

AKUSTIKA. MÜRAALLIKATE HELIVÕIMSUSE TASEME
MÄÄRAMINE HELIRÕHU ABIL. TEHNILISED MEETODID
VÄIKESTE LIIKUVATE ALLIKATE JAOKS
REVERBEREERUVATES VÄLJADES. OSA 2: MEETODID
SPETSIAALSE JÄRELKÕLAKESTUSEGA KATSERUUMIDE
JAOKS

Acoustics - Determination of sound power levels of
noise sources using sound pressure - Engineering
methods for small, movable sources in reverberant
fields - Part 2: Methods for special reverberation test
rooms (ISO 3743-2:2018)

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

| | |
|---|--|
| See Eesti standard EVS-EN ISO 3743-2:2019 sisaldab Euroopa standardi EN ISO 3743-2:2019 ingliskeelset teksti. | This Estonian standard EVS-EN ISO 3743-2:2019 consists of the English text of the European standard EN ISO 3743-2:2019. |
| Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas | This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation. |
| Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 25.09.2019. | Date of Availability of the European standard is 25.09.2019. |
| Standard on kättesaadav Eesti Standardikeskusest. | The standard is available from the Estonian Centre for Standardisation. |

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

ICS 17.140.01

Standardite reprodutseerimise ja levitamise õigus kuulub Eesti Standardikeskusele

Andmete paljundamine, taastekitamine, kopeerimine, salvestamine elektroonsesse süsteemi või edastamine ükskõik millises vormis või millisel teel ilma Eesti Standardikeskuse kirjaliku loata on keelatud.

Kui Teil on küsimusi standardite autorikaitse kohta, võtke palun ühendust Eesti Standardikeskusega:
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

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.

If you have any questions about copyright, please contact Estonian Centre for Standardisation:

Homepage www.evs.ee; phone +372 605 5050; e-mail info@evs.ee

English Version

Acoustics - Determination of sound power levels of noise sources using sound pressure - Engineering methods for small, movable sources in reverberant fields - Part 2: Methods for special reverberation test rooms (ISO 3743-2:2018)

Acoustique - Détermination des niveaux de puissance acoustique émis par les sources de bruit à partir de la pression acoustique - Méthodes d'expertise en champ réverbéré applicables aux petites sources transportables - Partie 2: Méthodes en salle d'essai réverbérante spéciale (ISO 3743-2:2018)

Akustik - Bestimmung der Schallleistungspegel von Geräuschquellen aus Schalldruckmessungen - Verfahren der Genauigkeitsklasse 2 für kleine, transportable Quellen in Hallfeldern - Teil 2: Verfahren für Sonder-Hallräume (ISO 3743-2:2018)

This European Standard was approved by CEN on 29 January 2018.

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, Turkey 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

European foreword

This document (EN ISO 3743-2:2019) has been prepared by Technical Committee ISO/TC 43 "Acoustics" in collaboration with Technical Committee CEN/TC 211 "Acoustics" 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 March 2020, and conflicting national standards shall be withdrawn at the latest by March 2020.

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 supersedes EN ISO 3743-2:2009.

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 the relationship with EU Directive(s) see informative Annex ZA, which is an integral part of this document.

According to the CEN-CENELEC Internal Regulations, the national standards organizations 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, Turkey and the United Kingdom.

Endorsement notice

The text of ISO 3743-2:2018 has been approved by CEN as EN ISO 3743-2:2019 without any modification.

Annex ZA (informative)

Relationship between this European Standard and the essential requirements of Directive 2006/42/EC aimed to be covered

This European Standard has been prepared under a Commission's standardization request M/396 (Machinery) to provide one voluntary means of conforming to essential requirements of Directive 2006/42/EC of the European Parliament and of the Council of 17 May 2006 on machinery, and amending Directive 95/16/EC (recast).

Once this standard is cited in the Official Journal of the European Union under that Directive, compliance with the normative clauses of this standard given in Table ZA.1 confers, within the limits of the scope of this standard, a presumption of conformity with the corresponding essential requirements of that Directive, and associated EFTA regulations.

Table ZA.1 — Correspondence between this European Standard and Directive 2006/42/EC

| Essential Directive | Requirements of | Clause(s)/sub-clause(s) of this EN | Remarks/Notes |
|---------------------|-----------------|-------------------------------------|---------------|
| 1.7.4.2 u) | | Clauses 5 to 13, Annexes A, E and F | |

WARNING 1 — Presumption of conformity stays valid only as long as a reference to this European Standard is maintained in the list published in the Official Journal of the European Union. Users of this standard should consult frequently the latest list published in the Official Journal of the European Union.

WARNING 2 — Other Union legislation may be applicable to the product(s) falling within the scope of this standard.

