BRITISH STANDARD

BS EN
352-3:2002

Hearing protectors — General requirements —

Part 3: Ear-Muffs attached to an industrial safety helmet

The European Standard EN 352-3:2002 has the status of a British Standard

ICS 13.340.20

BSI
British Standards

National foreword

This British Standard is the official English language version of EN 352-3:2002. It supersedes BS EN 352-3:1997 which is withdrawn.

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

This British Standard, having been prepared under the direction of the Health and Environment Sector Policy and Strategy Committee, was published under the authority of the Standards Policy and Strategy Committee on 31 October 2002

Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 16, an inside back cover and a back cover.

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

Amendments issued since publication

Amd. No.	Date	Comments

ISBN 0 580 40668 7

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 352-3

October 2002

ICS 13.340.20

Supersedes EN 352-3:1996

English version

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

Protecteurs individuels contre le bruit - Exigences générales - Partie 3: Serre tête montés sur casque de protection pour l'industrie

Gehörschützer - Allgemeine Anforderungen - Teil 3: An Industriehelmen befestigte Kapselgehörschützer

This European Standard was approved by CEN on 18 August 2002.

CEN 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 Management Centre or to any CEN 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 CEN member into its own language and notified to the Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: rue de Stassart, 36 B-1050 Brussels

Ref. No. EN 352-3:2002 E

Contents

Foreword

This document (EN 352-3:2002) has been prepared by Technical Committee CEN/TC 159, "Hearing protectors", the secretariat of which is held by SIS.

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 April 2003, and conflicting national standards shall be withdrawn at the latest by April 2003.

This document supersedes EN 352-3:1996.

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.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Annex A is informative.

Introduction

This standard for ”Hearing Protectors : Ear-muffs attached to an industrial safety helmet : General requirements”, sets requirements for personal hearing protection devices in relation to Directive 89/686/EEC – Personal Protective Equipment.

The particular requirement in relation to the ability of hearing protectors to reduce noise below daily limit levels is addressed in the standard by requiring the sound attenuation of the hearing protectors, measured in accordance with EN 24869-1, to be not less than a specified minimum. Further, by requiring that the measured sound attenuation be declared, the selection of suitable hearing protectors for individual circumstances may be undertaken according to established practice.

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 deals with testing plans common to all types of hearing protectors covered by this series of prENs, and is in two Parts; Part 1 : Physical test methods, and Part 2 : Acoustic test methods.

Additional safety requirements and the associated test procedures for level-dependent ear-muffs are contained in EN 352-4, for ear-muffs with active noise reduction in prEN 352-5, for ear-muffs with audio communications in prEN 352-6 and for level-dependent ear-plugs in prEN 352-7.

The Parts of prEN 352, other than Parts 1, 2 and 3, cover the performance of functions additional to passive hearing protection. Hearing protectors which incorporate one or more of these functions are subject to the requirements and tests of each of the relevant Parts of prEN 352, including Parts 1, 2 or 3, as appropriate.

An associated standard EN 458, covers selection, use, care and maintenance of hearing protectors.

The requirements of EN 352-3 are concerned primarily with the physical and acoustic performance of the ear-muffs fitted to an industrial helmet which complies with EN 397.

The sizing requirements enable the great majority of the industrial population to be fitted satisfactorily by ”medium size range” helmet mounted ear-muffs. Populations of other sizes may be accommodated by ”small size range” or ”large size range” helmet mounted ear-muffs, which are required to be accompanied by information regarding the range of sizes which they are designed to fit.

The standard also calls for the values of sound attenuation afforded by the helmet mounted ear-muffs (measured in accordance with EN 24869-1) in order to assist purchasers in selecting the most appropriate model for their needs. Minimum values of sound attenuation are also specified.

A maximum variability in insertion loss, measured objectively after a series of performance tests, is specified. The objective test method only facilitates the making of comparative measurements, and the insertion loss values obtained will differ from the measured sound attenuation values.

The latter, which require the helmet mounted ear-muffs to be tested whilst being worn by human test subjects, is regarded as providing the reference test method for the measurement of the acoustic performance of hearing protectors.

