



SLOVENSKI STANDARD SIST EN ISO 9614-3:2003

01-december-2003

5_i gh_U! 'I [cHj `Ub^fUj b]nj c b\ 'a c]j]fcj \ fi dUn'a Yf^b^Ya `U_cgh]nj c_U!
' "XY. 'DfYW]n]g_Ua YfcXU]nj YnbY[Ua Yf^b^Udc'd`cg_j]fGC' - *%!' .&\$\$&L

Acoustics - Determination of sound power levels of noise sources using sound intensity - Part 3: Precision method for measurement by scanning (ISO 9614-3:2002)

Akustik - Bestimmung der Schalleistungspegel von Geräuschquellen aus Schallintensitätsmessungen - Teil 3: Scanning-Verfahren der Genauigkeitsklasse 1 (ISO 9614-3:2002)

STANDARD PREVIEW
(Standard: EN ISO 9614-3)

[SIST EN ISO 9614-3:2003](https://standards.iteh.ai/catalog/standards/sist/018d58a8-fd9f-44dd-953b-954177c229ac/sist-en-iso-9614-3-2003)

Acoustique - Détermination par intensimétrie des niveaux de puissance acoustique émis par les sources de bruit - Partie 3: Méthode de précision pour mesurage par balayage (ISO 9614-3:2002)

Ta slovenski standard je istoveten z: EN ISO 9614-3:2002

ICS:

17.140.01 Acoustic measurements and noise abatement in general

SIST EN ISO 9614-3:2003 en

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN ISO 9614-3:2003](https://standards.iteh.ai/catalog/standards/sist/018d58a8-fd9f-44dd-953b-534177c23ae8/sist-en-iso-9614-3-2003)

<https://standards.iteh.ai/catalog/standards/sist/018d58a8-fd9f-44dd-953b-534177c23ae8/sist-en-iso-9614-3-2003>

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN ISO 9614-3

November 2002

ICS 17.140.01

English version

Acoustics - Determination of sound power levels of noise sources using sound intensity - Part 3: Precision method for measurement by scanning (ISO 9614-3:2002)

Acoustique - Détermination par intensimétrie des niveaux de puissance acoustique émis par les sources de bruit - Partie 3: Méthode de précision pour mesurage par balayage (ISO 9614-3:2002)

Akustik - Bestimmung der Schallleistungspegel von Geräuschquellen aus Schallintensitätsmessungen - Teil 3: Scanning-Verfahren der Genauigkeitsklasse 1 (ISO 9614-3:2002)

This European Standard was approved by CEN on 9 October 2002.

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 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 Management Centre 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, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.



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

Management Centre: rue de Stassart, 36 B-1050 Brussels

EN ISO 9614-3:2002 (E)

CORRECTED 2002-12-18

Foreword

This document (EN ISO 9614-3:2002) 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 May 2003, and conflicting national standards shall be withdrawn at the latest by May 2003.

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 ZA, 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, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

(standards.iteh.ai)

Endorsement notice

[SIST EN ISO 9614-3:2003](https://standards.iteh.ai/catalog/standards/sist/en-iso-9614-3-2002)

The text of ISO 9614-3:2002 has been approved by CEN as EN ISO 9614-3:2002 without any modifications.

Annex ZA (informative)

Relationship of this document with EC Directives

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 Directive(s) :

Machinery Directive 98/37/EC, amended by Directive 98/79/EC.

Compliance with this document provides one means of conforming with the specific essential requirements of the Directive concerned and associated EFTA regulations.

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

Table ZA.1: Correspondence between this International Standard and Directive 98/37/EC.

Clauses of this International Standard	Essential requirements (Er)s of directive	Qualifying remarks/Notes
The whole standard	1.7.4 (f)	Information on noise emission (noise declaration) given by manufacturers in the instructions for use and in the technical documentation of the machinery is based on noise emission values obtained from measurements
The whole standard	1.5.8, partly	The determination of noise emission values is a prerequisite for a manufacturer to assess the noise reduction obtained at the design stage.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN ISO 9614-3:2003](#)

<https://standards.iteh.ai/catalog/standards/sist/018d58a8-fd9f-44dd-953b-534177c23ae8/sist-en-iso-9614-3-2003>

Acoustics — Determination of sound power levels of noise sources using sound intensity —

**Part 3:
Precision method for measurement by scanning**

Acoustique — Détermination par intensimétrie des niveaux de puissance acoustique émis par les sources de bruit —

Partie 3: Méthode de précision pour mesurage par balayage

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN ISO 9614-3:2003](https://standards.iteh.ai/catalog/standards/sist/018d58a8-fd9f-44dd-953b-534177c23ae8/sist-en-iso-9614-3-2003)

<https://standards.iteh.ai/catalog/standards/sist/018d58a8-fd9f-44dd-953b-534177c23ae8/sist-en-iso-9614-3-2003>



Reference number
ISO 9614-3:2002(E)

© ISO 2002

PDF disclaimer

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

iTeh STANDARD PREVIEW (standards.iteh.ai)

[SIST EN ISO 9614-3:2003](https://standards.iteh.ai/catalog/standards/sist/018d58a8-fd9f-44dd-953b-534177c23ae8/sist-en-iso-9614-3-2003)

<https://standards.iteh.ai/catalog/standards/sist/018d58a8-fd9f-44dd-953b-534177c23ae8/sist-en-iso-9614-3-2003>

© ISO 2002

All rights reserved. Unless otherwise specified, 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 either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.ch
Web www.iso.ch

Printed in Switzerland

Contents

Page

Foreword	v
Introduction.....	vi
1 Scope.....	1
2 Normative references.....	1
3 Terms and definitions	2
4 General requirements	7
4.1 Size of sound source under test.....	7
4.2 Character of sound radiated by the source.....	7
4.3 Measurement uncertainty.....	7
5 Acoustic environment.....	9
5.1 Criteria for adequacy of the test environment	9
5.2 Extraneous intensity	9
5.3 Wind and gas flows.....	9
5.4 Temperature.....	9
5.5 Configuration of the surroundings.....	9
5.6 Atmospheric conditions	9
6 Instrumentation	10
6.1 General	10
6.2 Calibration and field check.....	10
6.3 Time-series of sound intensity and sound pressure.....	10
7 Installation and operation of the source.....	10
7.1 General	10
7.2 Operating conditions of the source under test.....	11
8 Measurement of normal sound intensity component levels	11
8.1 Determination of measurement surface	11
8.2 Determination of scanning paths and segments	11
8.3 Measurements	12
8.4 Further actions	14
9 Determination of sound power level	15
9.1 Calculation of partial sound powers for each partial surface of the measurement surface	15
9.2 Calculation of normalized sound power level.....	15
10 Information to be recorded.....	15
Annex A (informative) List of symbols used in this part of ISO 9614	17
Annex B (normative) Calculation of field indicators	19
B.1 General	19
B.2 Definition of field indicators.....	19
B.2.1 Temporal variability indicator, F_T	19
B.2.2 Unsigned pressure-intensity indicator, $F_{p I_n }$	19
B.2.3 Signed pressure-intensity indicator, F_{pI_n}	20
B.2.4 Field non-uniformity indicator, F_S	21
Annex C (normative) Procedure for achieving the desired accuracy	22
C.1 Qualification requirements.....	22
C.1.1 General	22

ISO 9614-3:2002(E)

C.1.2	Check for the adequacy of the averaging time	22
C.1.3	Check for the repeatability of the scan on a partial surface	22
C.1.4	Check for the adequacy of the measurement equipment	22
C.1.5	Check for the presence of strong extraneous noise	23
C.1.6	Check for the field non-uniformity	23
C.2	Action to be taken to increase the grade of accuracy of determination	23
Annex D (informative)	Effects of airflow on measurement of sound intensity	26
Annex E (informative)	Effect of sound absorption within the measurement surface	27
Annex F (informative)	Measurement surface and scanning procedure	28
Annex G (informative)	Procedure for obtaining time-averaged intensities and squared pressures from a sequence of short-time averaged intensities and squared pressures	29
Annex H (informative)	Normalization of sound power level	30
H.1	General	30
H.2	Calculation of normalized sound power level	30
Annex I (informative)	Field indicators used in ISO 9614-1, -2 and -3	32
Bibliography	33

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN ISO 9614-3:2003](https://standards.iteh.ai/catalog/standards/sist/018d58a8-fd9f-44dd-953b-534177c23ae8/sist-en-iso-9614-3-2003)

<https://standards.iteh.ai/catalog/standards/sist/018d58a8-fd9f-44dd-953b-534177c23ae8/sist-en-iso-9614-3-2003>

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.

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 part of ISO 9614 may be the subject of patent rights other than those identified above. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 9614-3 was prepared by Technical Committee ISO/TC 43, *Acoustics*, Subcommittee SC 1, *Noise*.

ISO 9614 consists of the following parts, under the general title *Acoustics — Determination of sound power levels of noise sources using sound intensity*:

- *Part 1: Measurement at discrete points*
- *Part 2: Measurement by scanning*
- *Part 3: Precision method for measurement by scanning*

Annexes B and C form a normative part of this part of ISO 9614. Annexes A, D, E, F, G, H and I are for information only.

iTeh STANDARD PREVIEW (standards.iteh.ai)

[SIST EN ISO 9614-3:2003](https://standards.iteh.ai/catalog/standards/sist/018d58a8-fd9f-44dd-953b-534177c23ae8/sist-en-iso-9614-3-2003)

<https://standards.iteh.ai/catalog/standards/sist/018d58a8-fd9f-44dd-953b-534177c23ae8/sist-en-iso-9614-3-2003>

Introduction

0.1 The sound power radiated by a source is equal in value to the integral of the scalar product of the sound intensity vector and the associated elemental area vector over any surface totally enclosing the source. Other International Standards which describe methods of determination of the sound power levels of noise sources, principally ISO 3740 to ISO 3747, without exception specify sound pressure level as the primary acoustic quantity to be measured. The relationship between sound intensity level and sound pressure level at any point depends on the characteristics of the source, the characteristics of the measurement environment, and the disposition of the measurement positions with respect to the source.

The procedures specified in ISO 3740 to ISO 3747 are not always applicable, for the following reasons.

- a) Specific facilities are necessary if high precision is required. It is frequently not possible to install, and operate, large pieces of equipment in such facilities.
- b) They cannot be used in the presence of high levels of extraneous noise generated by sources other than that under investigation.

0.2 This part of ISO 9614 specifies methods of determining the sound power levels of sources, within specific ranges of uncertainty, under test conditions which are less restricted than those required by ISO 3740 to ISO 3747.

It is recommended that personnel performing sound intensity measurements according to this part of ISO 9614 are appropriately trained and experienced.

0.3 This part of ISO 9614 complements ISO 9614-1, ISO 9614-2 and the ISO 3740 to ISO 3747 series, which specify various methods for the determination of sound power levels of machines and equipment. It differs from the ISO 3740 to ISO 3747 series principally in three aspects.

- a) Measurements are made of sound intensity as well as of sound pressure.
- b) The uncertainty of the sound power level determined by the method specified in this part of ISO 9614 is classified according to the results of specified ancillary tests and calculations performed in association with the test measurements.
- c) Current limitations of intensity measurement equipment which conforms to IEC 61043 restrict measurements to the one-third octave range 50 Hz to 6,3 kHz. Octave band and band-limited A-weighted values are determined from the constituent one-third-octave band values.

0.4 The integral over any surface totally enclosing the source of the scalar product of the sound intensity vector and the associated elemental area vector provides a measure of the sound power radiated directly into the air by all sources located within the enclosing surface and excludes sound radiated by sources located outside this surface. In practice, this exclusion is effective only if the source under test and other sources of extraneous intensity on the measurement surface are stationary over time. In the presence of sound sources operating outside the measurement surface, any system lying within the surface can absorb a proportion of energy incident upon it. The total sound power absorbed within the measurement surface will appear as a negative contribution to source power, and can produce an error in the sound power determination. In order to minimize the associated error, it is therefore necessary to remove any sound-absorbing material lying within the measurement surface which is not normally present during the operation of the source under test.

This method is based on sampling of the intensity normal to the measurement surface by moving an intensity probe continuously along specified paths. The resulting sampling error is a function of the spatial variation of the normal intensity component over the measurement surface, which depends on the directivity of the source, the chosen measurement surface, the pattern and speed of the probe scanning, and the proximity of extraneous sources outside the measurement surface.

The accuracy of measurement of the normal component of sound intensity at a position is sensitive to the difference between the local sound pressure level and the local normal sound intensity level. A large difference can occur when the intensity vector at a measurement position is directed at a large angle (approaching 90°) to the local normal to the measurement surface. Alternatively, the local sound pressure level can contain strong contributions from sources outside the measurement surface, but can be associated with little net sound energy flow, as in a reverberant field in an enclosure; or the field can be strongly reactive because of the presence of the near field and/or standing waves.

The accuracy of determination of sound power level is adversely affected by a flow of sound energy into the volume enclosed by the measurement surface through a portion of that surface, even though it is, in principle, compensated by increased flow of the volume out through the remaining portion of the surface. This condition is caused by the presence of a strong extraneous source outside the measurement surface. This part of ISO 9614 limits such situations by giving relevant criteria.

iTeh STANDARD PREVIEW (standards.iteh.ai)

[SIST EN ISO 9614-3:2003](https://standards.iteh.ai/catalog/standards/sist/018d58a8-fd9f-44dd-953b-534177c23ae8/sist-en-iso-9614-3-2003)

<https://standards.iteh.ai/catalog/standards/sist/018d58a8-fd9f-44dd-953b-534177c23ae8/sist-en-iso-9614-3-2003>