
JUfcj UUG`i \ U!`DfYg_i yUb^Y!`&"XY.`5_i gh bY`dfYg_i gbY`a YfcXY

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: EN 13819-2:2002

[SIST EN 13819-2:2003](https://standards.iteh.ai/catalog/standards/sist/e21e431d-0734-4e9c-89d6-93b021c3b5fe/sist-en-13819-2-2003)

<https://standards.iteh.ai/catalog/standards/sist/e21e431d-0734-4e9c-89d6-93b021c3b5fe/sist-en-13819-2-2003>

ICS:

13.340.20 Varovalna oprema za glavo Head protective equipment

SIST EN 13819-2:2003

en

iTeh STANDARD PREVIEW **(standards.iteh.ai)**

SIST EN 13819-2:2003

<https://standards.iteh.ai/catalog/standards/sist/e21e431d-0734-4e9c-89d6-93b021c3b5fe/sist-en-13819-2-2003>

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 European Standard was approved by CEN on 9 September 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.

STANDARD PREVIEW
(standards.iteh.ai)
<https://standards.iteh.ai/catalog/standards/sist/e21e431d-0734-4e9c-89d6-93b021c3b5fe/sist-en-13819-2-2003>



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

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

Contents

	Page
Foreword	3
Introduction	4
1 Scope	5
2 Normative references	5
3 Terms and definitions	5
4 Test methods	5
4.1 Insertion loss (ear-muffs only)	5
4.1.1 Principle	5
4.1.2 Apparatus	6
4.1.3 Procedure	6
4.1.4 Report	6
4.2 Sound attenuation	6
4.2.1 Principle	6
4.2.2 Apparatus	6
4.2.3 Procedure	6
4.2.4 Report	7
4.3 Sound level effective to the ear (ear-muffs only)	7
4.3.1 Principle	7
4.3.2 Apparatus	8
4.3.3 Procedure	8
4.3.4 Report	8
Annex A (informative) Uncertainty of measurement and interpretation of test results	10
Annex ZA (informative) Clauses of this European standard addressing essential requirements or other provisions of EU Directive	12
Bibliography	13

Foreword

This document (EN 13819-2:2002) 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 May 2003, and conflicting national standards shall be withdrawn at the latest by May 2003.

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 Directives, see informative Annex ZA, which is an integral part of this standard.

In this European Standard the Annex A is informative.

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.

iTeh STANDARD PREVIEW (standards.iteh.ai)

SIST EN 13819-2:2003

<https://standards.iteh.ai/catalog/standards/sist/e21e431d-0734-4e9c-89d6-93b021c3b5fe/sist-en-13819-2-2003>

Introduction

This standard for "Hearing Protectors Testing : Part 2 - Acoustic test methods", specifies procedures for the testing of personal hearing protection devices in relation to Directive 89/686/EEC - Personal Protective Equipment.

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 and consists of two Parts:

Part 1: Physical test methods

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 EN 352-5, for ear-muffs with audio communications in EN 352-6 and for level-dependent ear-plugs in EN 352-7.

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.

4.1 specifies a method of measuring the insertion loss of ear-muffs using an acoustic test fixture.

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

4.3 specifies a method of sound immission measurement carried out with miniature microphones inserted in the ear canals of human test subjects. The technique is known as the microphone in real ear technique (MIRE technique).

iteh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 13819-2:2003

<https://standards.iteh.ai/catalog/standards/sist/e21e431d-0734-4e9c-89d6-93b021c3b5fe/sist-en-13819-2-2003>

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

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

EN 24869-3, *Acoustics - Hearing protectors - Part 3: Simplified method for the measurement of insertion loss of ear-muff type protectors for quality inspection purposes* (ISO/TR 4869-3:1989)

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)

EN ISO 11904-1:2002, *Acoustics - Determination of sound immissions from sound sources placed close to the ears - Part 1: Technique using a microphone in a real ear (MIRE-technique)* (ISO 11904-1:2002)

ITih STANDARD PREVIEW
(standards.itech.ai)

3 Terms and definitions

SIST EN 13819-2:2003

[https://standards.itech.ai/catalog/standards/sist/e21e431d-0734-4e9c-89d6-](https://standards.itech.ai/catalog/standards/sist/e21e431d-0734-4e9c-89d6-03b031e365f6/sist-en-13819-2-2003)

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

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 ear-muffs, as defined in EN 24869-3

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

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

4 Test methods

4.1 Insertion loss (ear-muffs only)

4.1.1 Principle

The insertion loss of each cup of the ear-muffs 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 24869-3. For helmet mounted ear-muffs, a supporting pad, as shown in Figure 1, shall be fitted to the acoustic test fixture in order adequately to support the complete helmet mounted ear-muff in position.

4.1.3 Procedure

Follow the procedure given in EN 24869-3, 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) The mean and standard deviation of the values reported in 4.1.3 b) shall be reported for all specified cups at each frequency;
- d) In the case of universal ear-muffs the insertion loss shall be measured in only one mode of wearing, preferably over-the-head;
- e) If means to adjust the headband force is incorporated, the force shall be adjusted to its maximum setting;
- f) In the case of helmet mounted ear-muffs, for a given model of ear-muffs fitted to more than one size of the same model of helmet, insertion loss shall be tested using only one size of helmet.

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, 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 EN 24869-1.

4.2.3 Procedure

4.2.3.1 Measure and present the sound attenuation of defined specimens in accordance with EN 24869-1.

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 ear-plugs, supply each subject with a separate pair of ear-plugs of appropriate size.

4.2.3.4 In the case of a helmet mounted ear-muffs 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.

4.2.3.5 In the case of universal ear-muffs, 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 two 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 4.2.3.5 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 and the attenuation data for the other modes shall be reported as measured.

4.2.3.6 In the case of helmet mounted ear-muffs 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 4.2.3.6 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 and the attenuation data for the supplementary combination shall be reported as measured;
- f) In the case of a given model of ear-muffs fitted to more than one size of the same model of helmet, 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. 16 test subjects shall be used - at least four test subjects for each size of helmet. Any one specimen shall be tested not more than four times;
- g) Attenuation data generated by this method shall be used as a basis for the information required to be supplied, when all sizes of helmet tested are available to the user;
- h) 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 4.2.3.5 d) or e), or at 4.2.3.6 e) or g), as appropriate, shall be reported in accordance with EN 24869-1.

4.3 Sound level effective to the ear (ear-muffs only)

4.3.1 Principle

In order to assess the sound level effective to the ear when a hearing protector fitted with a sound reproduction facility (internal loudspeaker or similar device) is worn, the output of the internal loudspeaker (or other similar device) is measured and subsequently converted into a corresponding (external) diffuse-field sound pressure level. The result is given as the diffuse-field related (equivalent continuous A-weighted) sound pressure level,

$L_{DF Aeq}$