1 Scope

This part of the standard specifies requirements for construction, design, performance, marking and user information for ear-muffs fitted to an industrial helmet which complies with EN 397.

In particular, it specifies the sound attenuation of the helmet mounted ear-muffs, measured in accordance with EN 24869-1.

Because one model of ear-muffs designed to be attached to an industrial safety helmet can be fitted to a number of helmet models and sizes, this part of the standard sets out a series of physical and acoustic requirements for the ear-muffs when fitted to the specified model(s) or size(s) of helmet.

All requirements apply to the ear-muffs fitted to one of the specified models or sizes of helmet (the basic combination), and an abbreviated set of requirements apply to the same model of ear-muffs when fitted to the other specified models or sizes of helmet (the supplementary combinations).

Information on the range models of helmet tested with the ear-muffs, and for which the combination satisfied this standard, is required to be made available.

Ergonomic aspects are addressed by taking into account, within the requirements, the interaction between the wearer, the device and where possible the working environment in which the device is likely to be used (see Annex ZA and EN 458).

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN 13819-1:2002*, Hearing protectors - Testing - Part 1: Physical test methods*

EN 13819-2:2002*, Hearing protectors - Testing - Part 2: Acoustic test methods*

EN 397*, Industrial safety helmets*

EN 960:1994*, Headforms for use in the testing of protective helmets*

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

3 Terms and definitions

For the purposes of this European Standard, the following terms and definitions apply:

3.1
cup
hollow component which is mounted on the equivalent headband and to which a cushion and a liner are usually fitted

3.2
cup supporting arm
arm, usually of metal or plastics, attached to the safety helmet shell and designed to enable the ear-muffs' cup to fit securely around the ear by exerting pressure through the cushion. It includes the means of attachment to the safety helmet shell

3.3
cushion
deformable component, usually containing a foam plastic or fluid filling, fitted to the rim of the cup to improve the comfort and fit of the ear-muffs on the head

3.4
liner
acoustically absorptive material contained within the cup which is intended to increase the attenuation of the ear-muffs at certain frequencies

3.5
ear-muffs
hearing protector consisting of a cup to be pressed against each pinna or of a circumaural cup to be pressed against the head around each pinna. The cups may be pressed against the head with a headband or by means of a device attached to a safety helmet or other equipment

3.6
headband
band designed to enable the ear-muffs to fit securely around the ears by exerting force against the cups and pressure through the cushions. In the case of helmet mounted ear-muffs it is deemed to be that part of the helmet mounted ear-muffs which supports the cups. It comprises the safety helmet shell and the cup support arms, and is intended to be functionally equivalent to the headband of headband ear-muffs

3.7
helmet
headgear, primarily intended to protect the upper part of a wearer's head against injury from falling objects and which complies with the requirements of EN 397

3.8
external vertical distance
vertical distance between the top of the test headform on which the helmet is mounted and the highest point on the outside surface of the helmet shell

3.9
insertion loss
mean algebraic difference in decibels between the one-third octave band sound pressure level, measured by the microphone of the acoustic test fixture in a specified sound field under specified conditions, with the hearing protector absent, and the sound pressure level with the hearing protector on, with other conditions identical

3.10
parking position
position of the ear-muffs in which the cups are located above the level of the lower edge of the helmet shell, as specified by the ear-muffs manufacturer in accordance with 6.2(h) (see also 3.12)

3.11
sound attenuation
for a given test signal, the mean difference in decibels between the threshold of hearing with and without the hearing protector in place, for a panel of test subjects

3.12
stand-by position
position of the ear-muffs in which the cups are located below the level of the lower edge of the helmet shell and in which the cushions are held away from the side of the head or pinna (see also 3.10)

3.13
basic combination
helmet mounted ear-muffs which includes the first or only model or size of helmet to which a given model of ear-muffs is fitted, and which will undergo all the tests in the standard (see also 3.14)

3.14
supplementary combination
helmet mounted ear-muffs which include a model or size of helmet, (other than the helmet of the basic combination), to which is fitted the same model of ear-muffs as for the basic combination, and which will undergo an abbreviated set of tests (see also 3.13)

3.15
hygiene covers
temporary, disposable covers fitted over the cushions and intended to protect them from the effects of dirt, perspiration and cosmetics, etc

4 Requirements

4.1 Sizing

Helmet mounted ear-muffs shall be classified into three size ranges, ‘Medium size range’, ‘Small size range’ and ‘Large size range'.

