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Hearing protectors - General requirements - Part 1: Earmuffs

Gehörschützer - Allgemeine Anforderungen - Teil 1: Kapselgehörschützer

Protecteurs individuels contre le bruit - Exigences générales - Partie 1: Serre-tête
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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 352-1

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English Version

**Hearing protectors - General requirements - Part 1:
Earmuffs**

Protecteurs individuels contre le bruit - Exigences
générales - Partie 1 : Serre-tête

Gehörschützer - Allgemeine Anforderungen - Teil 1:
Kapselgehörschützer

This European Standard was approved by CEN on 24 February 2020.

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 CEN-CENELEC 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 CEN-CENELEC Management Centre has the same status as the official versions.

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

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Contents	Page
European foreword.....	3
Introduction	4
1 Scope	6
2 Normative references	6
3 Terms, definitions, symbols and abbreviations	6
3.1 Terms and definitions	6
3.2 Symbols and abbreviations	8
4 Requirements	8
4.1 Sizing.....	8
4.2 Materials and construction.....	9
4.2.1 Materials.....	9
4.2.2 Construction.....	9
4.3 Performance	9
4.3.1 General.....	9
4.3.2 Sizing and adjustability.....	9
4.3.3 Cup rotation	10
4.3.4 Headband force.....	10
4.3.5 Cushion pressure.....	10
4.3.6 Resistance to damage when dropped.....	11
4.3.7 Resistance to damage when dropped at low temperature (optional).....	11
4.3.8 Change in headband force (including optional water immersion with headband under stress).....	11
4.3.9 Insertion loss	11
4.3.10 Resistance to leakage.....	11
4.3.11 Ignitability	11
4.3.12 Minimum sound attenuation	11
5 Marking	12
6 User information	12
Annex A (informative) Technical changes between this document and the previous edition of this European Standard	15
Annex ZA (informative) Relationship between this European Standard and the essential requirements of Regulation (EU) 2016/425 aimed to be covered	17
Bibliography	19

European foreword

This document (EN 352-1:2020) 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 May 2021, and conflicting national standards shall be withdrawn at the latest by November 2023.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document will supersede EN 352-1:2002.

The technical changes between this document and the previous edition of this European Standard are listed in Annex A.

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

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

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

EN 352-1:2020 (E)**Introduction**

This document sets requirements for personal hearing protection devices in relation to Regulation (EU) 2016/425 on personal protective equipment.

The particular requirement in relation to the ability of hearing protectors to reduce noise below limit levels is addressed in the standard by requiring the sound attenuation of the hearing protectors, measured in accordance with EN ISO 4869-1, 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 can be undertaken according to established practice.

EN 352-1 is part of a family of standards describing product requirements for hearing protectors:

- EN 352-1, *Hearing protectors — General requirements — Part 1: Earmuffs*
- EN 352-2, *Hearing protectors — General requirements — Part 2: Earplugs*
- EN 352-3, *Hearing protectors — General requirements — Part 3: Earmuffs attached to head protection and/or face protection devices*
- EN 352-4, *Hearing protectors — Safety requirements — Part 4: Level-dependent earmuffs*
- EN 352-5, *Hearing protectors — Safety requirements — Part 5: Active noise reduction earmuffs*
- EN 352-6, *Hearing protectors — Safety requirements — Part 6: Earmuffs with safety-related audio input*
- EN 352-7, *Hearing protectors — Safety requirements — Part 7: Level-dependent earplugs*
- EN 352-8, *Hearing protectors — Safety requirements — Part 8: Entertainment audio earmuffs*
- EN 352-9, *Hearing protectors — Safety requirements — Part 9: Earplugs with safety-related audio input*
- EN 352-10, *Hearing protectors — Safety requirements — Part 10: Entertainment audio earplugs*

Test methods for these requirements for all types of hearing protectors are described in the following standards:

- EN 13819-1, *Hearing protectors — Testing — Part 1: Physical test methods*
- EN 13819-2, *Hearing protectors — Testing — Part 2: Acoustic test methods*
- EN 13819-3, *Hearing protectors — Testing — Part 3: Supplementary acoustic test methods*

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

The parts of EN 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 EN 352-4 to EN 352-10, in addition to that of parts 1, 2 or 3, as appropriate.

The requirements of this document are concerned primarily with the physical and acoustic performance of the earmuffs.

The sizing requirements enable the majority of the user population to be fitted satisfactorily by “medium size range” earmuffs. Individuals with other sizes can be accommodated by “small size range” or “large size range” earmuffs, which are required to be accompanied by information regarding the range of sizes which they are designed to fit.

The document also calls for the values of sound attenuation provided by the earmuffs (measured in accordance with EN ISO 4869-1) in order to assist users in selecting the most appropriate model of earmuffs 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 method to determine the sound attenuation values, which requires the earmuffs 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.

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EN 352-1:2020 (E)**1 Scope**

This document specifies requirements for construction, design, performance, marking and user information for earmuffs.

In particular, it specifies requirements regarding the sound attenuation of the earmuffs, measured in accordance with EN ISO 4869-1:2018.

The document does not apply to earmuffs outside the size range of headsizes as defined in this document.

This document does not apply to earmuffs for attachment to head protection and/or face protection devices.

