

Australian/New Zealand Standard™

Acoustics—Hearing protectors



standards Australia



AS/NZS 1270:2002

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Association of Consulting Engineers, Australia
Australian Acoustical Society
Australian Chamber of Commerce and Industry
Australian Hearing
Australian and New Zealand Environment and Conservation Council
Consumers Federation of Australia
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OF
AS/NZS 1270:2002
Acoustics—Hearing protectors

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NOTES

Australian/New Zealand Standard™

Acoustics—Hearing protectors

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PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee AV-003, Acoustics, Human Effects, to supersede AS/NZS 1270:1999, *Acoustics—Hearing protectors*.

The major changes from the 1999 edition are the revision of the physical test requirements (Section 3) and the addition of guidance for testing specialist devices (Section 5). The method for the measurement of the real-ear attenuation of hearing protectors (Section 4) is unchanged from the 1999 edition.

The physical test requirements specified in this Standard represent a compromise between the extensive physical testing of hearing protectors required by European Standards and the absence of physical test requirements in United States Standards. The test regime specified in this Standard comprises a practical, cost-effective approach that seeks to ensure that hearing protectors are sufficiently robust to maintain their acoustic performance when in use.

In the interests of consistency, the European test procedures and related requirements have been adopted for physical tests that are common to this Standard and the corresponding draft European Standards, namely, prEN 13819.1:1999, *Hearing protectors—Testing*, Part 1: *Physical test methods* and prEN 352:1999, *Hearing protectors—General requirements*. This Standard includes one test not currently included in the European Standards, namely, the dry heat (50°C) test. This test was judged applicable to Australian and New Zealand conditions. One physical test has been added in this edition of the Standard, namely, the headband flexing test required by the European Standards.

In response to the increasing numbers of specialist hearing protectors available to users, guidance for testing such devices is provided in this edition. Specialist hearing protectors offer some method in addition to or other than a simple blocking of the sound transmission. Examples of such devices include level-dependent earmuffs and noise cancelling headsets. Currently there is no recognized procedure for the testing of these devices in their operating state. However, recommendations are given for undertaking passive testing. Once appropriate tests for devices in their operating state have been developed, this Standard will be revised accordingly.

The term ‘normative’ has been used in this Standard to define the application of the appendix to which it applies. A ‘normative’ appendix is an integral part of the Standard. An ‘informative’ appendix is only for information and guidance.

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Australian/New Zealand Standard Acoustics—Hearing protectors

SECTION 1 SCOPE AND GENERAL

1.1 SCOPE

This Standard specifies requirements for the design, materials, and performance of conventional hearing protectors. It also provides guidance on the general requirements for, and the physical and acoustic testing of, specialist hearing protectors.

1.2 APPLICATION

Conventional hearing protectors shall comply with the general requirements of Section 2 and with the physical requirements of Section 3. The real-ear attenuation shall be measured in accordance with Section 4. When testing specialist hearing protectors, consideration should be given to the guidance provided in Section 5.

1.3 REFERENCED DOCUMENTS

The following Standards are referred to in this Standard:

AS

1633 Acoustics—Glossary of terms and related symbols

2586 Audiometers

AS/NZS

1269 Occupational noise management

1269.3 Part 3: Hearing protector program

4476 Acoustics—Octave-band and fractional-octave-band filters

ISO

4869 Acoustics—Hearing protectors

TR 4869-3 Part 3: Simplified method for the measurement of insertion loss of ear-muff type protectors for quality inspection purposes

8253 Acoustics—Audiometric test methods (series)

ANSI

S12.6 Methods for measuring the real-ear attenuation of hearing protectors

prEN

13819 Hearing protectors—Testing

13819.1 Part 1: Physical test methods

1.4 DEFINITIONS

For the purpose of this Standard, the definitions in AS 1633 and those below apply.

1.4.1 Diffuse sound field

A sound field of uniform sound pressure level in which, for purposes of measurements under Clause 4.2.2 of this Standard, point-to-point, all directions of sound propagation are equally probable.

1.4.2 Disposable earplug

An earplug designed to be worn once.

1.4.3 Ear canal cap

A hearing protector that covers the ear canal entrance and is held in place by a head, neck or chin band.