‘Medium size range' ear-muffs shall be so classified if their adjustability complies with clause 4.3.2.2.

'Small size range' ear-muffs shall be so classified if their adjustability complies with 4.3.2.3.

'Large size range' ear-muffs shall be so classified if their adjustability complies with 4.3.2.4.

'Small size range’ and ‘large size range' helmet mounted ear-muffs shall be accompanied by the information specified in 6.2 i).

NOTE A model of helmet mounted ear-muffs may fall into more than one size range.

4.2 Materials and construction

4.2.1 Materials

4.2.1.1 Those parts of the ear-muffs that may come into contact with the skin shall be non-staining, soft, pliable and not known to be likely to cause skin irritation, allergic reaction or any other adverse effect on health.

4.2.1.2 All materials shall be visibly unimpaired after cleaning and disinfection by the methods specified by the manufacturer.

4.2.2 Construction

4.2.2.1 All parts of the ear-muffs and cup supporting arms shall be rounded, finished smooth and be free from sharp edges.

4.2.2.2 Ear-muffs whose cushions and/or liners are intended by the manufacturer to be replaced by the wearer shall not require the use of tools for this purpose.

4.3 Performance

4.3.1 General

The requirements specified in 4.3.2 to 4.3.12 shall be satisfied.

Helmet mounted ear-muffs shall be conditioned and tested in accordance with EN 13819-1:2002, 4.1.1, 4.1.2 and 4.1.3.

4.3.2 Sizing and adjustability

4.3.2.1 General

Sizing and adjustability shall be tested in accordance with EN 13819-1:2002, 4.2 and the following requirements satisfied, as appropriate.

In the case of helmet mounted ear-muffs incorporating a means to adjust the headband force, these requirements shall be satisfied at both the maximum and the minimum force setting.

4.3.2.2 'Medium size range' ear-muffs

Adjustment of the helmet shall enable it to fit the B, J, N heads specified in EN 960:1994.

For each of the combinations of test dimensions shown by the letter M in EN 13819-1:2002, Table 3, the range of adjustment of the cups/headband and of the width between the cushions shall enable the helmet mounted ear-muffs to be fitted to the headform.

4.3.2.3 'Small size range' ear-muffs

Adjustment of the helmet shall enable it to fit the B, J heads specified in EN 960:1994.

For each of the combinations of test dimensions shown by the letter S in EN 13819-1:2002, Table 3, the range of adjustment of the cups/headband and of the width between the cushions shall enable the helmet mounted ear-muffs to be fitted to the headform.

4.3.2.4 'Large size range' ear-muffs

Adjustment of the helmet shall enable it to fit the J, N heads specified in EN 960:1994.

For each of the combinations of test dimensions shown by the letter L in EN 13819-1:2002, Table 3, the range of adjustment of the cups/headband and of the width between the cushions shall enable the helmet mounted ear-muffs to be fitted to the headform.

4.3.3 Cup rotation

When tested in accordance with EN 13819-1:2002, 4.3, the contact between the cushions and the plates of the fixture shall be continuous insofar as it provides an unbroken barrier between the inside and outside perimeter of the cushions.

4.3.4 Headband force

When tested in accordance with EN 13819-1:2002, 4.4, the headband force of each specimen shall be not greater than 14N. In the case of helmet mounted ear-muffs incorporating means to adjust this force, it shall be possible to adjust the force to 14N or less.

