 and EN 352-8 simultaneously.

Annex A
(informative)

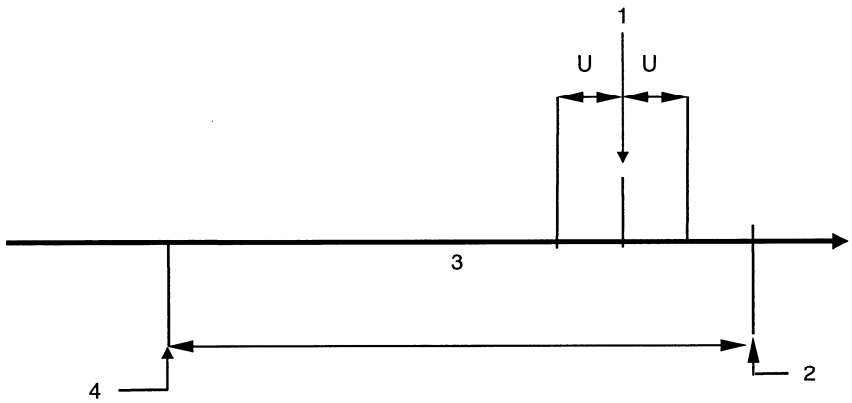
Test results, uncertainty of measurement

For each of the required measurements performed in accordance with this standard, a corresponding estimate of the uncertainty of measurement should be evaluated.

This estimate of uncertainty should be applied and stated when reporting test results, in order to enable the user of the test report to assess the reliability of the data.

The following protocol with regard to uncertainty of measurement should be applied to test results:

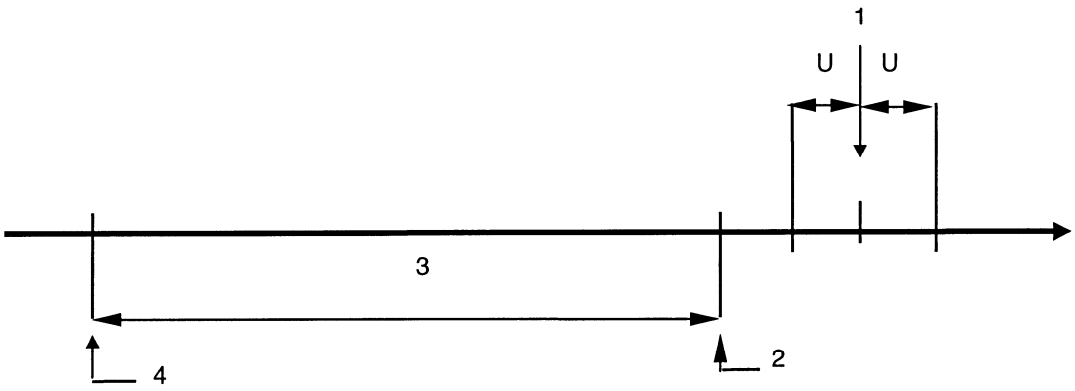
If the limit value for the particular test given in the standard falls outside of the range of values calculated from the test data plus/minus the estimated uncertainty of measurement (U), then the result should be deemed to be a straightforward pass or fail (Figure A.1 and Figure A.2).



Key

1 Result of a measurement
2 Upper specification limit (USL)
3 Specification range
4 Lower specification limit (LSL)

Figure A.1 - Result pass

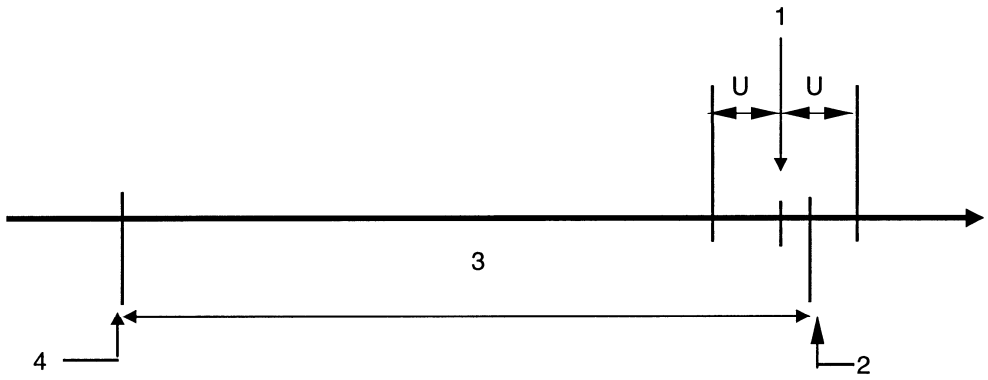


Key

1 Result of a measurement
2 Upper specification limit (USL)
3 Specification range
4 Lower specification limit (LSL)

Figure A.2 — Result fail

If the limit value for the particular test given in the standard falls within the range of values calculated from the test data plus/minus the estimated uncertainty of measurement U), then the assessment of pass or fail should be determined on the basis of safety, that is, considering the safest conditions for the user of the PPE (Figure A.3).



Key

1 Result of a measurement
2 Upper specification limit (USL)
3 Specification range
4 Lower specification limit (LSL)

Figure A.3 — Result fail

Annex ZA
(informative)

Relationship between this European Standard and the Essential Requirements of EU Directive 89/686/EEC

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association to provide a means of conforming to Essential Requirements of the New Approach Directive 89/686/EEC.

Once this standard is cited in the Official Journal of the European Communities under that Directive and has been implemented as a national standard in at least one Member State, compliance with the normative clauses of this standard given in Table ZA.1 confers, within the limits of the scope of this standard, a presumption of conformity with the corresponding Essential Requirements of that Directive and associated EFTA regulations.

Table ZA.1 — Correspondence between this International Standard and Directive 89/686/EEC

Clause(s)/sub-clause(s) of this International standard	Essential requirements (ERs) of EU Directive 89/686/EEC, Annex II	Qualifying remarks/Notes
4.3.2	1.2.1 Absence of risks and other inherent nuisance factors	
6.2	1.4 Information supplied by the manufacturer	

WARNING: Other requirements and other EU Directives may be applicable to the product(s) falling within the scope of this standard.

Bibliography

[1] IEC 60268-1, Sound system equipment - Part 1: General

[2] EN 458:2004, Hearing protectors - Recommendations for selection, use, care and maintenance - Guidance document

[3] EN ISO 4869-2:1995, Acoustics - Hearing Protectors - Part 2: Estimation of effective A-weighted sound pressure levels when hearing protectors are worn (ISO 4869-2:1994)

[4] EN 50332-1:2000, Sound system equipment: Headphones and earphones associated with portable audio equipment - Maximum sound pressure level measurement methodology and limit considerations - Part 1: General method for "one package equipment"

[5] EN 60315-4:2002, Methods of measurement on radio receivers for various classes of emission - Part 4: Receivers for frequency-modulated sound broadcasting emissions (IEC 60315-4:1997)

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