

EHITUSAKUSTIKA. HOONETE AKUSTILISE TOIMIVUSE
HINDAMINE ELEMENTIDE AKUSTILISE TOIME PÕHJAL.
OSA 4: SISEHELI KANDUMINE VÄLJAPOOLE RUUMI

Building acoustics - Estimation of acoustic performance
of buildings from the performance of elements - Part 4:
Transmission of indoor sound to the outside (ISO
12354-4:2017)

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

See Eesti standard EVS-EN ISO 12354-4:2017 sisaldab Euroopa standardi EN ISO 12354-4:2017 ingliskeelset teksti.	This Estonian standard EVS-EN ISO 12354-4:2017 consists of the English text of the European standard EN ISO 12354-4:2017.
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 and Accreditation.
Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 16.08.2017.	Date of Availability of the European standard is 16.08.2017.
Standard on kättesaadav Eesti Standardimis- ja Akrediteerimiskeskusest.	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 91.120.20

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 autoriõiguse kaitse 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 standards copyright protection, please contact the Estonian Centre for Standardisation and Accreditation: Homepage www.evs.ee; phone +372 605 5050; e-mail info@evs.ee

English Version

Building acoustics - Estimation of acoustic performance of
buildings from the performance of elements - Part 4:
Transmission of indoor sound to the outside (ISO 12354-
4:2017)

Acoustique du bâtiment - Calcul de la performance
acoustique des bâtiments à partir de la performance
des éléments - Partie 4: Transmission du bruit
intérieur à l'extérieur (ISO 12354-4:2017)

Bauakustik - Berechnung der akustischen
Eigenschaften von Gebäuden aus den
Bauteileigenschaften - Teil 4: Schallübertragung von
Räumen ins Freie (ISO 12354-4:2017)

This European Standard was approved by CEN on 22 April 2017.

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, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, 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: Avenue Marnix 17, B-1000 Brussels

European foreword

This document (EN ISO 12354-4:2017) has been prepared by Technical Committee ISO/TC 43 “Acoustics” in collaboration with Technical Committee CEN/TC 126 “Acoustic properties of building elements and of buildings” the secretariat of which is held by AFNOR.

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 February 2018, and conflicting national standards shall be withdrawn at the latest by February 2018.

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 12354-4:2000.

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, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Endorsement notice

The text of ISO 12354-4:2017 has been approved by CEN as EN ISO 12354-4:2017 without any modification.

Contents

Page

Foreword	iv
Introduction	v
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
3.1 Quantities to express building performance	2
3.2 Quantities to express element performance	2
3.3 Other terms and quantities	3
4 Calculation model	3
4.1 General principles	3
4.2 Determination of substitute point sound sources	4
4.3 Determination of the sound power level for a substitute point source	5
4.3.1 General	5
4.3.2 Segment of structural elements of the building envelope	5
4.3.3 Segment of openings	6
4.4 Determination of the directivity correction for a substitute point source	7
4.5 Limitations	7
5 Accuracy	7
Annex A (normative) List of symbols	8
Annex B (informative) Interior sound field	9
Annex C (informative) Sound reduction index	10
Annex D (informative) Directivity of sound radiation	11
Annex E (informative) Simplified model to predict exterior sound pressure levels	12
Annex F (informative) Application of the model to single number ratings	15
Annex G (informative) Calculation example	17
Bibliography	23

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 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 the European Committee for Standardization (CEN) Technical Committee CEN/TC 126, *Acoustic properties of building elements and of buildings*, in collaboration with ISO Technical Committee TC 43, *Acoustics*, SC 2, *Building acoustics*, in accordance with the agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This first edition cancels and replaces ISO 15712-4:2005, which has been technically revised.

A list of all the parts in the ISO 12354 series can be found on the ISO website.

Introduction

This document is part of a series specifying calculation models in building acoustics.

Although this document covers the main types of building construction it cannot as yet cover all variations in the construction of buildings. It sets out an approach for gaining experience for future improvements and developments.

The accuracy of this document alone is difficult to specify since it forms just one link in the chain of inside sound level, sound radiation and sound propagation outdoors; the first and last item are not covered by this document. The accuracy can only be specified after widespread comparisons with field data in combination with other prediction standards, i.e. those for outdoor sound propagation. It is the responsibility of the user (i.e. a person, an organization, the authorities) to address the consequences of the accuracy, inherent for all measurement and prediction methods, by specifying requirements for the input data and/or applying a safety margin to the results or applying some other correction.

It is intended for acoustical experts and provides the framework for the development of application documents and tools for other users in the field of building construction, taking into account local circumstances.

Building acoustics — Estimation of acoustic performance of buildings from the performance of elements —

Part 4: Transmission of indoor sound to the outside

1 Scope

This document specifies a calculation model to estimate the sound power level radiated by the envelope of a building due to airborne sound inside that building, primarily by means of measured sound pressure levels inside the building and measured data which characterize the sound transmission by the relevant elements and openings in the building envelope. These sound power levels, together with those of other sound sources in or in front of the building envelope, form the basis for the calculation of the sound pressure level at a chosen distance from a building as a measure for the acoustic performance of buildings.

The prediction of the inside sound pressure level from knowledge of the indoor sound sources is outside the scope of this document.

The prediction of the outdoor sound propagation is outside the scope of this document.

NOTE For simple propagation conditions an approach is given for the estimation of the sound pressure level in [Annex E](#).

This document describes the principles of the calculation model, lists the relevant quantities and defines its applications and restrictions.

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.

ISO 7235, *Acoustics — Laboratory measurement procedures for ducted silencers and air-terminal units — Insertion loss, flow noise and total pressure loss*

ISO 10140-1:2016, *Acoustics — Laboratory measurement of sound insulation of building elements — Part 1: Application rules for specific products*

ISO 16283-3, *Acoustics — Field measurement of sound insulation in buildings and of building elements — Part 3: Airborne sound insulation of façades*

3 Terms and definitions

For the purposes of this document, the following terms and definitions, and the symbols and units listed in [Annex A](#), apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>