For each supplementary combination set, if both of the following conditions a) and (b.1 & b.2) are not met, the supplementary combination shall be additionally tested for sound attenuation in accordance with EN 13819-2:2002, 4.2.

a) The mean value of headband force of the specimens of the supplementary combination set, as reported in EN 13819-1:2002, 4.4.4, shall be not less than 8N.

b.1) When the mean value of headband force of the specimens of the basic combination set, as reported in EN 13819-1:2002, 4.4.4, is 11N or more, the mean value of headband force of the specimens of the supplementary combination set as reported in EN 13819-1:2002, 4.4.4, shall be not less than 80% of that of the specimens of the basic combination set

b.2) When the mean value of equivalent headband force of the specimens of the basic combination set, as reported in EN 13819-1:2002, 4.4.4, is less than 11N, the mean value of that of the supplementary combination set shall be not less than the value 'S_{min}' in equation (1).

$$S_{min} = BASIC - \frac{R \times BASIC}{100} \qquad (1)$$

where, *BASIC* is the mean value of equivalent headband force of the specimens of the basic combination set, as reported in EN 13819-1:2002, 4.4, in Newton and *R* is obtained from Figure 1.

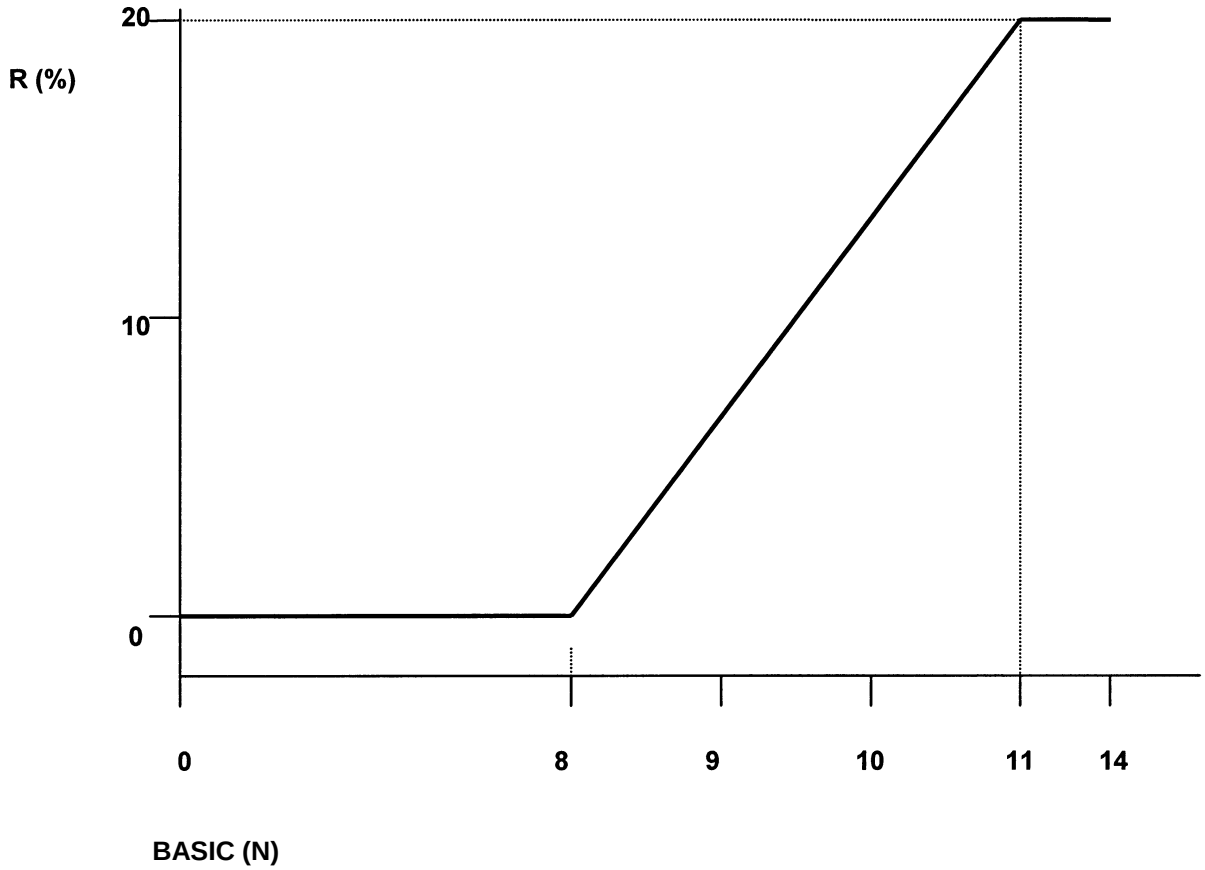


Figure 1 : Maximum permitted percentage reduction (R) of the mean value of the headband force of the specimens of the supplementary combination set, as reported in EN 13819-1:2002, 4.4.4

4.3.5 Cushion pressure

When tested in accordance with EN 13819-1:2002, 4.5, the cushion pressure of each specimen shall be not greater than 4500 Pa. For helmet mounted ear-muffs incorporating means to adjust the headband force, this requirement shall apply to the maximum force setting or 14 N, whichever is the lower.

