



SLOVENSKI STANDARD

SIST EN 352-2:1996

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Varovanje sluha - Varnostne zahteve in preskušanje - 2. del: Čepi

Hearing protectors - Safety requirements and testing - Part 2: Earplugs

Gehörschützer - Sicherheitstechnische Anforderungen und Prüfungen - Teil 2:
Gehörschutzstöpsel

Protecteurs contre le bruit - Exigences de sécurité et essais - Partie 2: Bouchons
d'oreilles

Ta slovenski standard je istoveten z: **EN 352-2:1993**

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ICS:

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EUROPEAN STANDARD

EN 352-2

NORME EUROPÉENNE

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Descriptors: Personal protective equipment, hearing protectors, earplugs, definitions, specifications, safety, characteristics, tests, marking

English version

Hearing protectors - Safety requirements and testing - Part 2: Earplugs

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Protecteurs contre le bruit - Exigences de sécurité et essais - Partie 2: Bouchons d'oreilles

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Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

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CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

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Foreword

This European Standard has been produced by CEN/TC 159 "Hearing protectors", the Secretariat of which is held by SIS.

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

The particular requirement for hearing protectors in relation to their ability to reduce noise to below daily limit levels is addressed in the standard by means of a requirement for attenuation performance, tested to EN 24869-1, to be declared, and by the setting of a minimum level of attenuation, enabling selection of suitable protectors for individual circumstances to be undertaken according to established practice.

Part 1 of this standard deals with ear-muffs and Part 3¹⁾ with ear-muffs for attachment to safety helmets. An associated European Standard EN 458, covers selection, use, care and maintenance of hearing protection.

Amplitude sensitive hearing protectors as well as the attenuation of hearing protectors when exposed to impulsive noise (peak levels larger than 140 dB) will be dealt with in coming standards.

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 February 1994, and conflicting national standards shall be withdrawn at the latest by February 1994.

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This European Standard was approved and according to the CEN/CENELEC Internal Regulations, the following countries are bound to implement this European Standard: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom.

Introduction

In order to assist users to select the correct size(s) of plug a procedure for describing a nominal size for an ear-plug is given. The Standard calls for the values of sound attenuation afforded by the ear-plugs, as measured in accordance with EN 24869-1, to be provided in order to assist purchasers in selecting the most appropriate type of ear-plugs for their needs and minimum values of sound attenuation are specified.

Additional tests, simulating the wearing of the ear-plugs, are under development. This part of the Standard is a specification intended for type approval purposes.

¹⁾ Currently in draft stage

Hearing protectors - Safety requirements and testing - Part 2: Ear-plugs

1 Scope

This part of the Standard is concerned with ear-plugs and specifies constructional, design and performance requirements, methods of test, marking requirements and user information.

It calls for information to be made available concerning the sound attenuation characteristics of the ear-plugs measured in accordance with EN 24869-1, and defines a minimum level of attenuation required for compliance with this specification.

This part of the Standard also includes custom moulded ear-plugs and banded devices; it does not deal with the performance of electronic devices which may be incorporated within ear-plugs nor amplitude-sensitive ear-plugs.

This standard does not deal with the performance of hearing protectors to impulsive noise.

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.

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- EN 24869-1:1992 Acoustics - Hearing protectors, Part 1: Subjective method for the measurement of sound attenuation.
- ISO/DIS 4869-2:1992 Acoustics - Hearing Protectors, Part 2: Determination of effective A-weighted sound pressure levels when hearing protectors are worn.

3 Definitions

For the purposes of this Standard, the following definitions apply.

3.1 ear-plug: A hearing protector worn within the external ear canal (aural) or in the concha, against the entrance to the external ear canal (semi-aural).

disposable ear-plug: Intended for one fitting only.

re-usable ear-plug: Intended for more than one fitting.

custom moulded ear-plug: Ear-plugs made using an impression of the individual concha and the external ear canal of the user.

banded ear-plug: Ear-plugs linked by a semi-rigid inter-connection.

3.2 test depth/test height: Vertical distance between the line through the centres of the mounting holes in the test fixture and the apex of the test fixture in Figure 1.

3.3 test width: Width between the two parallel sides of the test fixture with the mounting holes in Figure 1.

NOTE: The depth, height and width dimensions given in tables 3 and 4 correspond with the definitions given here.

3.4 sound attenuation: For a given test signal, the difference in decibels between the threshold of hearing with and without the hearing protector in place, for a test subject.

4 Sizing

The size or, if appropriate, the range of sizes shall be tested according to 7.2 and reported.

Custom moulded and semi-aural ear-plugs shall not be subject to this test.

5 Materials and construction

5.1 Materials

Materials used in parts of ear-plugs coming into contact with the wearer's skin shall comply with the following requirements:

5.1.1 The materials shall not be known to be likely to cause skin irritation, skin disorders, allergic reactions nor any other adverse effects to health within the lifetime of the use of the ear-plugs.