1.4.4 Earmuff

A hearing protector that covers the entire ear and is held in place by a suspension system.

1.4.5 Earplug

A hearing protector that is inserted into the ear canal.

1.4.6 Hearing protector

A device worn by a person to reduce unwanted effects of sound.

1.4.7 Occluded-ear threshold of hearing

The threshold of hearing when a hearing protector is worn.

1.4.8 Open-ear threshold of hearing

The threshold of hearing when no hearing protector is worn.

1.4.9 Pink noise

Noise in which sound pressure spectral density is inversely proportional to frequency.

1.4.10 Real-ear attenuation

The difference in decibels between the occluded-ear threshold of hearing and the open-ear threshold of hearing.

1.4.11 Reference point

A fixed point within the test chamber in relation to which the test subject is positioned so that the mid-point of a line connecting the subject's ear canal openings coincides with the reference point; the point to which all objective measurements of the sound field characteristics are referenced.

1.4.12 Specialist hearing protector

A device worn by an individual that reduces the effects of unwanted sound (noise) by some method additional to or other than a simple blocking of the sound transmission path. This may include some form of electronic or mechanical damping of the sound energy.

1.4.13 Suspension system

A device that holds the hearing protector in proper position on the wearer's head. A suspension system may be a clamp-band (headband or neckband), a support strap or harness, or a safety helmet.

1.4.14 Test signal

A one-third octave band of pink noise of specified centre frequency.

1.4.15 Threshold of hearing

The lowest sound pressure level of a signal at which the signal is audible to a test subject.

1.4.16 User formable earplug

An earplug that is shaped by the user before insertion into the ear canal.

SECTION 2 GENERAL REQUIREMENTS

2.1 DESIGN AND CONSTRUCTION

2.1.1 General

All parts shall be finished smooth and free from sharp edges and from irregularities that could be a potential hazard or cause discomfort to the wearer.

Hearing protectors, other than disposable or user formable earplugs, shall be durable in construction.

2.1.2 Earmuffs

All edges of earmuffs which are in contact with the earmuff cushions shall be rounded, finished smooth, and free from sharp edges which could cause damage to the cushions.

Over-the-head straps shall be supplied with all earmuffs designed to allow the clamping band to be worn behind the neck or under the chin.

2.2 MATERIALS

Materials used in the construction of hearing protectors shall be suitable for the conditions of use; in particular—

- (a) metal parts shall be made of corrosion-resistant metal or shall be treated so as to be corrosion-resistant;
- (b) materials which may come in contact with the skin shall be non-staining, soft, pliable, and not likely to cause skin irritation, and shall be resistant to perspiration, ear wax, and skin and hair oils; and
- (c) materials shall be capable of being cleaned and disinfected except for user formable hearing protectors.

2.3 WEARER INFORMATION

2.3.1 Information in or on the packaging

The following information for the wearer shall be provided in or on the package in which the protector is supplied:

- (a) Where a range of sizes is offered, the method of selecting the correct size of protector. For small and large size range of hearing protectors, a note shall be included.

NOTE: The wearer information should include a warning that the small and large size ranges are designed to fit wearers for whom the medium size range is not suitable.

- (b) The method of adjusting and fitting the protector.
- (c) Instructions for cleaning and disinfecting the protector, if appropriate.
- (d) Maintenance requirements, if appropriate.
- (e) A list of spare parts available for replacing worn or damaged components.
- (f) For earmuffs, the mass of the protector.
- (g) For earmuffs and ear canal caps, the clamping force as measured in accordance with Clause 3.2.9.
- (h) A note warning that the reported attenuation will be obtained only if the protector is in good condition and worn as directed.

NOTE: Reference to AS/NZS 1269.3 should be made for guidance.

- (i) For earmuffs, a note warning that noise reduction will be adversely affected by anything that impairs the seal of the earmuff cushions against the head, such as thick spectacle frames, balaclavas, etc, and a note stating that cushions may deteriorate with use and should be renewed regularly.
- (j) Details of the real-ear attenuation of the protector measured according to Section 4 and expressed as a set of mean, standard deviation and mean-minus-standard deviation attenuations, calculated in accordance with Appendix A. To facilitate selection of an appropriate hearing protector, this information shall be displayed so that it can be viewed without opening the packaging.
- (k) For helmet mounted earmuffs information on the manufacturer(s) and model designation(s) of helmet(s) tested in combination with the earmuffs shall be provided in or on the packaging. The information shall be given in the form:

These earmuffs were tested in combination with the following industrial safety helmets, and may give different levels of protection if fitted to different helmets: (*list helmets*).