4.3.6 Resistance to damage when dropped

Unless 4.3.7 is to be satisfied, the helmet shell, the cups and the cup supporting arms shall not crack when tested in accordance with EN 13819-1:2002, 4.6. Neither shall any part of the helmet mounted ear-muffs become detached, such that correct re-assembly requires the use of either a tool or a replacement part.

4.3.7 Resistance to damage when dropped at low temperature (optional)

When tested in accordance with EN 13819-1:2002, 4.7, the helmet shell, the cups and the cup supporting arms shall not crack. Neither shall any part of the helmet mounted ear-muffs become detached, such that correct re-assembly requires the use of either a tool or a replacement part.

4.3.8 Change in headband force (including optional water immersion - headband under stress)

The headband force of each specimen shall not change by more than ± 15 % from that measured at 4.3.4 after the helmet mounted ear-muffs have been subjected to the appropriate conditioning and tests specified in EN 13819-1:2002, 4.1.3.7 a) to 4.1.3.7 i). If the headband force was measured at 4.3.4, at more than one size adjustment, the

± 15 % limit shall apply only to the size adjustment which gave the highest initial force. Additionally, and in all cases, the final headband force of each specimen shall not exceed 14 N.

4.3.9 Insertion loss

The standard deviations reported in accordance with EN 13819-2:2002, 4.1, shall be not greater than 4,0 dB in four or more adjacent one-third octave bands, and not greater than 7,0 dB in any individual one-third octave band.

4.3.10 Resistance to leakage

In the case of fluid filled cushions, they shall not leak when the ear-muffs are tested in accordance with EN 13819-1:2002, 4.12.

4.3.11 Ignitability

When tested in accordance with EN 13819-1:2002, 4.13, no part of the ear-muffs or cup supporting arms shall ignite upon application of the heated rod nor continue to glow after removal of the heated rod.

4.3.12 Minimum attenuation

When tested in accordance with EN 13819-2:2002, 4.2, the values (M_f - s_f) of the helmet mounted ear-muffs shall be not less than the values given in Table 1 of this standard.

Table 1: Minimum attenuation requirement

Frequency in Hz	125	250	500	1000	2000	4000	8000
(M_f - s_f) in dB	5	8	10	12	12	12	12

M_f are the mean attenuation data and s_f the standard deviations as measured in accordance with EN 13819-2.

5 Marking

The ear-muffs shall be durably marked with the following information:

a) the name, trade mark or other identification of the manufacturer or his authorised representative;

b) the model designation;

c) the number of this EN Standard, i.e. the generic mark “EN 352”

NOTE A product can also meet other parts of the EN 352 series simultaneously.

d) in the case of ear-muffs intended by the manufacturer to be worn in a particular orientation, an indication of the FRONT and/or TOP of the cups, and/or an indication of LEFT and RIGHT cup.

6 Information supplied by the manufacturer

6.1 General

Information in accordance 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 shall be supplied with the ear-muffs (as appropriate):

a) the number of this European standard, i.e. EN 352-3:2002;

b) the name, trade mark or other means of identification of the manufacturer or his authorised representative;

c) the model designation;

d) as appropriate the statement(s):

> "This model of ear-muffs has satisfied the optional requirements at +50 °C."
>
> "This model of ear-muffs has satisfied the optional requirements at –20 °C."

