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**Varovala sluha - Varnostne zahteve in preskušanje - 4. del: Naušniki, prilagodljivi ravni hrupa**

Hearing protectors - Safety requirements and testing - Part 4: Level-dependent ear-muffs

Gehörschützer - Sicherheitstechnische Anforderungen und Prüfungen - Teil 4:  
Pegelabhängige Kapselgehörschützer

Protecteurs individuels contre le bruit - Exigences de sécurité et essais - Partie 4: Serre-tête à atténuation dépendante du niveau

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English version

## Hearing protectors - Safety requirements and testing - Part 4: Level-dependent ear-muffs

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This European Standard was approved by CEN on 18 January 2001.

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, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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## Foreword

This European Standard 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of an identical text or by endorsement, at the latest by September 2001, and conflicting national standards shall be withdrawn at the latest by September 2001.

This European Standard 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 Directive(s), see informative Annex ZA, which is an integral part of this standard.

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, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

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## Introduction

Level-dependent ear-muffs are designed to provide restoration of external sounds, while providing attenuation of sounds at high levels. They may be selected for use in intermittent or impulsive noise environments and where external warning sounds are required to be heard. This Standard is concerned with those ear-muffs having an electronic sound restoration circuit.

This part of the Standard is a specification intended for type approval purposes, for which four sets of specimen ear-muffs are tested.

The requirements and tests of the standard are concerned primarily with the level-dependent performance of the ear-muffs.

This Standard for "Hearing Protectors - Safety Requirements and Testing: Level-dependent ear-muffs", sets requirements for personal hearing protection devices in relation to Directive 89/686/EEC - Personal Protective Equipment.

EN 352-1:1993 deals with requirements and test methods for ear-muffs, EN 352-2:1993 with ear-plugs, EN 352-3:1996: with ear-muffs for attachment to safety helmets. Additional safety requirements and the associated test procedures for ear-muffs with active noise reduction are contained in prEN 352-5:2000, for ear-muffs with audio communications in prEN 352-6:2000 and for level-dependent ear-plugs in prEN 352-7:2000. An associated standard EN 458, covers selection, use, care and maintenance of hearing protection.

The particular requirement for hearing protectors in relation to their ability to reduce noise to below daily limit levels set by Directive 86/188/EEC - "on the protection of workers from the risks related to exposure to noise at work" is addressed in the standard by means of a requirement to report in which noise environments the hearing protector may be used without exceeding the relevant action level set by that Directive.

An additional acoustic performance test method to that described in EN 24869-1 and applied in EN 352-1:1993, EN 352-2:1993 and EN 352-3:1996 is required for level-dependent ear-muffs. Methods of measurement are under consideration by CEN/TC 211. Until such time as this work is completed the test method described in annex B of this standard is recommended for level-dependent ear-muffs in addition to the EN 24869-1 test.

## 1 Scope

This European Standard is applicable to level-dependent ear-muffs. It specifies additional constructional, design and performance requirements, methods of test, marking requirements and user information relating to the incorporation of the level-dependency facility.

## 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 apply (including amendments).

EN 352-1 : 1993      Hearing protectors - General requirements - Part 1 : Ear-muffs

## 3 Terms and definitions

For the purposes of this European Standard the terms and definitions given in EN 352-1:1993 and the following definitions apply.

### 3.1

#### **criterion level (H)**

A-weighted sound pressure level of the H noise for which the A-weighted equivalent diffuse field related sound pressure level when a level-dependent ear-muff is worn first exceeds 85 dB(A)

### 3.2

#### **criterion level (M)**

A-weighted sound pressure level of the M noise for which the A-weighted equivalent diffuse field related sound pressure level when a level-dependent ear-muff is worn first exceeds 85 dB(A)

### 3.3

#### **criterion level (L)**

A-weighted sound pressure level of the L noise for which the A-weighted equivalent diffuse field related sound pressure level when a level-dependent ear-muff is worn first exceeds 85 dB(A)

### 3.4

#### **level-dependent ear-muff**

an ear-muff fitted with an electronic sound restoration circuit

### 3.5

#### **sound restoration circuit**

an electroacoustic device intended to reproduce lower level external sounds in the ear canal, while usually providing attenuation of higher level sounds by means of a level-dependent gain function

## 4 Requirements

Level-dependent ear-muffs shall meet the requirements of EN 352-1:1993. Additional requirements are listed below.

### 4.1 Sizing

There are no additional requirements for level-dependent ear-muffs beyond those referenced in EN 352-1:1993.

### 4.2 Materials and construction

No component of the ear-muff shall constitute an electrical safety hazard to the user.

### 4.3 Performance

#### 4.3.1 General

Level-dependent ear-muffs shall meet all the performance requirements of EN 352-1:1993, including the minimum attenuation requirement in their passive mode. Additionally, the requirements specified below shall be satisfied.

Specimens of ear-muffs shall be conditioned and tested as specified in 5.1.1 and 5.1.2. The scheme of testing shall be as specified in 5.1.3.

#### 4.3.2 Criterion levels

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The criterion levels for the three noises H, M and L determined in accordance with 5.2 shall be reported in wearer information.

#### 4.3.3 Spread of sound attenuation and sound transmission

The standard deviations reported in accordance with 5.3 shall not be greater than 3 dB within the range of 50 dB(A) to the criterion level, for each of the three noises, H, M and L.

## 5 Testing

This scheme of testing is additional to that described in EN 352-1:1993. It shall be carried out on additional samples.

### 5.1 Specimens, conditioning and scheme of testing

#### 5.1.1 Specimens

Four pairs of ear-muffs shall be submitted for testing. The individual ear-muff cups shall be numbered 1 to 8 (or in the case that level-dependent facilities are not fitted to both cups of the ear-muffs, 1 to 4). Fresh batteries, if any are installed in the ear-muffs, shall be fitted for the tests.

### 5.1.2 Conditioning and testing atmosphere

All specimens shall be conditioned and tested in an atmosphere having a temperature of  $22\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$  and a relative humidity of not more than 85%, as required in EN 352-1:1993.

### 5.1.3 Scheme of testing

The eight ear-muff cups (or four if level-dependent facilities are not fitted to both cups) shall be tested for criterion levels as described in 5.2. The spread of sound transmission shall be calculated as described in 5.3.

## 5.2 Criterion levels

The acoustic measurements for level dependent ear-muffs are under consideration. For the time being and because of the urgent need, such measurements may be carried out in accordance with test procedures described in annex B.

## 5.3 Spread of sound transmission

The acoustic measurements for level dependent ear-muffs are under consideration. For the time being and because of the urgent need, such measurements may be carried out in accordance with test procedures described in annex B.

## 6 Information supplied by the manufacturer

Information according with 6.1 and 6.2 shall be provided at least in the official language(s) of the European state of destination.

### 6.1 Wearer information

The following information for the wearer (in addition to that required by EN 352-1:1993) shall be supplied with the ear-muffs:

- a) the number of this standard, EN 352-4;
- b) an indication as to whether the hearing protector provides a level-dependent facility;
- c) the values of the criterion levels as determined by the procedures described in annex B;
- d) recommended storage conditions before and after use;
- e) method of checking, charging and changing batteries;
- f) for ear-muffs with a level-dependent facility, the statements:
  - i) "This ear-muff is provided with level-dependent attenuation. The wearer should check correct operation before use. If distortion or failure is detected, the wearer should refer to the