5.1.2 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 ear-plugs that would result in significant alteration to those properties of the ear-plugs that are required to be assessed when the ear-plugs are examined for compliance with 5 and 7.

5.2 Construction

5.2.1 All parts of ear-plugs shall be designed and manufactured such that they are not liable to cause physical damage to the wearer when fitted and used according to the manufacturer's instructions (see 8.1 d) and 9 e)).

5.2.2 Any part of the ear-plug that is likely to protrude outside the ear canal when fitted in accordance with the manufacturer's instructions (see 8.1 d) and 9 e)) shall be of such a construction that mechanical contact with the ear-plug is unlikely to cause any injury to the ear.

5.2.3 When inserted in accordance with the manufacturer's instructions (see 8.1 d) and 9 e)) ear-plugs 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: Appropriate information concerning compliance with this clause may be derived from observations arising during the course of, or following tests carried out in accordance with, EN 24869-1 (see 7.5).

5.2.4 Where ear-plugs are marked re-usable (see 9 d)), suitable packaging to ensure hygienic storage between use shall be supplied.

6 Performance

6.1 General

The requirements specified in 6.2 to 6.5 shall be satisfied.

Specimens of ear-plugs shall be conditioned and tested as specified in 7.1.1 and 7.1.2. The scheme of testing shall be as specified in 7.1.3.

6.2 Cleaning

If ear plugs are marked re-usable, after the ear-plugs have been cleaned once, there shall not be:

- any significant alteration to those initial properties of the ear-plugs that are required to be assessed when the ear-plugs are examined for compliance with clauses 4 and 5, and
- any changes that would be expected to cause any significant alteration to the attenuation characteristics stated in accordance with 7.5

6.3 Ignitability

When tested in accordance with 7.3 the ear-plug shall not ignite nor continue to glow after the removal of the heated rod.

6.4 Range of fitting for banded ear-plugs

When tested in accordance with 7.4

6.4.1 Over-the-head banded ear-plugs

For each of the combinations of test dimensions shown in Table 3 the range of fitting of the band shall enable the ear-plugs to be fitted to the fixture.

6.4.2 Behind-the-head and under-the-chin banded ear-plugs

For each of the combinations of test dimensions shown in Table 4 the range of fitting of the band shall enable the ear-plugs to be fitted to the fixture.

6.5 Minimum attenuation

When tested in accordance with 7.5 the values ($M_r - s_r$) of the ear-plug shall be not less than the data in table 1.

M_r are the mean attenuation data and s_r the standard deviations according to EN 24869-1.

Table 1: Attenuation requirement for ear-plugs

f in Hz	125	250	500	1000	2000	4000	8000
($M_r - s_r$) in dB	5	8	10	12	12	12	12

7 Testing

7.1 Specimens, conditioning and scheme of testing

7.1.1 Specimens

Ear-plugs shall be submitted for testing in the condition in which they are offered for sale. Sufficient specimens shall be submitted in each size, if appropriate, to carry out the tests described in 7.2 to 7.5.

7.1.2 Conditioning and testing atmosphere

All specimens shall be conditioned and tested in an atmosphere having a temperature of $22^{\circ}\text{C} \pm 5^{\circ}\text{C}$ and a relative humidity of not more than 85%, unless required otherwise by the test procedure.

7.1.3 Scheme of testing

The scheme of testing for the specimens shall be as follows:

NOTE: Testing may be discontinued in the event of a specimen failing to satisfy the respective requirement.

7.1.3.1 Unpack all ear-plugs completely.

7.1.3.2 Condition all specimens for not less than 4 h in the atmosphere specified in 7.1.2.

7.1.3.3 Weigh all the plugs (of one size, if appropriate) together and calculate the mean mass of one plug for each size..

7.1.3.4 Determine the size or, if appropriate, the range of sizes according to 7.2.

7.1.3.5 Check one pair of specimens for compliance with the requirements of 6.3.

7.1.3.6 For re-usable ear-plugs clean once all specimens to be used in test 7.5 according to the wearer information supplied by the manufacturer.

7.1.3.7 For banded ear-plugs check the range of fitting in accordance with 7.4.

7.1.3.8 Measure the sound attenuation of the specimens in accordance with 7.5.

7.1.3.9 During the course of the tests carried out under 7.1.3.8 check that the ear-plugs are capable of being readily and completely removed from the ear canal by the user without the use of special instruments.

7.2 Assessment of nominal size designation

7.2.1 Principle

In order to assign a nominal size designation to each ear-plug, the dimensions of that part or those parts of the ear-plug that are intended to seal the ear canal are assessed using a gauge comprising a set of circular holes. When the ear-plug is available in a range of sizes this test shall be carried out for each size.