

SLOVENSKI STANDARD

SIST EN ISO 3741:2001

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Acoustics - Determination of sound power levels of noise sources using sound pressure - Precision methods for reverberation rooms (ISO 3741:1999)

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Akustik - Ermittlung der Schalleistungspegel von Geräuschquellen durch Schalldruckmessungen - Hallraumverfahren der Genauigkeitsklasse 1 (ISO 3741:1999)

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Acoustique - Détermination des niveaux de puissance acoustique émis par les sources de bruit à partir de la pression acoustique - Méthodes de laboratoire en salles réverbérantes (ISO 3741:1999)

Ta slovenski standard je istoveten z: EN ISO 3741:1999

ICS:

17.140.01 Acoustic measurements and noise abatement in general

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English version

Acoustics - Determination of sound power levels of noise
sources using sound pressure - Precision methods for
reverberation rooms (ISO 3741:1999)

Acoustique - Détermination des niveaux de puissance
acoustique émis par les sources de bruit à partir de la
pression acoustique - Méthodes de laboratoire en salles
réverbérantes (ISO 3741:1999)

Akustik - Ermittlung der Schalleistungspegel von
Geräuschquellen durch Schalldruckmessungen -
Hallraumverfahren der Genauigkeitsklasse 1 (ISO
3741:1999)

This European Standard was approved by CEN on 1 July 1999.

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

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

Foreword

The text of the International Standard ISO 3741:1999 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 DS.

This European Standard supersedes EN 23741:1991 and EN 23742:1991.

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 2000, and conflicting national standards shall be withdrawn at the latest by February 2000.

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).

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.

Endorsement notice

The text of the International Standard ISO 3741:1999 was approved by CEN as a European Standard without any modification.

NOTE: Normative references to International Standards are listed in annex ZA (normative).

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Annex ZA (normative)

Normative references to international publications with their relevant European publications

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 applies.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN</u>	<u>Year</u>
ISO 354	1985	Acoustics - Measurement of sound absorption in a reverberation room	EN ISO 354	1993
ISO 4871	1996	Acoustics - Declaration and verification of noise emission values of machinery and equipment	EN ISO 4871	1996
ISO 7574-1	1985	Acoustics - Statistical methods for determining and verifying stated noise emission values of machinery and equipment - Part 1: General considerations and definitions	EN 27574-1	1988
ISO 7574-4	1985	Acoustics - Statistical methods for determining and verifying stated noise emission values of machinery and equipment - Part 4: Methods for stated values for batches of machines	EN 27574-4	1988
ISO 12001	1996	Acoustics - Noise emitted by machinery and equipment - Rules for the drafting and presentation of a noise test code	EN ISO 12001	1996

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INTERNATIONAL STANDARD

**ISO
3741**

Third edition
1999-08-01

Acoustics — Determination of sound power levels of noise sources using sound pressure — Precision methods for reverberation rooms

*Acoustique — Détermination des niveaux de puissance acoustique émis
par les sources de bruit à partir de la pression acoustique — Méthodes de
laboratoire en salles réverbérantes*

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Reference number
ISO 3741:1999(E)

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 3741 was prepared by Technical Committee ISO/TC 43, *Acoustics*, Subcommittee SC 1, *Noise*.

This third edition of ISO 3741 cancels and replaces ISO 3741:1988 and ISO 3742:1988, which have been technically revised and amalgamated.

Annexes A, E and F form a normative part of this International Standard. Annexes B, C and D are for information only.

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0 Introduction

0.1 This International Standard is one of the ISO 3740 series, which specifies various methods for determining the sound power levels of machines, equipment, and their sub-assemblies. When selecting one of the methods of the ISO 3740 series, it is necessary to select the most appropriate for the conditions and purpose of the test. General guidelines to assist in the selection are provided in ISO 12001 and ISO 3740. The ISO 3740 series 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.

0.2 This International Standard specifies laboratory methods for determining the sound power radiated by sources as a function of frequency, using a reverberation test room having specified acoustical characteristics. If a room having these characteristics is not available, other documents of the series of basic standards with different environmental requirements are offered (see Table 1 and ISO 3744 or ISO 9614).

In this International Standard, the computation of sound power from sound pressure measurements is based on the premise that, for a source emitting a given sound power in the reverberation test room, the mean-square sound pressure averaged in space and time, $\overline{p^2}$, is directly proportional to the sound power and otherwise depends only on the acoustical and geometric properties of the room and on the physical constants of air.

If a source emits narrow-band or discrete-frequency sound, a precise determination of the radiated sound power level requires greater effort. The reasons are as follows:

- a) the space/time-averaged sound pressure along a short microphone path, or as determined with an array of a small number of microphones, is not always a good estimate of the space/time averaged mean-square pressure throughout the room;
- b) the sound power radiated by the sources is more strongly influenced by the normal modes of the room and by the position of the source within the room.

