



SLOVENSKI STANDARD
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Varovala sluha - Preskušanje - 2. del: Akustične preskusne metode

Hearing protectors - Testing - Part 2: Acoustic test methods

Gehörschützer - Prüfung - Teil 2: Akustische Prüfverfahren

Protecteurs individuels contre le bruit - Essais - Partie 2: Méthodes d'essai acoustique

Ta slovenski standard je istoveten z: prEN 13819-2

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English Version

Hearing protectors - Testing - Part 2: Acoustic test methods

Protecteurs individuels contre le bruit - Essais - Partie
2: Méthodes d'essai acoustique

Gehörschützer - Prüfung - Teil 2: Akustische
Prüfverfahren

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 159.

If this draft becomes a European Standard, 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.

This draft European Standard was established by CEN 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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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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

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European foreword

This document (prEN 13819-2:2018) has been prepared by Technical Committee CEN/TC 159 “Hearing protectors”, the secretariat of which is held by DIN.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 13819-2:2002.

This document has been prepared under a standardization request given to CEN by the European Commission and the European Free Trade Association.

In comparison with the previous edition, the following technical modifications have been made:

- 4 — Scope widened for earmuffs attached to head protection and/or face protection devices
- 4.2.3 — Some details on the test procedure for the sound attenuation of earplugs and custom moulded earplugs added
- Clause 4.3 of EN 13819-2:2002 (Sound level effective to the ear (earmuffs only)) deleted
- Annex ZA of EN 13819-2:2002 deleted

The technical changes referred to include the significant technical changes from the EN revised but is not an exhaustive list of all modifications from the previous edition.

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Introduction

This standard specifies procedures for the testing of personal hearing protection devices in relation to Regulation (EU) 2016/425 - Personal Protective Equipment.

The EN 352 series describes product requirements of hearing protectors:

- *Part 1: Earmuffs*
- *Part 2: Earplugs*
- *Part 3: Earmuffs attached to head protection and/or face protection devices*
- *Part 4: Level-dependent earmuffs*
- *Part 5: Active noise reduction earmuffs*
- *Part 6: Earmuffs with safety-related audio input*
- *Part 7: Level-dependent earplugs*
- *Part 8: Entertainment audio earmuffs*
- *Part 9: Earplugs with safety-related audio input*
- *Part 10: Earplugs with entertainment audio input*

Test methods for these requirements are described in the EN 13819 series:

- *Part 1: Physical test methods*
- *Part 2: Acoustic test methods*
- *Part 3: Supplementary acoustic test methods*

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

This standard is intended as a supplement to the specific product standards for hearing protectors.

The performance requirements are given in the hearing protector product standard.

If deviations from the procedures specified in this standard are necessary, these deviations are specified in the hearing protection product standard (relevant part of the EN 352 series).

4.1 specifies a method of measuring the insertion loss of earmuffs using an acoustic test fixture.

4.2 specifies a method of measuring the sound attenuation of hearing protectors using human test subjects.

1 Scope

This European Standard EN 13819-2 specifies acoustic test methods for hearing protectors. The purpose of these tests is to enable assessment of the performance of the hearing protector as specified in the appropriate product standard.

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.

prEN ISO 4869-1, *Acoustics — Hearing protectors — Part 1: Subjective method for the measurement of sound attenuation (ISO/DIS 4869-1)*

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)*

EN ISO 4869-3, *Acoustics - Hearing protectors - Part 3: Measurement of insertion loss of ear-muff type protectors using an acoustic test fixture (ISO 4869-3)*

3 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

acoustic test fixture

ATF

device that approximates certain dimensions of an average adult human head and is used for measuring the insertion loss of earmuffs

[SOURCE: EN ISO 4869-3]

3.2

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

3.3

sound attenuation

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

4 Test methods

4.1 Insertion loss (earmuffs only)

4.1.1 Principle

The insertion loss of each cup of the earmuffs is measured at specified one-third octave band centre frequencies.

4.1.2 Apparatus

The required equipment, including a suitable acoustic test fixture and test site, is described in EN ISO 4869-3. For mounted earmuffs, a supporting pad, an example of which is shown in Figure 1, shall be fitted to the acoustic test fixture in order adequately to support the complete mounted earmuff in position.

4.1.3 Procedure

Follow the procedure given in EN ISO 4869-3, subject to the following modifications:

- a) Either the random incidence sound field or the plane progressive wave shall be used. When using the plane progressive wave, if the requirement for insertion loss is not satisfied, the test shall be repeated using the random incidence field. If the requirement for insertion loss is then satisfied, this shall be deemed to be the definitive result;
- b) The insertion loss shall be measured at all one-third octave bands from 250 Hz to 8000 Hz;
- c) In the case of universal earmuffs the insertion loss shall be measured in only one mode of wearing, preferably over-the-head;
- d) If means to adjust the headband force is incorporated, the force shall be adjusted to its maximum setting;
- e) In the case of mounted earmuffs, for a given model of earmuffs fitted to more than one size of the same model of carrier, insertion loss shall be tested using only one size of carrier.
- f) In the case of headband or mounted earmuffs with electronic supplementary functions that show – as intended by the manufacturer – different sound attenuation on left and right cups, mean and standard deviation shall be reported separately for left and right cups.

