

Hearing protectors - Testing - Part 3: Supplementary acoustic test methods

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

See Eesti standard EVS-EN 13819-3:2019+A1:2024 sisaldab Euroopa standardi EN 13819-3:2019+A1:2024 ingliskeelset teksti. Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas. Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 03.04.2024. Standard on kättesaadav Eesti Standardimis-ja Akrediteerimiskeskusest.	This Estonian standard EVS-EN 13819-3:2019+A1:2024 consists of the English text of the European standard EN 13819-3:2019+A1:2024. This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation and Accreditation. Date of Availability of the European standard is 03.04.2024. The standard is available from the Estonian Centre for Standardisation and Accreditation.
---	---

Tagasisidet standardi sisu kohta on võimalik edastada, kasutades EVS-i veebilehel asuvat tagasiside vormi või saates e-kirja meiliaadressile standardiosakond@evs.ee.

ICS 13.340.20

Standardite reprodutseerimise ja levitamise õigus kuulub Eesti Standardimis- ja Akrediteerimiskeskusele. Andmete paljundamine, taastekitamine, kopeerimine, salvestamine elektroonsesse süsteemi või edastamine ükskõik millises vormis või millisel teel ilma Eesti Standardimis-ja Akrediteerimiskeskuse kirjaliku loata on keelatud.

Kui Teil on küsimusi standardite autorikaitse kohta, võtke palun ühendust Eesti Standardimis-ja Akrediteerimiskeskusega: Koduleht www.evs.ee; telefon 605 5050; e-post info@evs.ee

The right to reproduce and distribute standards belongs to the Estonian Centre for Standardisation and Accreditation. No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying, without a written permission from the Estonian Centre for Standardisation and Accreditation.

If you have any questions about copyright, please contact Estonian Centre for Standardisation and Accreditation: Homepage www.evs.ee; phone +372 605 5050; e-mail info@evs.ee

English Version

Hearing protectors - Testing - Part 3: Supplementary acoustic test methods

Protecteurs individuels contre le bruit - Essais - Partie
3 : Méthodes d'essais acoustiques supplémentaires

Gehörschützer - Prüfung - Teil 3: Zusätzliche
akustische Prüfverfahren

This European Standard was approved by CEN on 13 December 2018 and includes Amendment 1 approved by CEN on 10 April 2023.

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 CEN-CENELEC 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 CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and United Kingdom.



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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

Contents

Page

European foreword.....	4
Introduction	5
1 Scope.....	6
2 Normative references.....	6
3 Terms and definitions	7
4 Symbols and abbreviations	9
5 Test conditioning and equipment.....	9
5.1 Conditioning and testing atmosphere	9
5.2 Occluded-ear simulator	9
5.3 Head simulator.....	9
5.4 Microphone in Real Ear (MIRE).....	9
6 Test signals.....	10
6.1 General.....	10
6.2 HML test sounds.....	10
6.3 Broadband noise test sound.....	10
6.4 Speech signal.....	10
6.5 Entertainment audio test signal	11
7 Test procedures.....	11
7.1 General.....	11
7.2 Level-dependent hearing protectors	11
7.2.1 Introduction	11
7.2.2 Level-dependent earmuff.....	11
7.2.3 Level-dependent earplug	12
7.3 Active noise reduction (ANR) hearing protectors.....	14
7.3.1 General.....	14
7.3.2 Earmuff with active noise reduction.....	15
7.4 Hearing protectors with FM radio receiver or DAB/DAB+ radio receiver $\langle A_1 \rangle$	16
7.4.1 General.....	16
7.4.2 Earmuff with FM radio receiver or DAB/DAB+ radio receiver $\langle A_1 \rangle$	17
7.4.3 Earplug with FM radio receiver or DAB/DAB+ radio receiver $\langle A_1 \rangle$	18
7.5 Hearing protectors with Bluetooth® receiver	20
7.5.1 Earmuff with Bluetooth® receiver	20
7.5.2 Earplug with Bluetooth® receiver.....	23
7.6 Hearing protectors with electrical audio input.....	25
7.6.1 Earmuff with electrical audio input.....	25
7.6.2 Earplug with electrical audio input.....	27
7.7 Hearing protectors with built-in two-way radio.....	29
7.7.1 Earmuff with built-in analogue frequency modulated two-way radio	29
7.7.2 Earplug with built-in analogue frequency modulated two-way radio.....	31
Annex A (informative) Overview of supplementary acoustic test methods	33
Annex B (normative) HML test sounds and pink noise with $L_{p,A} = 100$ dB and tolerances.....	34

Annex C (informative) Calculation example for level-dependent hearing protectors	36
C.1 Calculation example for level-dependent earmuff.....	36
C.2 Calculation example for level-dependent earplugs	37
Annex D (informative) Calculation example for ANR	38
Annex E (informative) Uncertainty of measurement and interpretation of test results.....	39
Bibliography	41

European foreword

This document (EN 13819-3:2019+A1:2024) has been prepared by Technical Committee CEN/TC 159 “Hearing protectors”, the secretariat of which is held by DIN.