Contents

Page

| | |
|--|-----------|
| Foreword | v |
| Introduction | vi |
| 1 Scope | 1 |
| 2 Normative references | 1 |
| 3 Terms and definitions | 1 |
| 4 Principle | 2 |
| 5 Noise source | 2 |
| 6 Requirements for special reverberation test room | 2 |
| 6.1 General | 2 |
| 6.2 Volume of test room | 2 |
| 6.3 Reverberation time of test room | 3 |
| 6.4 Surface treatment | 3 |
| 6.5 Criterion for background noise | 3 |
| 6.6 Criteria for temperature and humidity | 4 |
| 6.7 Evaluation of suitability of test room | 4 |
| 7 Instrumentation | 5 |
| 7.1 General | 5 |
| 7.2 Microphone and its associated cable | 5 |
| 7.3 Amplifier and weighting network | 5 |
| 7.4 Octave-band filters | 6 |
| 7.5 Squaring and averaging circuits and indicating device | 6 |
| 7.6 Frequency response of the instrumentation system | 6 |
| 7.7 Calibration | 6 |
| 8 Installation and operation of source under test | 6 |
| 8.1 General | 6 |
| 8.2 Source location | 6 |
| 8.3 Source mounting | 7 |
| 8.4 Auxiliary equipment | 7 |
| 8.5 Operation of source during the test | 7 |
| 9 Measurements in test room | 8 |
| 9.1 General | 8 |
| 9.2 Period of observation | 8 |
| 9.3 Microphone positions | 8 |
| 9.4 Number of microphones and source positions | 8 |
| 9.5 Criteria for the presence of spectral irregularities | 10 |
| 9.6 Averaging technique with moving microphones | 10 |
| 9.6.1 General | 10 |
| 9.6.2 Path length for continuous averaging | 10 |
| 9.6.3 Location of path within test room | 10 |
| 9.6.4 Speed of traverse | 10 |
| 9.7 Array of fixed microphones | 11 |
| 9.8 Correction for background sound pressure levels | 11 |
| 10 Calculation of sound power levels | 11 |
| 10.1 Calculation of mean band pressure levels | 11 |
| 10.2 Direct method for determining sound power levels | 12 |
| 10.3 Comparison method for determining band power levels | 12 |
| 10.4 A-weighted sound power levels determined by the comparison method | 13 |
| 11 Measurement uncertainty | 13 |
| 11.1 Methodology | 13 |
| 11.2 Determination of σ_{omc} | 14 |

| | | |
|---------------------|--|-----------|
| 11.3 | Determination of σ_{R0} | 14 |
| 11.3.1 | General..... | 14 |
| 11.3.2 | Round robin test..... | 14 |
| 11.3.3 | Modelling approach for σ_{R0} | 15 |
| 11.4 | Typical upper bound values of σ_{R0} | 15 |
| 11.5 | Total standard deviation σ_{tot} and expanded uncertainty U | 16 |
| 12 | Information to be recorded | 16 |
| 12.1 | General..... | 16 |
| 12.2 | Sound source under test..... | 16 |
| 12.3 | Acoustical environment..... | 17 |
| 12.4 | Instrumentation..... | 17 |
| 12.5 | Acoustical data..... | 17 |
| 13 | Information to be reported | 17 |
| Annex A | (normative) Characteristics and calibration of reference sound source | 18 |
| Annex B | (informative) Guidelines for the design of special reverberation test rooms | 19 |
| Annex C | (informative) Examples of suitable instrumentation systems | 24 |
| Annex D | (informative) Guidance on the development of information on measurement uncertainty | 26 |
| Annex E | (normative) Sound power level under reference meteorological conditions | 36 |
| Annex F | (normative) Calculation of A-weighted sound power levels from octave band levels | 37 |
| Bibliography | | 38 |

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 43, *Acoustics*, Subcommittee SC 1, *Noise*.

This second edition cancels and replaces the first edition (ISO 3743-2:1994), of which it constitutes a minor revision. The main changes are the following:

- Table 0.1 in the Introduction deleted;
- restructuring of the content of [Clause 1](#);
- references updated;
- clause on measurement uncertainty revised to be in-line with the other standards of the ISO 3740 series (now [Clause 11](#));
- new [Annexes D, E, and F](#) added;
- new entries in Bibliography added.

A list of all the parts in the ISO 3743 series can be found on the ISO website.

Introduction

ISO 3743 is one standard of the series ISO 3741 to ISO 3747 series, which specifies various methods for determining the sound power levels of machines, equipment and sub-assemblies. These basic standards specify the acoustical requirements for measurements appropriate for different test environments. When selecting one of the methods of the series ISO 3741 to ISO 3747, it is necessary to select the most appropriate for the conditions and purposes of the noise test. General guidelines to assist in the selection are provided in ISO 3740. The series ISO 3741 to ISO 3747 gives only general principles regarding the operating and mounting conditions of the machine or equipment under test. Reference should be made to the noise test code for a specific type of machine or equipment, if available, for specifications on mounting and operating conditions.

The method given in this document enables measurement of sound pressure levels with A-weighting and in octave bands at pre-scribed fixed microphone positions or along prescribed paths. It allows determination of A-weighted sound power levels or sound power levels with other weighting and octave-band sound power levels. Quantities which cannot be determined are the directivity characteristics of the source and the temporal pattern of noise radiated by sources emitting non-steady noise.

ISO 3743-1 and this document specify engineering methods for determining the A-weighted and octave-band sound power levels of small noise sources. The methods are applicable to small machines, devices, components and sub-assemblies which can be installed in a special reverberation test room or in a hard-walled test room with prescribed acoustical characteristics. The methods are particularly suitable for small items of portable equipment; they are not intended for larger pieces of stationary equipment which, due to their manner of operation or installation, cannot readily be moved into the test room and operated as in normal usage. The procedures are intended to be used when an engineering grade of accuracy is desired without requiring the use of laboratory facilities.

In ISO 3743-1, a comparison method is used to determine the octave-band sound power levels of the source. The spatial average (octave-band) sound pressure levels produced by the source under test are compared to the spatial average (octave-band) sound pressure levels produced by a reference sound source of known sound power output. The difference in sound pressure levels is equal to the difference in sound power levels if conditions are the same for both sets of measurements. The A-weighted sound power level is then calculated from the octave-band sound power levels.

The requirements to be fulfilled by the special reverberation test room for measurements in accordance with this document are significantly more restrictive than those placed on the hard-walled test room by the comparison method of ISO 3743-1.