

**SLOVENSKI STANDARD**  
**SIST EN ISO 3744:2009**

**01-november-2009**

**BUXca Yý U**  
**SIST EN ISO 3744:1997**

5\_i gh\_U! 'I [ cHj `Ub^fUj b]nj c b] `a c ]j ]fcj ` fi dUn'a Yf^b^Ya `nj c bY[ U  
 hU\_U! :byYb]fg\_Ua YrcXUj `dfYH^ybc`dfcghYa `dc`f `bUX`cXVc`bc`fUj b]bc`fIGC  
 ' +(.%-(Ł

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)

**iTeh STANDARD PREVIEW**

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)

<https://standards.iteh.ai/catalog/standards/sist/80288a0f-95c1-4d41-964a-8a0f-7198/sist-en-iso-3744-2009>

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)

**Ta slovenski standard je istoveten z: EN ISO 3744:2009**

**ICS:**

17.140.01 Acoustic measurements and noise abatement in general

**SIST EN ISO 3744:2009 en**

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

SIST EN ISO 3744:2009

<https://standards.iteh.ai/catalog/standards/sist/80288a0f-95c1-4d41-964a-9e0fce71981a/sist-en-iso-3744-2009>

EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**EN ISO 3744**

July 2009

ICS 17.140.01

Supersedes EN ISO 3744:1995

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)

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)

This European Standard was approved by CEN on 13 July 2009.

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 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 Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.



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

**Management Centre: Avenue Marnix 17, B-1000 Brussels**

<b>Contents</b>	<b>Page</b>
<b>Foreword</b> .....	<b>3</b>
<b>Annex ZA (informative) Relationship between this European Standard and the Essential Requirements of EU Directive 98/37/EC</b> .....	<b>4</b>
<b>Annex ZB (informative) Relationship between this European Standard and the Essential Requirements of EU Directive 2006/42/EC</b> .....	<b>5</b>

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

[SIST EN ISO 3744:2009](https://standards.iteh.ai/catalog/standards/sist/80288a0f-95c1-4d41-964a-9e0fce71981a/sist-en-iso-3744-2009)  
<https://standards.iteh.ai/catalog/standards/sist/80288a0f-95c1-4d41-964a-9e0fce71981a/sist-en-iso-3744-2009>

## Foreword

The text of ISO 3744:1994 has been prepared by Technical Committee ISO/TC 43 "Acoustics" of the International Organization for Standardization (ISO) and has been taken over as EN ISO 3744:2009 by 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 January 2010, and conflicting national standards shall be withdrawn at the latest by January 2010.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN ISO 3744:1995.

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 EC Directives.

For relationship with EC Directives, see informative Annexes ZA and ZB, which are integral parts 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, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

<https://standards.iteh.ai/catalog/standards/sist/80288a0f-95c1-4d41-964a-9e0fce71981a/sist-en-iso-3744-2009>

### Endorsement notice

The text of ISO 3744:1994 has been approved by CEN as a EN ISO 3744:2009 without any modification.

## Annex ZA (informative)

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

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/EC, amended by 98/79/EC on machinery.

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 confers, within the limits of the scope of this standard, a presumption of conformity with the relevant 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.

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

[SIST EN ISO 3744:2009](https://standards.iteh.ai/catalog/standards/sist/80288a0f-95c1-4d41-964a-9e0fce71981a/sist-en-iso-3744-2009)

<https://standards.iteh.ai/catalog/standards/sist/80288a0f-95c1-4d41-964a-9e0fce71981a/sist-en-iso-3744-2009>

## Annex ZB (informative)

### Relationship between this European Standard and the Essential Requirements of EU Directive 2006/42/EC

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 2006/42/EC on machinery.

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 confers, within the limits of the scope of this standard, a presumption of conformity with the relevant 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.

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

[SIST EN ISO 3744:2009](https://standards.iteh.ai/catalog/standards/sist/80288a0f-95c1-4d41-964a-9e0fce71981a/sist-en-iso-3744-2009)

<https://standards.iteh.ai/catalog/standards/sist/80288a0f-95c1-4d41-964a-9e0fce71981a/sist-en-iso-3744-2009>

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

SIST EN ISO 3744:2009

<https://standards.iteh.ai/catalog/standards/sist/80288a0f-95c1-4d41-964a-9e0fce71981a/sist-en-iso-3744-2009>



INTERNATIONAL  
STANDARD

**ISO**  
**3744**

Second 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**

iTeh STANDARD PREVIEW

(standards.iteh.ai)

*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*

<https://standards.iteh.ai/catalog/standards/sist/80288a0f-95e1-4d41-964a-9e0fce71981a/sist-en-iso-3744-2009>



Reference number  
ISO 3744:1994(E)

## Contents

	Page
<b>1</b> Scope .....	<b>1</b>
<b>2</b> Normative references .....	<b>2</b>
<b>3</b> Definitions .....	<b>3</b>
<b>4</b> Acoustic environment .....	<b>4</b>
<b>5</b> Instrumentation .....	<b>5</b>
<b>6</b> Installation and operation of source under test .....	<b>5</b>
<b>7</b> Measurement of sound pressure levels .....	<b>7</b>
<b>8</b> Calculation of surface sound pressure level and sound power level .....	<b>10</b>
<b>9</b> Information to be recorded .....	<b>12</b>
<b>10</b> Information to be reported .....	<b>13</b>

## Annexes

<b>A</b> Qualification procedures for the acoustic environments .....	<b>14</b>
<b>B</b> Microphone array on the hemispherical measurement surface .....	<b>18</b>
<b>C</b> Microphone array on the parallelepiped measurement surface .....	<b>23</b>
<b>D</b> Guidelines for the detection of impulsive noise .....	<b>29</b>
<b>E</b> Guidelines for the determination of the directivity index .....	<b>30</b>
<b>F</b> Bibliography .....	<b>31</b>

iTeh STANDARD PREVIEW

(standards.iteh.ai)

SIST EN ISO 3744:2009

<https://standards.iteh.ai/catalog/standards/sist/80288a005c1-4d41-964a-9e0fce71981a/sist-en-iso-3744-2009>

© ISO 1994

All rights reserved. No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from the publisher.

International Organization for Standardization  
Case Postale 56 • CH-1211 Genève 20 • Switzerland

Printed in Switzerland

## 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.

iTeh STANDARD PREVIEW  
SIST EN ISO 3744:2009  
(standards.iteh.ai)  
https://standards.iteh.ai/catalog/standards/sist/80288a0f-95c1-4d41-964a-067297a3e11c/iso-3744-2009

## 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 <sup>1)</sup>	$K_2 \leq 0,5$ 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 <sup>1)</sup>	$\Delta L \geq 10$ 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	$\geq 10$	$\geq 9$ <sup>2)</sup>	$\geq 4$ <sup>2)</sup>
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 $\sigma_R$ is 1 dB greater.
<p>1) The values of <math>K_1</math> and <math>K_2</math> 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 <math>K_{1A}</math> and <math>K_{2A}</math>.</p> <p>2) Under given circumstances (see 7.2 to 7.4), it is permissible to use a reduced number of microphone positions.</p>			