NOTE These statements may be combined.

e) materials of the cup supporting arms (see 3.2) and of the cushions (see 3.3);

f) the manufacturer(s) and model designation(s) of helmet(s) in combination with which the ear-muffs satisfy this standard. This information shall be given in the form: "These ear-muffs should be fitted to, and used only with, the following industrial safety helmets: .. (*list helmets)*";

g) method of assembling the ear-muffs to the helmet;

h) method of fitting/adjustment, including instructions regarding the setting of any means to adjust the headband force, and instructions regarding the correct operation of any means to set the parking position and/or the stand-by position;

i) the size range(s) of the helmet mounted ear-muffs for each mode of wearing, as determined in 4.1, on both the packaging/box and in wearer information:

> for 'small size range' and 'large size range' (but not for 'medium size range') helmet mounted ear-muffs, the statements:
>
> *On packaging/box*
>
> "**Warning**: Small size range or large size range (as appropriate) helmet mounted ear-muffs. Refer to wearer information."
>
> *In Wearer Information*
>
> "**Warning**: These helmet mounted ear-muffs are of 'small size range' or 'large size range' (as appropriate). Helmet mounted ear-muffs complying with EN 352-3 are of 'medium size range' or 'small size range' or 'large size range'. 'Medium size range' helmet mounted ear-muffs will fit the majority of wearers. 'Small size range' or 'large size range' helmet mounted ear-muffs are designed to fit wearers for whom 'medium size range' helmet mounted ear-muffs are not suitable."

j) for each basic combination, and, if required by 4.3.4, those supplementary combinations, of helmet mounted ear-muffs, the following sound attenuation values:

> 1) mean value and standard deviation at each test frequency;
>
> 2) APV-value at each test frequency in accordance with EN ISO 4869-2 with the parameter $\alpha = 1$;
>
> 3) H-, M- and L- value in accordance with EN ISO 4869-2 with the parameter $\alpha = 1$;
>
> 4) SNR-value in accordance with EN ISO 4869-2 with the parameter $\alpha = 1$;

Each set of values shall be given equal prominence.

k) recommendation that the wearer should ensure that:

1) the helmet mounted ear-muffs are fitted, adjusted and maintained in accordance with the manufacturer's instructions;

2) the helmet mounted ear-muffs are worn at all times in noisy surroundings;

3) the helmet mounted ear-muffs are regularly inspected for serviceability;

l) a warning that, if the recommendations given in 6.2 k) are not adhered to, the protection afforded by the helmet mounted ear-muffs will be severely impaired;

m) methods of cleaning and disinfection which shall specify, and require the use of, agents that are not known to be harmful to the wearer;

n) the statement "This product may be adversely affected by certain chemical substances. Further information should be sought from the manufacturer";

o) the statement "Ear-muffs, and in particular cushions, may deteriorate with use and should be examined at frequent intervals for cracking and leakage, for example";

p) the statement ”The fitting of hygiene covers to the cushions may affect the acoustic performance of the ear-muffs”;

q) recommended storage conditions before and after use;

r) the designation/reference and other information required when ordering replacement cushions;

s) if appropriate, the method of cushion replacement;

t) the mean mass of the ear-muffs to the nearest gram;

u) the address from which additional information can be obtained.

6.3 Additional information

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

a) range of head sizes fitted

b) information as specified in 6.2;

c) results of tests performed in accordance with this standard;

d) the name and country of the test laboratory which performed the tests specified in 6.3 c) and the date of the tests.

Annex A
(informative)

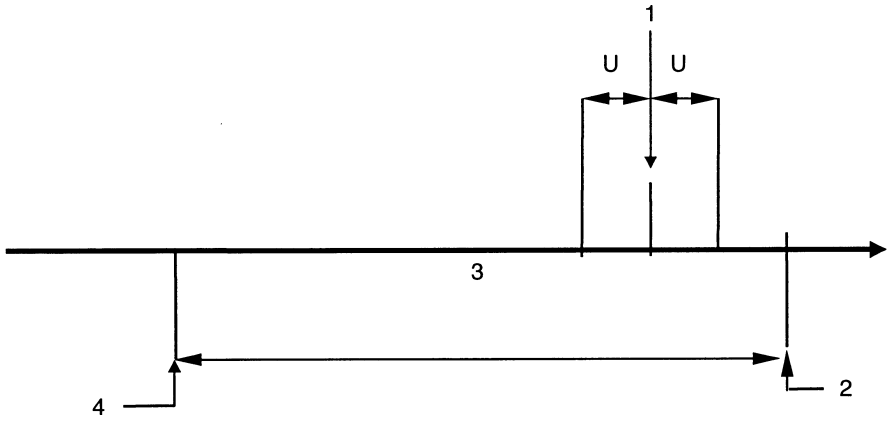
Uncertainty of measurement and interpretation of test results