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 October 2024, and conflicting national standards shall be withdrawn at the latest by October 2024.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document includes Amendment 1 approved by CEN on 10 April 2023.

This document supersedes A1 EN 13819-3:2019 A1.

The start and finish of text introduced or altered by amendment is indicated in the text by tags A1 A1.

Any feedback and questions on this document should be directed to the users’ national standards body. A complete listing of these bodies can be found on the CEN website.

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and the United Kingdom.

Introduction

This standard is part of a set of standards for personal hearing protectors.

The EN 13819 series consists of three parts and deals with testing plans of hearing protectors.

- EN 13819-1, *Hearing protectors — Testing — Part 1: Physical test methods*
- EN 13819-2, *Hearing protectors — Testing — Part 2: Acoustic test methods*
- EN 13819-3, *Hearing protectors — Testing — Part 3: Supplementary acoustic test methods*

The product requirements are described in a family of standards:

- EN 352-1, *Hearing protectors — General requirements — Part 1: Earmuffs*
- EN 352-2, *Hearing protectors — General requirements — Part 2: Earplugs*
- EN 352-3, *Hearing protectors — General requirements — Part 3: Earmuffs attached to head protection and/or face protection devices*
- EN 352-4, *Hearing protectors — Safety requirements — Part 4: Level-dependent earmuffs*
- EN 352-5, *Hearing protectors — Safety requirements — Part 5: Active noise reduction earmuffs*
- EN 352-6, *Hearing protectors — Safety requirements — Part 6: Earmuffs with safety-related audio input*
- EN 352-7, *Hearing protectors — Safety requirements — Part 7: Level-dependent earplugs*
- EN 352-8, *Hearing protectors — Safety requirements — Part 8: Entertainment audio earmuffs*
- EN 352-9, *Hearing protectors — Safety requirements — Part 9: Earplugs with safety-related audio input*
- EN 352-10, *Hearing protectors — Safety requirements — Part 10: Entertainment audio earplugs*

This standard also provides informative spreadsheets with

- calculation examples for level-dependent earplugs
- calculation examples for ANR

to allow the user to make own calculations.

CEN is not responsible for errors that may arise or occur with the use of these spreadsheets.

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

1 Scope

This document specifies supplementary acoustic test methods for hearing protectors with additional electronic functions. The purpose of these tests is to enable assessment of the hearing protector performance as specified in the appropriate product standards.

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.

EN 352-2:2020, *Hearing protectors — General requirements — Part 2: Earplugs*

EN 352-8:2020+A1:2024, *Hearing protectors — Safety requirements — Part 8: Entertainment audio earmuffs*

EN 352-10:2020+A1:2024, *Hearing protectors — Safety requirements — Part 10: Entertainment audio earplugs* ^{A1}

EN 60318-4:2010, *Electroacoustics — Simulators of human head and ear — Part 4: Occluded-ear simulator for the measurement of earphones coupled to the ear by means of ear inserts (IEC 60318-4:2010)*

EN ISO 4869-1:2018, *Acoustics — Hearing protectors — Part 1: Subjective method for the measurement of sound attenuation (ISO 4869-1:2018)*

EN ISO 4869-2:2018, *Acoustics — Hearing protectors — Part 2: Estimation of effective A-weighted sound pressure levels when hearing protectors are worn (ISO 4869-2:2018)*

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

EN ISO 11904-2:2021, *Acoustics — Determination of sound immission from sound sources placed close to the ear — Part 2: Technique using a manikin (ISO 11904-2:2021)* ^{A1}

IEC 60268-1:1985, *Sound system equipment — Part 1: General*

ITU-T P.50:1999, *SERIES P: TELEPHONE TRANSMISSION QUALITY, TELEPHONE INSTALLATIONS, LOCAL LINE NETWORKS, Objective measuring apparatus, Artificial voices. Appendix I: Test signals*