
Akustika - Ugotavljanje ravni zvočnih moči virov hrupa - Precizijska metoda za gluhe in polgluhe prostore (ISO 3745:2003)

Acoustics - Determination of sound power levels of noise sources using sound pressure - Precision methods for anechoic and semi-anechoic rooms (ISO 3745:2003)

Akustik - Bestimmung der Schalleistungspegel von Geräuschquellen aus Schalldruckmessungen - Verfahren der Genauigkeitsklasse 1 für reflexionsarme Räume und Halbräume (ISO 3745:2003)

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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 pour les salles anéchoïques et semi-anéchoïques (ISO 3745:2003)

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Acoustics - Determination of sound power levels of noise sources using sound pressure - Precision methods for anechoic and hemi-anechoic rooms (ISO 3745:2003)

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This European Standard was approved by CEN on 3 November 2003.

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EN ISO 3745:2003 (E)

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Foreword

This document (EN ISO 3745:2003) 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 shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by June 2004, and conflicting national standards shall be withdrawn at the latest by June 2004.

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 relationship with EU Directive(s), see informative Annex ZB, 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, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and the United Kingdom.

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Endorsement notice

The text of ISO 3745:2003 has been approved by CEN as EN ISO 3745:2003 without any modifications.

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

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 (including amendments).

NOTE Where an International Publication has been modified by common modifications, indicated by (mod.), the relevant EN/HD applies.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN</u>	<u>Year</u>
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

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ANNEX ZB (informative)

Relationship between this European Standard and the Essential Requirements of EU Directive 98/37 EEC

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association to provide a means of conforming to Essential Requirements of the New Approach Directive 98/37 EEC.

Once this standard is cited in the Official Journal of the European Communities under that Directive and has been implemented as a national standard in at least one Member State, 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.

WARNING: Other requirements and other EU Directives may be applicable to the product(s) falling within the scope of this standard.

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INTERNATIONAL STANDARD

**ISO
3745**

Second edition
2003-12-01

Acoustics — Determination of sound power levels of noise sources using sound pressure — Precision methods for anechoic and hemi-anechoic rooms

*Acoustique — Détermination des niveaux de puissance acoustique
émis par les sources de bruit à partir de la pression acoustique —
Méthodes de laboratoire pour les salles anéchoïques et semi-
anéchoïques*

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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 2.

The main task of technical committees is to prepare International Standards. 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.

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.

ISO 3745 was prepared by Technical Committee ISO/TC 43, *Acoustics*, Subcommittee SC 1, *Noise*.

This second edition cancels and replaces the first edition (ISO 3745:1977), which has been technically revised.

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ISO 3745:2003(E)**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 other 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 source 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 a laboratory method for determining the sound power radiated by sources using an anechoic test room or a hemi-anechoic test room having specified acoustical characteristics. The method specified in this International Standard is only applicable to indoor measurements in specialized test rooms.

0.3 This International Standard specifies a laboratory method for the determination of not only sound power levels but also sound energy levels of sound sources. For a single burst of sound energy or transient sound, the sound power level cannot be defined and so it is necessary to adopt the sound energy level in order to specify the emitted sound with such a time history. The application of sound energy levels will be considered in the future revision of other standards of the ISO 3740 series.

0.4 In this International Standard, the sound power level or sound energy level for reference meteorological conditions is determined. This is required especially for grade 1 measurements.

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3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

**3.1
instantaneous sound pressure**
 $p(t)$
value at a particular instant in time of the fluctuating pressure that is superimposed on the atmospheric static pressure due to the presence of a sound wave, and existing at a given point in space, in a stated frequency band

NOTE It is expressed in pascals.

**3.2
sound pressure**
 p
in space, the root mean square pressure determined over a specified time interval of the instantaneous sound pressure

NOTE It is expressed in pascals.

**3.3
sound pressure level**
 L_p
ten times the logarithm to the base 10 of the ratio of the time-mean-square of the instantaneous sound pressure to the square of the reference sound pressure p_0 [$p_0 = 20 \mu\text{Pa}$ ($2 \times 10^{-5} \text{ Pa}$)]

$$L_p = 10 \lg \frac{p^2}{p_0^2} \text{ dB} \quad (1)$$

NOTE 1 Sound pressure levels are expressed in decibels.

NOTE 2 The frequency weighting or the width of the frequency band used and the time weighting should be indicated.

EXAMPLE The A-weighted sound pressure level with time weighting S is L_{pAS} .

**3.3.1
time-averaged sound pressure level**
 $L_{peq,T}$
sound pressure level of a steady or fluctuating sound over the measurement time interval T: ten times the logarithm to the base 10 of the ratio of the time-mean-square of the instantaneous sound pressure, during a stated time interval, to the square of the reference sound pressure

$$L_{peq,T} = 10 \lg \left[\frac{1}{T} \int_0^T \frac{p^2(t)}{p_0^2} dt \right] \text{ dB} \quad (2)$$

NOTE In general, the subscripts "eq" and "T" are omitted since time-averaged sound pressure levels are necessarily determined over a certain measurement time interval.

**3.3.2
measurement time interval**
time interval for which the time-averaged sound pressure level is determined

3.4 measurement surface

hypothetical surface of area S , enveloping the source, on which the measurement positions are located

NOTE In the case of a hemi-anechoic room, the measurement surface terminates on the reflecting plane.

3.5 surface sound pressure level

$\overline{L_{pf}}$

energy-average of the time-averaged sound pressure levels at all the microphone positions on the measurement surface, with the background noise correction K_1 (3.18) applied

$$\overline{L_{pf}} = 10 \lg \left[\frac{1}{N} \sum_{i=1}^N 10^{0,1 L_{pi}} \right] \text{ dB} \quad (3)$$

where

$\overline{L_{pf}}$ is the surface sound pressure level, in decibels;

L_{pi} is the sound pressure level corrected for background noise resulting from the i th microphone position, in decibels;

N is the number of microphone positions.

NOTE It is expressed in decibels.

3.6 sound power

W rate at which airborne sound energy is radiated by a source

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NOTE It is expressed in watts.

3.7 sound power level

L_W

ten times the logarithm to the base 10 of the ratio of the sound power radiated by the sound source under test to the reference sound power W_0 [$W_0 = 1 \text{ pW}$ (10^{-12} W)]

$$L_W = 10 \lg \frac{W}{W_0} \text{ dB} \quad (4)$$

NOTE 1 It is expressed in decibels.

NOTE 2 The frequency weighting or the width of the frequency band used should be indicated.

3.8 single-event sound pressure level

L_{pE}

sound pressure level of a single burst of sound or transient sound, given by the formula

$$L_{pE} = 10 \lg \left[\int_{t_1}^{t_2} \frac{p^2(t)}{p_0^2 T_0} dt \right] \text{ dB} \quad (5)$$