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:

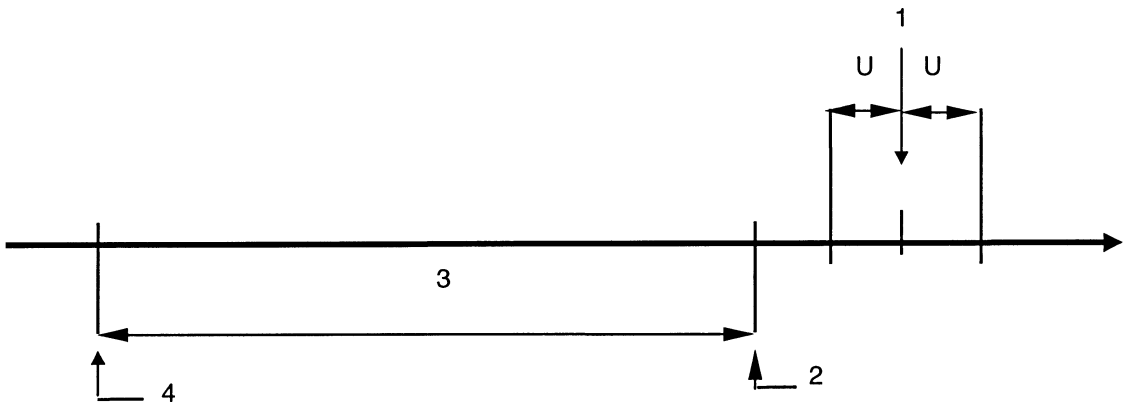
If the limit value for the particular test given in the standard falls outside of the range of values calculated from the test data plus/minus the estimated uncertainty of measurement (U), then the result should be deemed to be a straightforward pass or fail (Figures A.1 and A.2).



Key

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

Figure A. 1 — Result pass

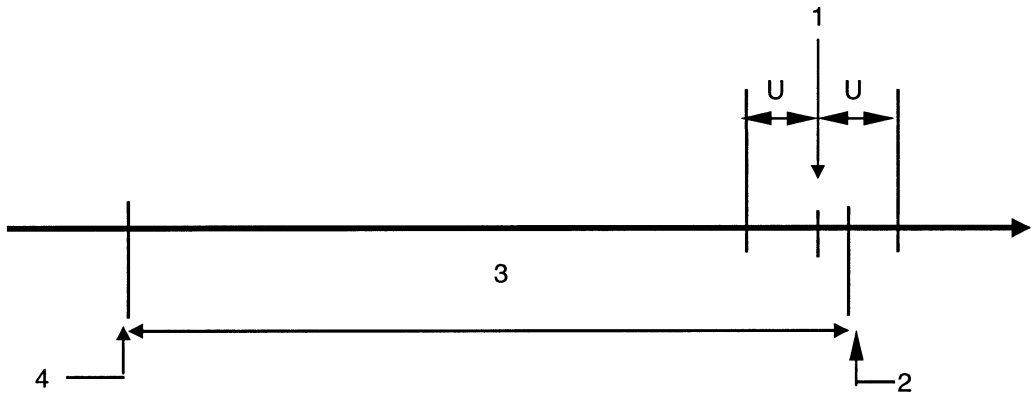


Key

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)

Clauses of this European standard addressing essential requirements or other provisions of EU Directives

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 :

European Directives 89/686/EEC.

Compliance with this Standard provides one means of conforming with the specific essential requirements of the Directives concerned and associated EFTA Regulations.

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

The following clauses of this document are likely to support requirements of Directive 89/686/EEC, Annex II.

Table ZA.1

Essential requirements of Directive 89/686/EEC		Clauses of this European standard
1.1.	**Design principles**	
1.1.1	Ergonomics	Scope, 4
1.1.2	Levels and classes of protection	
1.1.2.1	Highest level of protection possible	4.3.12
1.1.2.2	Classes of protection appropriate to different levels of risk	4.3.12, 6.2
1.2	**Innocuousness of PPE**	
1.2.1	Absence of risks and other inherent nuisance factors	4.2.1.1, 4.3.11
1.2.1.1	Suitable constituent materials	4.2.1.1
1.2.1.2	Satisfactory surface condition of all PPE parts in contact with the user	4.2.2.1
1.2.1.3	Maximum permissible user impediment	6.2
1.3	**Comfort and efficiency**	
1.3.1	Adaptation to users morphology	4.2.2., 4.3.2, 4.3.3, 4.3.4, 4.3.5
1.3..2	Lightness and design strength	4.3.6, 4.3.7, 4.3.8, 4.3.10
1.3.3	Compatibility of different classes or types of PPE designed for simultaneous use	1, 4.3.2, 4.3.4, 4.3.12, 6.2
1.4	**Information supplied by the manufacturer**	6
2.4	**PPE subject to ageing**	6.2
2.1	**PPE incorporating adjustment system**	4.3.2
2.2	**PPE enclosing the parts of the body to be protected**	6.2(p)
2.9	**PPE incorporating components which can be adjusted or removed by the user**	4.2.2.2, 4.3.2, 6.2
2.12	**PPE bearing one or more identification or recognition marks directly or indirectly relating to health and safety**	5
2.14	**Multi-risk PPE**	1, 4
3.5	**Protection against the harmful effect of noise**	4.3.12

Compliance with the clauses of this standard provides one means of conforming with the specific essential requirements of the Directive concerned and associated EFTA regulations.

Bibliography

EN 458, Hearing protectors - Recommendations for selection, use, care and maintenance – Guidance document

EN 352-1*, Hearing protectors - General requirements – Part 1: Ear-muffs*

EN 24869-1, Acoustics – Hearing protectors – Part 1 : Subjective method for the measurement of sound attenuation (ISO 4869-1:1990)

blank

BSI — British Standards Institution

BSI is the independent national body responsible for preparing British Standards. It presents the UK view on standards in Europe and at the international level. It is incorporated by Royal Charter.

Revisions

British Standards are updated by amendment or revision. Users of British Standards should make sure that they possess the latest amendments or editions.

It is the constant aim of BSI to improve the quality of our products and services. We would be grateful if anyone finding an inaccuracy or ambiguity while using this British Standard would inform the Secretary of the technical committee responsible, the identity of which can be found on the inside front cover. Tel: +44 (0)20 8996 9000. Fax: +44 (0)20 8996 7400.

BSI offers members an individual updating service called PLUS which ensures that subscribers automatically receive the latest editions of standards.

Buying standards

Orders for all BSI, international and foreign standards publications should be addressed to Customer Services. Tel: +44 (0)20 8996 9001. Fax: +44 (0)20 8996 7001. Email: orders@bsi-global.com. Standards are also available from the BSI website at http://www.bsi-global.com.

In response to orders for international standards, it is BSI policy to supply the BSI implementation of those that have been published as British Standards, unless otherwise requested.

Information on standards

BSI provides a wide range of information on national, European and international standards through its Library and its Technical Help to Exporters Service. Various BSI electronic information services are also available which give details on all its products and services. Contact the Information Centre. Tel: +44 (0)20 8996 7111. Fax: +44 (0)20 8996 7048. Email: info@bsi-global.com.

Subscribing members of BSI are kept up to date with standards developments and receive substantial discounts on the purchase price of standards. For details of these and other benefits contact Membership Administration. Tel: +44 (0)20 8996 7002. Fax: +44 (0)20 8996 7001. Email: membership@bsi-global.com.

Information regarding online access to British Standards via British Standards Online can be found at http://www.bsi-global.com/bsonline.

Further information about BSI is available on the BSI website at http://www.bsi-global.com.

Copyright

BSI
389 Chiswick High Road
London
W4 4AL