If narrow bands of noise or discrete tones are emitted by a source, a determination of its sound power level in a reverberation room requires either the optimization and qualification of the room and test set-up (see annex A) or the use of a greater number of source locations and microphone positions (or greater path length for a moving microphone). These numbers can be reduced by adding low frequency absorbers to decrease the reverberation time. It is also helpful if one or more diffusers are rotating in the test room during the measurements. Guidelines for the design of suitable rotating diffusers are given in annex B.

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Table 1 — Overview of International Standards for determination of sound power levels of noise sources under reverberation conditions giving different grades of accuracy

Parameter	ISO 3741 Precision method Grade 1	ISO 3743-1 Engineering method Grade 2	ISO 3743-2 Engineering method Grade 2
Test environment	Reverberation room	Hard-walled room	Special reverberation test room
Criteria for suitability of test environment	Room volume, V , and reverberation time, T_{rev} , to be qualified	$V \geq 40 \text{ m}^3$ and $V > 40 V_Q$ Sound absorption coefficient $\bar{\alpha} < 0,20$ Special qualification	Specified requirements
Volume of sound source V_Q	Preferably less than 2 % of test room volume	Preferably less than 2,5 % of test room volume	
Character of noise	Steady, broad-band, narrow-band, discrete frequencies	Any, but no isolated bursts	
Limitation for background noise	$\Delta L \geq 10 \text{ dB}$	$\Delta L \geq 6 \text{ dB}$	$\Delta L \geq 4 \text{ dB}$
Number N_M of measuring positions	$N_M \geq 6$ or a continuous microphone traverse, if appropriate	$N_M \geq 3$ or a continuous microphone traverse, if appropriate	$N_M \geq 3$ or a continuous microphone traverse, if appropriate
Instrumentation: a) Sound level meter at least complying with b) Integrating sound level meter at least complying with c) Frequency band filter set at least complying with d) calibrator at least complying with	a) type 1 according to IEC 61672 b) type 1 according to IEC 61672 c) class 1 according to IEC 61260 d) class 1 according to IEC 60942		
Sound power levels to be obtained	In one-third-octave or octave bands	In octave bands	A-weighted and in octave bands
Precision of method for determining L_{WA} expressed as standard deviation of reproducibility σ_R	$\sigma_R \leq 0,5 \text{ dB}$	$\sigma_R \leq 1,5 \text{ dB}$	$\sigma_R \leq 2,0 \text{ dB}$
<p>STANDARD PREVIEW <i>(standards.iteh.ai)</i> SIST EN ISO 3741:2001 (for sources which emit noise with a relatively "flat" spectrum) https://standards.iteh.ai/catalog/standards/sist/b691bf31-78c9-4034-8b2d-cad3fc349620/sist-en-iso-3741-2001</p>			

Acoustics — Determination of sound power levels of noise sources using sound pressure — Precision methods for reverberation rooms

1 Scope

1.1 This International Standard specifies a direct method and a comparison method for determining the sound power level that would be produced by a source operating in an environment at standard meteorological conditions corresponding to a characteristic impedance of $\rho c = 400 \text{ N}\cdot\text{s}/\text{m}^3$ (where ρ is the density of air and c is the speed of sound). It specifies test room requirements, source location and general rules for operating conditions, instrumentation and techniques for obtaining an estimate of mean-square sound pressure levels from which the sound power levels of the source in octave or one-third-octave bands are calculated with a grade 1 accuracy. The quantities to be measured are time-averaged sound pressure levels in frequency bands. The quantities to be determined are sound power levels, A-weighted and in frequency bands. Other quantities, which are optional, are sound power levels with other frequency weightings calculated from the measurements in frequency bands. This standard does not provide the means to determine directivity and temporal variation of sound from a source.

In general, the frequency range of interest includes the one-third-octave bands with midband frequencies from 100 Hz to 10 000 Hz. Guidelines for the application of the specified methods in an extended frequency range in respect to lower frequencies are given in annex C. This International Standard is not applicable to frequency ranges above the 10 000 Hz one-third-octave band. For higher frequencies the use of methods given in ISO 9295 is recommended.

1.2 The method specified in this International Standard is suitable for steady noise with broad-band, narrow-band and discrete-frequency components as described in ISO 12001. The noise may be emitted from a device, machine, component or sub-assembly.

This International Standard is applicable to noise sources with volumes which are preferably not greater than 2 % of the volume of the reverberation room used for the test. For sources with volumes greater than 2 % of the room volume, the standard deviations given by Table 2 could be exceeded.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 354, *Acoustics — Measurement of sound absorption in a reverberation room.*

ISO 4871, *Acoustics — Declaration and verification of noise emission values of machinery and equipment.*

ISO 6926, *Acoustics — Determination of sound power levels of noise sources — Requirements for the performance and calibration of reference sound sources.*

ISO 7574-1:1985, *Acoustics — Statistical methods for determining and verifying stated noise emission values of machinery and equipment — Part 1: General considerations and definitions.*