



SLOVENSKI STANDARD

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Varovala sluha - Splošne zahteve - 2. del: Ušesni čepi

Hearing protectors - General requirements - Part 2: Earplugs

Gehörschützer - Allgemeine Anforderungen - Teil 2: Gehörschutzstöpsel

Protecteurs individuels contre le bruit - Exigences générales - Partie 2: Bouchons d'oreille

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13.340.20 Varovalna oprema za glavo Head protective equipment

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 352-2

November 2020

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Supersedes EN 352-2:2002

English Version

**Hearing protectors - General requirements - Part 2:
Earplugs**

Protecteurs individuels contre le bruit - Exigences
générales - Partie 2 : Bouchons d'oreille

Gehörschützer - Allgemeine Anforderungen - Teil 2:
Gehörschutzstöpsel

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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European foreword

This document (EN 352-2:2020) 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of an identical text or by endorsement, at the latest by May 2021, and conflicting national standards shall be withdrawn at the latest by November 2023.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 supersedes EN 352-2:2002.

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 352-2:2020 (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 352-2 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 -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 earplugs. It covers disposable, re-usable, custom moulded and banded earplugs.

In order to assist users to select the correct size(s) of earplugs, a nominal diameter, or range of diameters, of the earplugs is required to be declared (except for custom moulded and semi-aural earplugs).

In the case of banded earplugs, the standard specifies sizing requirements which enable the majority of the user population to be fitted satisfactorily by “medium size range” earplugs. Individuals with other sizes can be accommodated by “small size range” or “large size range” earplugs, 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 provided by the earplugs (measured in accordance with EN ISO 4869-1) in order to assist users in selecting the most appropriate model of earplugs for their needs. Minimum values of sound attenuation are also specified.

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EN 352-2:2020 (E)**1 Scope**

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

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

This document applies to earplugs designed for users who are able to follow supplied instructions and understand the related risks, can fit the earplugs correctly and can give feedback on the performance.

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)*

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

<https://standards.iteh.ai/catalog/standards/sist/3a70c945-ffd2-4719-9678-bffb2adad1c/sist-en-352-2-2021>

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.

[SOURCE: EN 352-1:2020, 3.1.1]

3.1.2**earplug**

hearing protector worn in each of the outer ear canals (aural) or in the concha, at the entrance of each of the outer ear canals (semi-aural)

Note 1 to entry: Earplugs can be formable, requiring a degree of manipulation prior to fitting, or pre-formed, which require no manipulation prior to fitting.

Note 2 to entry: Earplugs can sometimes be attached to an interconnecting cord.

3.1.3**headband**

<earplug> band, usually made of plastics, designed to enable the earplugs to be held within (aural) or against (semi-aural) the entrance to the outer ear canals by exerting force against the earplug elements

3.1.4**disposable earplug**

earplug intended for one fitting only

3.1.5**re-usable earplug**

earplug intended for more than one fitting

3.1.6**custom moulded earplug**

earplug made using an impression of the individual concha and the outer ear canal of the user

Note 1 to entry: These are usually of the re-usable type.

3.1.7**banded earplugs**

eartips linked by a headband designed to be used in at least one position

Note 1 to entry: Eartips can be aural or semi-aural; disposable or re-usable.

Note 2 to entry: Banded earplugs belong to the group of re-usable earplugs (see 3.1.5).

3.1.7.1**over-the-head headband earplug**

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

3.1.7.2**behind-the-head headband earplug**

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

3.1.7.3**under-the-chin headband earplug**

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

3.1.7.4**universal headband earplug**

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

EN 352-2:2020 (E)**3.1.8****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.]

3.2 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

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4 Requirements**4.1 Sizing and adjustability**

[SIST EN 352-2:2021](https://standards.iteh.ai/catalog/standards/sist/3a70c945-ffd2-4719-9678-bffb2adad1c/sist-en-352-2-2021)

4.1.1 Aural earplugs

<https://standards.iteh.ai/catalog/standards/sist/3a70c945-ffd2-4719-9678-bffb2adad1c/sist-en-352-2-2021>

The nominal diameter or, if appropriate, the range of nominal diameters of the earplugs, shall be tested in accordance with EN 13819-1:2020, 5.2 and reported.

Custom moulded and semi-aural earplugs shall not be subjected to this test.

4.1.2 Banded earplugs

Adjustability shall be tested in accordance with EN 13819-1:2020, 5.3 and the following requirements satisfied, as appropriate.

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

a) Over-the-head headband earplugs

For each of the combinations of test dimensions shown in EN 13819-1:2020, Table 6, the range of fitting of the headband shall enable the earplugs to be fitted to the fixture.

b) Behind-the-head and under-the-chin headband earplugs

For each of the combinations of test dimensions shown in EN 13819-1:2020, Table 7, the range of fitting of the headband shall enable the earplugs to be fitted to the fixture.

4.2 Materials and construction

4.2.1 Materials

Those materials used in parts of earplugs coming into contact with the user's skin shall comply with the following requirements:

- a) The materials shall not be likely to cause skin irritation, skin disorders, allergic reactions or have any other adverse effects to health within the lifetime of the use of the earplugs.

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

- b) When subject to contact with sweat, ear wax or with other materials likely to be found in the ear canal, the materials shall not be known to undergo changes within the lifetime of the use of the earplugs that would result in significant alteration to those properties of the earplugs that are required to be assessed when the earplugs are examined for compliance with 4.2 and 4.3.

4.2.2 Construction

4.2.2.1 All parts of earplugs shall be designed and manufactured such that they are not liable to cause physical damage to the user when fitted and used according to the user information [see Clause 6 g)].

4.2.2.2 Any part of the earplugs that is likely to protrude outside the ear canal when fitted in accordance with the user information [see Clause 6 g)] shall be of such a construction that mechanical contact with the earplugs is unlikely to cause any injury to the ear.

4.2.2.3 When inserted in accordance with the user information [see Clause 6 g)], earplugs shall be capable of being readily and completely removed from the ear canal by the user, without the use of tools or instruments, when tested using a test panel of 16 subjects.

NOTE This requirement can be checked during the test according to EN 13819-2:2020, 4.2.

4.2.2.4 When earplugs are marked re-usable [see Clause 5 c)], re-closable packaging, suitable to ensure hygienic storage between use, shall be supplied with each pair of earplugs.

4.2.2.5 For custom moulded earplugs, impression of the concha and outer ear canal of test subjects shall be created by competent personnel only and with a defined protocol.

NOTE Competent personnel and protocol are defined and approved by the manufacturer.

To adequately assess the protective function of each sample of a custom moulded earplug a fit test shall be performed according to manufacturer's specifications and instructions.

4.3 Performance

4.3.1 General

The requirements specified in 4.3.2 to 4.3.6 shall be satisfied.

Earplugs shall be conditioned and tested in accordance with EN 13819-1:2020, 5.1.1, 5.1.2 and 5.1.3.