
Akustika - Ugotavljanje ravni zvočnih moči virov hrupa z merjenjem zvočnega tlaka - Inženirska metoda v pretežno prostem polju nad odbojno ravnino (ISO 3744:1994)

Acoustics - Determination of sound power levels of noise sources using sound pressure - Engineering method in an essentially free field over a reflecting plane (ISO 3744:1994)

Akustik - Bestimmung der Schalleistungspegel von Geräuschquellen aus Schalldruckmessungen - Hüllflächenverfahren der Genauigkeitsklasse 2 für ein im wesentlichen freies Schallfeld über einer reflektierenden Ebene (ISO 3744:1994)

Acoustique - Détermination des niveaux de puissance acoustique émis par les sources de bruit à partir de la pression acoustique - Méthode d'expertise dans des conditions approchant celles du champ libre sur plan réfléchissant (ISO 3744:1994)

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ICS:

17.140.01	Akustična merjenja in blaženje hrupa na splošno	Acoustic measurements and noise abatement in general
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EN ISO 3744

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Descriptors: acoustics, sound sources, noise(sound), tests, acoustic tests, determination, sound power, sound pressure, acoustic measurements, testing conditions, rules of calculation

English version

**Acoustics - Determination of sound power levels
of noise sources using sound pressure -
Engineering method in an essentially free field
over a reflecting plane (ISO 3744:1994)**

Acoustique - Détermination des niveaux de puissance acoustique émis par les sources de bruit à partir de la pression acoustique - Méthode d'expertise dans des conditions approchant celles du champ libre sur plan réfléchissant (ISO 3744:1994)

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CEN

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 from ISO/TC 43 "Acoustics" of the International Organization for Standardization (ISO) has been taken over as a European Standard by the Technical Committee CEN/TC 211 "Acoustics".

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of an identical text or by endorsement, at the latest by March 1996, and conflicting national standards shall be withdrawn at the latest by March 1996.

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 EC Directive(s).

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The text of the International Standard ISO 3744:1994 has been approved by CEN as a European Standard without any modification.

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).

<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 20354	1993
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 https://standards.iteh.ai/catalog/standards/sist/a7398157-5710-4d2d-b547-42913bb3b4c3/sist-en-iso-3744-1997	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 batchess of machines	EN 27574-4	1988

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INTERNATIONAL
STANDARD**ISO**
3744Second edition
1994-05-01

**Acoustics — Determination of sound
power levels of noise sources using sound
pressure — Engineering method in an
essentially free field over a reflecting plane**

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*Acoustique — Détermination des niveaux de puissance acoustique émis
par les sources de bruit à partir de la pression acoustique — Méthode
d'expertise dans des conditions approchant celles du champ libre sur plan
réfléchissant*

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International Organization for Standardization

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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.

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 3744 was prepared by Technical Committee ISO/TC 43, Acoustics, Sub-Committee SC 1, *Noise*.

This second edition cancels and replaces the first edition (ISO 3744:1981), which has been technically revised.

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

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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 purposes of the noise test. General guidelines to assist in the selection are provided in 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 a method for measuring the sound pressure levels on a measurement surface enveloping the source, and for calculating the sound power level produced by the source. The enveloping surface method can be used for any of three grades of accuracy (see table 0.1), and is used in this International Standard for grade 2 accuracy.

The use of this International Standard requires certain qualification criteria to be fulfilled, as described in table 0.1. If the relevant qualification criteria cannot be met, other basic standards with different environmental requirements are suggested (table 0.1; see also ISO 3740 and ISO 9614).

Noise test codes for specific families of machines or equipment should be based without any contradiction on the requirements of one or more of the ISO 3740 series or ISO 9614.

Free-field conditions are usually not encountered in typical machine rooms where sources are normally installed. If measurements are made in such installations, corrections may be required to account for background noise or undesired reflections.

The methods specified in this International Standard permit the determination of sound power level both as an A-weighted value and in frequency bands.

The A-weighted value calculated from frequency band data may differ from that determined from measured A-weighted sound pressure levels.

0.3 In this International Standard, the computation of sound power level from sound pressure level measurements is based on the premise that the sound power output of the source is directly proportional to the mean-square sound pressure averaged over time and space.