Ergonomic aspects are addressed by taking into account, within the requirements, the interaction between the user, 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

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.

EN 13819-1:2020, *Hearing protectors — Testing — Part 1: Physical test methods*

EN 13819-2:2020, *Hearing protectors — Testing — Part 2: Acoustic test methods*

EN ISO 4869-2:2018, *Acoustics — Hearing protectors — Part 2: Estimation of effective A-weighted sound pressure levels when hearing protectors are worn (ISO 4869-2:2018)*

[https://standards.iteh.ai/catalog/standards/sist/8e917d76-0e3d-4fb2-921d-](https://standards.iteh.ai/catalog/standards/sist/8e917d76-0e3d-4fb2-921d-e13da8160aa7/sist-en-352-1-2021)

3 Terms, definitions, symbols and abbreviations**3.1 Terms and definitions**

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

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

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

3.1.1**passive hearing protection**

hearing protection that provides attenuation of external sounds not by means of electronics

Note 1 to entry: All hearing protectors have the characteristics of reducing noise by their design and type of material used. Devices that have only this function are called passive hearing protection.

3.1.2**cup**

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

3.1.3**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 earmuff on the head

3.1.4**liner**

acoustically absorptive material contained within the cup which is intended to increase the attenuation of the earmuffs at certain frequencies

3.1.5**headband**

< earmuff > band, usually of metal and/or plastics, designed to enable the earmuff to fit securely around the ears by exerting force against the cups and pressure through the cushions

3.1.6**earmuff**

hearing protector consisting of circumaural cups pressed or held against the head around each pinna

3.1.6.1**over-the-head earmuff**

earmuff designed to be worn with the headband passing over the top of the head

3.1.6.2**behind-the-head earmuff**

earmuff designed to be worn with the headband passing behind the head

3.1.6.3**under-the-chin earmuff**

earmuff designed to be worn with the headband passing under the chin

3.1.6.4**universal earmuff**

earmuff designed to be worn as over-the-head, behind-the-head and under-the-chin earmuff

3.1.7**headstrap**

flexible strap fitted to each cup, or to the headband close to the cup

Note 1 to entry: A headstrap is designed to support behind-the-head and under-the-chin earmuffs by passing over, and resting on top of the head.

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EN 352-1:2020 (E)**3.1.8****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 present, with other conditions identical

[SOURCE: EN ISO 4869-3:2007, 3.5, modified — The words “mean”, “in a specified sound field under specified conditions” and “with other conditions identical” have been added.]

3.1.9**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

Note 1 to entry: Measured in accordance with EN ISO 4869-1:2018 for a panel of test subjects.

[SOURCE: EN ISO 4869-1:2018, 3.8, modified — The words “for a given test signal” have been moved to beginning of definition, the words “mean”, “in decibels” have been added, the words “for a test subject” have been deleted and Note 1 to entry has been added.]

3.1.10**hygiene cover**

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

3.2 Symbols and abbreviations

For the purposes of this document, the following symbols and abbreviations apply.

H	High-frequency attenuation value
M	Medium-frequency attenuation value
L	Low-frequency attenuation value
APV _{f98}	Assumed Protection Value for frequency f and a protection performance of 98 %
SNR	Single Number Rating
PPE	Personal Protective Equipment

4 Requirements**4.1 Sizing**

Earmuffs shall be classified into three size ranges:

- 'medium size range' if their adjustability complies with 4.3.2.2 a) and 4.3.2.2 b), as appropriate;
- 'small size range' if their adjustability complies with 4.3.2.3 a) and 4.3.2.3 b), as appropriate;
- 'large size range' if their adjustability complies with 4.3.2.4 a) and 4.3.2.4 b), as appropriate.

'Small size range' and 'large size range' earmuffs shall be accompanied by the user information specified in Clause 6 k).

NOTE A model of earmuffs can fall into one or more size ranges.

4.2 Materials and construction

4.2.1 Materials

4.2.1.1 Those parts of the earmuffs that come into contact with the skin shall be non-staining, soft and pliable.

4.2.1.2 Those parts of the earmuffs that come into contact with the skin shall not be likely to cause skin irritation, allergic reaction or have any other adverse effect on health.

NOTE A written statement confirming this requirement can be provided to the test house by the manufacturer.

4.2.1.3 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 earmuffs shall be finished smooth and be free from sharp edges that could cause excessive irritation or injuries.

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

4.2.2.3 All universal earmuffs that have a mass in excess of 150 g shall be provided with a headstrap.

4.2.2.4 Earmuffs that are suitable for wearing only in the behind-the-head or under-the-chin modes, and that have a mass in excess of 150 g, shall be provided with a headstrap.

4.3 Performance

4.3.1 General

The requirements of 4.3.2 to 4.3.12 shall be satisfied.

Earmuffs shall be conditioned and tested in accordance with EN 13819-1:2020, 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 13819-1:2020, 4.2 and the following requirements satisfied, as appropriate.

In the case of earmuffs 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' earmuffs

a) over-the-head and under-the-chin earmuffs

For each of the combinations of test dimensions shown by the letter M in EN 13819-1:2020, Table 1, the range of adjustment of the cups/headband and of the width between the cushions shall enable the earmuffs to be fitted to the fixture.