2.3.2 Information on the packaging

To facilitate selection of an appropriate hearing protector, the following statement shall be displayed so that it can be viewed without opening the packaging:

Hearing protector class X tested to AS/NZS 1270. When selected, used and maintained as specified in AS/NZS 1269, this protector may be used in noise up to Y dB(A) assuming an 85 dB(A) criterion. A lower criterion may require a higher protector class.

X is the class of the protector determined according to Paragraph A4 of Appendix A. Y is the corresponding dB(A) value shown for that class in Table 2.1.

NOTE: For full details of methods of selecting a hearing protector, see AS/NZS 1269.3.

TABLE 2.1
DETERMINATION OF Y USING X

X (class)	Y, dB(A)
1	90
2	95
3	100
4	105
5	110

2.3.3 Information with each packaged pair of earplugs

Each packaged pair of earplugs shall be accompanied by fitting instructions.

NOTE: The use of diagrams for fitting instructions is recommended.

2.4 MARKING

The following information shall be durably marked on every hearing protector except earplugs for which the information shall be on the earplugs or on the smallest commercially available packaging (their storage package container) or on a nameplate securely attached thereto:

- (a) The name or trade name or other identifying mark of the manufacturer.
- (b) Product identification, model designation or catalogue number.

- (c) For earmuffs intended by the manufacturer to be worn in a particular orientation, an indication of the front and/or top of the cups, and/or an indication of left and right cups.
- (d) For earplugs, whether the earplugs are disposable, user formable, or other.

NOTE: Manufacturers making a statement of compliance with this Australian/New Zealand Standard on a product, or on packaging or promotional material related to that product, are advised to ensure that such compliance is capable of being verified.

SECTION 3 PERFORMANCE

3.1 PHYSICAL REQUIREMENTS

The hearing protector shall be deemed to have satisfied the requirements of this Section of this Standard if—

- (a) it has not suffered significant damage when tested in accordance with Clause 3.2; and
- (b) the headband force values obtained in the first and second measurements of headband force (see Table 3.1) do not differ by more than 20%.

For the purpose of this Clause, significant damage shall be deemed to include—

- (i) for ear plugs and canal caps . . . noticeable deformation;
- (ii) for earmuff cups . . . evidence of cracking, crazing or noticeable deformation;
- (iii) for earmuff cushions . . . cracking, rupturing or deformation to a noticeable extent; and
- (iv) for suspension systems . . . breaking or noticeable deformation.

Splits less than 15 mm long on plastic seal surfaces that do not make contact with the wearer's head shall be deemed not to be significant damage.

3.2 TEST PROCEDURES

3.2.1 General

The samples submitted for type testing shall be fully representative of items offered for sale.

Since the samples used in these tests are also to be used in the acoustic performance testing in accordance with Section 4, a sufficient number shall be submitted to enable those acoustic tests to be carried out. The minimum number of samples shall be 2, and in the case of multiple size range models the minimum number of samples shall be 2 of each size.

The tests appropriate to the particular type of protector shall be conducted in the order in which they are listed in the relevant column of Table 3.1. Details of the tests are described in Clauses 3.2.2 to 3.2.10. At the conclusion of each test, the hearing protector shall be examined and any crack, rupture, visible deterioration, or deformation shall be recorded and reported.

NOTE: For recommended quality control testing, see Appendix B.

3.2.2 Examination

The hearing protector shall be examined visually for compliance with Clause 2.1. Any damage or faults shall be recorded and reported. These may include defects in construction, the presence of foreign bodies, moisture, dust, corrosion of metals, and any form of deterioration of materials and finishes, distortion, or mechanical imperfection.

3.2.3 Preparation

The hearing protector shall be prepared for use according to the manufacturer's instructions normally supplied to the wearer.