

**SLOVENSKI STANDARD
SIST EN ISO 3743-2:2019****01-december-2019****Nadomešča:****SIST EN ISO 3743-2:2009**

Akustika - Ugotavljanje ravni zvočnih moči virov hrupa z merjenjem zvočnega tlaka - Inženirske metode za majhne premične vire v odmevnih poljih - 2. del: Metode za posebne odmevnice (ISO 3743-2:2018)

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)

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

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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)

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17.140.01	Akustična merjenja in blaženje hrupa na splošno	Acoustic measurements and noise abatement in general
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EUROPEAN STANDARD

EN ISO 3743-2

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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)

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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of an identical text or by endorsement, at the latest by March 2020, and conflicting national standards shall be withdrawn at the latest by March 2020.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.

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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.

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

INTERNATIONAL
STANDARDISO
3743-2Second edition
2018-02

**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**

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*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

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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.

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.

ISO 3743-2:2018(E)**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.

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

1 Scope

This document specifies a relatively simple engineering method for determining the sound power levels of small, movable noise sources. The methods specified in this document are suitable for measurements of all types of noise within a specified frequency range, except impulsive noise consisting of isolated bursts of sound energy which are covered by ISO 3744 and ISO 3745.

NOTE A classification of different types of noise is given in ISO 12001.

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 3741, *Acoustics — Determination of sound power levels and sound energy levels of noise sources using sound pressure — Precision methods for reverberation test rooms*

ISO 3743-1, *Acoustics — Determination of sound power levels and sound energy levels of noise sources using sound pressure — Engineering methods for small movable sources in reverberant fields — Part 1: Comparison method for a hard-walled test room*

ISO 3745, *Acoustics — Determination of sound power levels and sound energy levels of noise sources using sound pressure — Precision methods for anechoic rooms and hemi-anechoic rooms*

ISO 5725 (all parts), *Accuracy (trueness and precision) of measurement methods and results*

ISO 6926, *Acoustics — Requirements for the performance and calibration of reference sound sources used for the determination of sound power levels*

ISO/IEC Guide 98-3, *Uncertainty of measurement — Part 3: Guide to the expression of uncertainty in measurement (GUM:1995)*

IEC 60942, *Electroacoustics — Sound calibrators*

IEC 61260 (all parts), *Electroacoustics — Octave-band and fractional-octave-band filters*

IEC 61672-1, *Electroacoustics — Sound level meters — Part 1: Specifications*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 3743-1 and the following apply.

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

— ISO Online browsing platform: available at <https://www.iso.org/obp>

ISO 3743-2:2018(E)

— IEC Electropedia: available at <http://www.electropedia.org/>

3.1

special reverberation test room

room which meets the requirements of [Clause 6](#) of ISO ISO 3743-2

Note 1 to entry: The requirements for a test room according to this document are significantly more restrictive than those placed on the hard-walled test room by the comparison method of ISO 3743-1.

4 Principle

The measurements are carried out when the source is installed in a specially designed room having a specified reverberation time over the frequency range of interest. The A-weighted sound power level of the source under test is determined from a single A-weighted sound pressure level measurement at each microphone position, rather than from a summation of octave-band levels. This direct method eliminates the need for a reference sound source, but requires the use of a special reverberation test room. The direct method is based on the premise that the sound pressure level, averaged in space and time in the test room, can be used to determine the sound power level emitted by the source. The properties of the special reverberation test room are chosen so that the room's influence on the sound power output of the equipment under test is small. The number of microphone positions and source locations required in the test room are specified. Guidelines for the design of special reverberation rooms are given in [Annex B](#).

In addition to the direct method, a comparison method is also described (see [10.3](#)). However, since the requirements on the test room for the comparison method of ISO 3743-1 are considerably less restrictive, it is recommended that the comparison method of ISO 3743-1 be used if a special reverberation test room is not available.

NOTE Precision methods for the determination of the sound power levels of small noise sources are specified in ISO 3741 and ISO 3745.

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5 Noise source

The noise source may be a device, machine, component or sub-assembly.

The maximum size of the source under test and the lower limit of the frequency range for which the methods are applicable depend upon the size of the room used for the acoustical measurements. The volume of the noise sources should not exceed 1 % of the volume of the special reverberation test room. For the minimum test room volume of 70 m³, the recommended maximum size of the source is 0,7 m³. Measurements on sources emitting discrete-frequency components below 200 Hz are frequently difficult to make in such small rooms.

6 Requirements for special reverberation test room

6.1 General

Guidelines for the design of a suitable test room and an example of the determination of the nominal reverberation time of the room are given in [Annex B](#). Methods of measurement of reverberation time are given in ISO 354.

6.2 Volume of test room

The volume of the test room shall be at least 70 m³ and preferably greater if the 125 Hz octave band is within the frequency range of interest. If the 4 kHz and 8 kHz octave bands are within the frequency range of interest, the volume shall not exceed 300 m³.

NOTE When using the comparison method, the use of larger room volumes is acceptable.

6.3 Reverberation time of test room

The calculation of sound power levels from measured values of the sound pressure levels requires a compensation for the frequency-dependent concentration of sound energy near the walls of the test room. To facilitate this compensation, the reverberation time should be slightly higher at low frequencies. The reverberation time of the test room shall fall within the limiting curves defined by $T = 0,9 RT_{\text{nom}}$ and $1,1 RT_{\text{nom}}$ where the reverberation parameter, R , is given by

$$R = 1 + \frac{257}{fV^{1/3}} \quad (1)$$

where

f is the frequency, in hertz;

V is the volume, in cubic metres.

NOTE The following is a more robust formula for R and is not limited to rooms that are nearly cubical:

$$R = 1 + \frac{c \cdot S}{f \cdot 8V}$$

where

c is the sound velocity, in metres per second;

S is the surface area of the test room, in square metres.

For frequencies above 6,3 kHz, constants 0,9 and 1,1 shall be replaced by 0,8 and 1,2 respectively. The nominal reverberation time of the room, T_{nom} is determined by centring the measured values of T (normalized to the reverberation time at 1 000 Hz) within the limiting curves specified above, and shall be between 0,5 s and 1,0 s (see [Annex B](#) for an example). For a room volume V of 70 m³, the value of R is determined from [Figure 1](#).

If, during the acoustical measurements, sound-absorptive structures support the source or if the source has absorptive surfaces, the reverberation time T shall be measured with these items present.

6.4 Surface treatment

The floor of the test room shall be reflective with an absorption coefficient less than 0,06. Except for the floor, none of the surfaces shall have absorptive properties significantly deviating from each other. For each octave band within the frequency range of interest, the mean value of the absorption coefficient of each wall and of the ceiling shall be within 0,5 and 1,5 times the mean value of the absorption coefficient of the walls and ceiling.

6.5 Criterion for background noise

At each microphone position, the sound pressure levels due to background noise shall be at least 4 dB and preferably more than 10 dB below the A-weighted sound pressure level or the band pressure levels produced by the source.