4.1.4 Report

For each centre frequency and for each cup, individual values of insertion loss shall be reported in accordance with 4.1.3 b). For all cups, the mean value and standard deviation at each frequency shall also be reported in accordance with 4.1.3 b).

4.2 Sound attenuation

4.2.1 Principle

The attenuation of the hearing protector is measured at specified one-third octave band centre frequencies.

4.2.2 Apparatus

The required apparatus, including test sites and sound field, is specified in prEN ISO 4869-1.

4.2.3 Procedure

4.2.3.1 Measure the sound attenuation of defined specimens in accordance with EN ISO 4869-1:2017, chapter 4.

4.2.3.2 If means to adjust the headband force is incorporated, adjust the force to its minimum setting.

4.2.3.3 In the case of earplugs, supply each subject with a separate pair of earplugs of appropriate size. Ask each test subject if the specimen fits. If it does fit perform the test. If it does not fit offer another size. If it does still not fit reject the subject from the panel and provide a replacement for him/her.

4.2.3.4 In case earplugs are provided in different versions that are considered to be equal with respect to attenuation, one measurement should be performed and the samples used for that measurement should include all of the versions.

NOTE Examples of different versions could be earplugs offered in different colours, with different handgrips or with and without a connecting cord.

4.2.3.5 In the case of custom-moulded earplugs, impression taking shall be carried out by a trained specialist. A trained specialist should have the appropriate qualification and knowledge of taking ear impressions safely and accurately.

4.2.3.6 In the case of custom-moulded earplugs that are provided by the manufacturer to be used with a special cream that eases insertion and improves the fitting the sound attenuation shall be measured without this cream.

4.2.3.7 In the case of mounted earmuffs which do not fit all size ranges, ask each test subject if the specimen fits. If it does fit, perform the test. If it does not fit, reject the subject from the panel and provide a replacement for him/her.

4.2.3.8 In the case of universal earmuffs and headband earplugs with different modes of wearing, provide sound attenuation values for each intended mode of wearing. Perform the measurement in one mode, using 16 test subjects. Perform the measurements in the other modes using an abbreviated procedure, as follows:

- a) Perform the measurement first using only ten test subjects;
- b) Calculate the values H, M and L in accordance with EN ISO 4869-2 with $\alpha = 1$;
- c) Compare the values of H, M and L calculated for the first mode of wearing with those calculated in 4.2.3.8 b);
- d) If the values of H and M and L for the other modes are within ± 3 dB of the corresponding value of the first mode, no further attenuation testing shall be performed. The attenuation data for the other modes shall be deemed to be equal to that of the first mode and the attenuation data for the first mode shall be used for the other modes;
- e) If the conditions in d) are not met, then the attenuation test shall be completed using the final six test subjects. If the conditions in d) are met for this enlarged set of attenuation data the data for the other modes shall be deemed to be equal to that of the first mode and the attenuation data for the first mode shall be used for the other modes;

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- f) If the conditions in d) and e) are not met the attenuation data for the other modes shall be reported as measured.

4.2.3.9 In the case of mounted earmuffs supplementary combinations which require sound attenuation to be measured, perform the measurement using the defined specimens but with the following amendments to the procedure:

- a) Perform the measurement first using only ten test subjects;
- b) Calculate the values H, M and L in accordance with EN ISO 4869-2 with $\alpha = 1$;
- c) Compare the values of H, M and L calculated for the basic combination with those calculated in 4.2.3.9 b);
- d) If the values of H and M and L for the supplementary combination are within ± 3 dB of the corresponding value of the basic combination, no further attenuation testing shall be performed. The attenuation data for the supplementary combination shall be deemed to be equal to that of the basic combination and the attenuation data for the basic combination shall be used for the supplementary combination;
- e) If the conditions in d) are not met, then the attenuation test shall be completed using the final six test subjects. If the conditions in d) are met for this enlarged set of attenuation data, the data for the supplementary combination shall be deemed to be equal to that of the basic combination and the attenuation data for the latter shall be used for the supplementary combination;
- f) If the conditions in d) and e) are not met the attenuation data for the supplementary combination shall be reported as measured;

4.2.3.10 In the case of a given model of earmuffs fitted to more than one size of the same model of carrier, test subjects shall be asked to select the combination which gives a correct fit. If a correct fit is possible, the test shall be performed. If it is not, the subject shall be rejected from the panel and a replacement provided. Sixteen test subjects shall be used - at least four test subjects for each size of carrier. Any one specimen shall be tested not more than four times.

Attenuation data generated by this method shall be reported in the user information.

This data shall not be used as basic combination attenuation data for the procedures given for supplementary combinations, since 16 tests are not carried out on a single size combination.

4.2.4 Report

Attenuation values determined at 4.2.3.8 d) or e) or f), or at 4.2.3.9 d) or e) or f), as appropriate, shall be reported in accordance with EN ISO 4869-1:2017, 6 a) to i) and k).