Hörselskydd – Provning –
Del 2: Akustiska provningsmetoder

Hearing protectors – Testing –
Part 2: Acoustic test methods

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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of an identical text or by endorsement, at the latest by May 2003, and conflicting national standards shall be withdrawn at the latest by May 2003.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.
Introduction


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).
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)


3 Terms and definitions

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: