SIST

SLOVENSKI STANDARD
SIST EN ISO 11904-1:2004

01-januar-2004

Akustika - Določanje imisije zvoka od zvočnih virov v neposredni bližini ušesa – 1. del: Metoda z mikrofonom v ušesu (metoda MIRE) (ISO 11904-1:2002)

Acoustics - Determination of sound immission from sound sources placed close to the ear - Part 1: Technique using a microphone in a real ear (MIRE technique) (ISO 11904-1:2002)

Akustik - Bestimmung der Schallimmission von ohrnahen Schallquellen - Teil 1: Verfahren mit Mikrofonen in menschlichen Ohren (MIRE-Verfahren) (ISO 11904-1:2002)

Acoustique - Détermination de l'exposition sonore due a des sources sonores placées a proximité de l'oreille - Partie 1: Technique du microphone placé dans une oreille réelle (technique MIRE) (ISO 11904-1:2002)

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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

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN ISO 11904-1

October 2002

ICS 17.140.01

English version

Acoustics - Determination of sound immission from sound sources placed close to the ear - Part 1: Technique using a microphone in a real ear (MIRE technique) (ISO 11904-1:2002)

Acoustique - Détermination de l'exposition sonore due à des sources sonores placées à proximité de l'oreille - Partie 1: Technique du microphone placé dans une oreille réelle (technique MIRE) (ISO 11904-1:2002)

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This European Standard was approved by CEN on 29 August 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

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Foreword

This document (EN ISO 11904-1:2002) has been prepared by Technical Committee ISO/TC 43 "Acoustic " 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 April 2003, and conflicting national standards shall be withdrawn at the latest by April 2003.

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.

Endorsement notice

The text of ISO 11904-1:2002 has been approved by CEN as EN ISO 11904-1:2002 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.

Publication	Year	Title	EN/HD	Year
ISO 8253-2	1992	Acoustics - Audiometric test methods - Part 2: Sound field audiometry with pure tone and narrow-band test signals	EN ISO 8253-2	1998

INTERNATIONAL STANDARD

ISO 11904-1

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Acoustics — Determination of sound immission from sound sources placed close to the ear —

Part 1: Technique using a microphone in a real ear (MIRE technique)

Acoustique — Détermination de l'exposition sonore due à des sources sonores placées à proximité de l'oreille —

Partie 1: Technique du microphone placé dans une oreille réelle (technique MIRE)

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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

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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 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 International Standard may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 11904-1 was prepared by Technical Committee ISO/TC 43, *Acoustics*.

ISO 11904 consists of the following parts, under the general title *Acoustics — Determination of sound immission from sound sources placed close to the ear:*

— *Part 1: Technique using a microphone in a real ear (MIRE technique)*

— *Part 2: Technique using a manikin (manikin technique)*

Annexes A and B of this part of ISO 11904 are for information only.

Introduction

ISO 11904 is a series of standards which specify methods for the determination of sound immissions from sources located close to the ear, in which situations the sound pressure level measured at the position of the exposed person (but with the person absent) does not adequately represent the sound exposure.

In order to make it possible to assess the exposure by means of well established criteria, the exposure of the ear is measured and subsequently converted into a corresponding free-field or diffuse-field level. The result is given as free-field related or diffuse-field related equivalent continuous A-weighted sound pressure level, $L_{FF,H,Aeq}$ or $L_{DF,H,Aeq}$ when ISO 11904-1 is used, or $L_{FF,M,Aeq}$ or $L_{DF,M,Aeq}$ when ISO 11904-2 is used.

ISO 11904-1 describes measurements carried out using miniature or probe microphones inserted in the ears of human subjects (microphone in real ear, MIRE technique). ISO 11904-2 describes measurements carried out using a manikin equipped with ear simulators including microphones (manikin technique).

ISO 11904 may, for instance, be applied to equipment tests and the determination of noise exposure at the workplace where, in the case of exposure from sources close to the ears, the sound pressure level measured at the position of the exposed person (but with the person absent) does not adequately represent the sound exposure. Examples of applications are head- and earphones used to reproduce music or speech, whether at the workplace or during leisure, nailguns used close to the head, and combined exposure from a close-to-ear sound source and an external sound field.

When specific types of equipment are to be tested (e.g. portable cassette players or hearing protectors provided with radio receivers), test signals suitable for this particular type of equipment have to be used. Neither such test signals nor the operating conditions of the equipment are included in ISO 11904 but might be specified in other standards.

When workplace situations are measured, the various noise sources contributing to the immission should be identified. Operating conditions for machinery and equipment used might be specified in other standards.

Both parts of ISO 11904 strive for the same result: a mean value for a population of the free-field or the diffuse-field related level. ISO 11904-1 does this by specifying the mean of measurements on a number of human subjects; ISO 11904-2 does this by using a manikin, which aims at reproducing the acoustical effects of an average human adult. However, the two methods yield different measurement uncertainties which can influence the choice of method. Only the method described in ISO 11904-1 gives results which indicate the variance in a human population. Information on the uncertainties is given in annexes A and B.

When using the MIRE technique for measurement of sound from earphones of insert and stethoscopic types, practical problems can occur with the positioning of microphones in the ear canal. When using the manikin technique, the head- or earphone has to be coupled to the pinna simulator and ear canal extension as far as possible in the way it is coupled to the human ear. In cases where head- or earphones or other objects touch the pinna, a possible deviation in stiffness or shape of the artificial pinna from human pinnae has a significant impact on the result and can even make the results invalid.

An overview of the differences of the two parts of ISO 11904 is given in Table 0.1.

Table 0.1 — Overview of differences between MIRE and manikin techniques

Parameter	ISO 11904-1	ISO 11904-2
Type of method	Microphone in real ear technique	Manikin technique
Limitation of the method	With earphones of insert and stethoscopic type, practical problems can occur with positioning of microphones in the ear canal.	A proper coupling may not always be obtained if the artificial pinna deviates from human pinnae in stiffness or shape. In some cases the exposed person cannot be replaced by a manikin, e.g. if the person has to operate equipment.
Main issues affecting accuracy	— Number of subjects When tabulated values are used for $\Delta L_{FF,H}$ or $\Delta L_{DF,H}$: — calibration of ear canal microphone — accuracy in positioning of microphones in the ear canal When individual values are used for $\Delta L_{FF,H}$ or $\Delta L_{DF,H}$: — quality of reference sound field — stability of sensitivity and frequency response as well as position of ear canal microphone	— Similarity of manikin to human subjects — Calibration of manikin
Frequency range	20 Hz to 16 kHz	20 Hz to 10 kHz