Table 0.1 — Overview of International Standards for determination of sound power levels of noise sources using enveloping surface methods over a reflecting plane and giving different grades of accuracy

Parameter	ISO 3745 Precision method Grade 1	ISO 3744 Engineering method Grade 2	ISO 3746 Survey method Grade 3
Test environment	Hemi-anechoic room	Outdoors or indoors	Outdoors or indoors
Criterion for suitability of test environment ¹⁾	$K_2 \leq 0,5$ dB	$K_2 \leq 2$ dB	$K_2 \leq 7$ dB
Volume of sound source	Preferably less than 0,5 % of test room volume	No restriction; limited only by available test environment	No restriction; limited only by available test environment
Character of noise	Any (broad-band, narrow-band, discrete-frequency, steady, non-steady, impulsive)		
Limitation for background noise ¹⁾	$\Delta L \geq 10$ dB (if possible, exceeding 15 dB) $K_1 \leq 0,4$ dB	$\Delta L \geq 6$ dB (if possible, exceeding 15 dB) $K_1 \leq 1,3$ dB	$\Delta L \geq 3$ dB $K_1 \leq 3$ dB
Number of measurement points	≥ 10	≥ 9 ²⁾	≥ 4 ²⁾
Instrumentation: — Sound level meter at least complying with — Integrating sound level meter at least complying with — Frequency band filter set at least complying with	a) type 1 as specified in IEC 651 b) type 1 as specified in IEC 804 c) class 1 as specified in IEC 225	a) type 1 as specified in IEC 651 b) type 1 as specified in IEC 804 c) class 1 as specified in IEC 225	a) type 2 as specified in IEC 651 b) type 2 as specified in IEC 804 —
Precision of method for determining L_{WA} expressed as standard deviation of reproducibility	$\sigma_R \leq 1$ dB	$\sigma_R \leq 1,5$ dB	$\sigma_R \leq 3$ dB (if $K_2 < 5$ dB) $\sigma_R \leq 4$ dB (if $5 \text{ dB} \leq K_2 \leq 7$ dB) If discrete tones are predominant, the value of σ_R is 1 dB greater.
<p>1) The values of K_1 and K_2 given shall be met in each frequency band within the frequency range of interest for determining the sound power spectrum. For determining A-weighted sound power levels, the same criteria apply to K_{1A} and K_{2A}.</p> <p>2) Under given circumstances (see 7.2 to 7.4), it is permissible to use a reduced number of microphone positions.</p>			

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Acoustics — Determination of sound power levels of noise sources using sound pressure — Engineering method in an essentially free field over a reflecting plane

1 Scope

This International Standard is applicable to noise sources of any type and size (e.g. device, machine, component, sub-assembly).

1.1 General

This International Standard specifies a method for measuring the sound pressure levels on a measurement surface enveloping a noise source, under essentially free-field conditions near one or more reflecting planes, in order to calculate the sound power level produced by the noise source. It gives requirements for the test environment and instrumentation, as well as techniques for obtaining the surface sound pressure level from which the sound power level of the source is calculated, leading to results which have a grade 2 accuracy.

It is important that specific noise test codes for various types of equipment be established and used in accordance with this International Standard. For each type of equipment, such noise test codes will give detailed requirements on mounting, loading and operating conditions for the equipment under test as well as a selection of the measurement surface and the microphone array as specified in this International Standard.

NOTE 1 The noise test code for a particular type of equipment should give detailed information on the particular surface that is selected, as the use of differently shaped measurement surfaces may yield differing estimates of the sound power level of a source.

1.2 Types of noise and noise sources

The method specified in this International Standard is suitable for measurements of all types of noise.

NOTE 2 A classification of different types of noise (steady, non-steady, quasi-steady, impulsive, etc.) is given in ISO 2204.

NOTE 3 Measurements according to this International Standard may be impracticable for very tall or very long sources such as chimneys, ducts, conveyors and multi-source industrial plants.

1.3 Test environment

The test environment that is applicable for measurements made in accordance with this International Standard is an essentially free field near one or more reflecting planes (indoors or outdoors).

1.4 Measurement uncertainty

Determinations made in accordance with this International Standard result, with few exceptions, in standard deviations of reproducibility of the A-weighted sound power level equal to or less than 1,5 dB (see table 1).

A single value of the sound power level of a noise source determined according to the procedures given in this International Standard is likely to differ from the true value by an amount within the range of the measurement uncertainty. The uncertainty in determinations of the sound power level arises from several factors which affect the results, some associated with environmental conditions in the measurement laboratory and others with experimental techniques.

If a particular noise source were to be transported to each of a number of different laboratories, and if, at each laboratory, the sound power level of that source were to be determined in accordance with this International Standard, the results would show a scatter. The standard deviation of the measured levels could be calculated (see examples in ISO 7574-4:1985, an-