SLOVENSKI STANDARD
oSIST prEN ISO 3740:2017

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Akustika - Ugotavljanje ravni zvočnih moči virov hrupa - Smernice za uporabo temeljnih standardov (ISO/DIS 3740:2017)

Acoustics - Determination of sound power levels of noise sources - Guidelines for the use of basic standards (ISO/DIS 3740:2017)

Akustik - Bestimmung der Schallleistungspegel von Geräuschquellen - Leitlinien zur Anwendung der Grundnormen (ISO/DIS 3740:2017)

Acoustique - Détermination des niveaux de puissance acoustique émis par les sources de bruit - Guide pour l'utilisation des normes de base (ISO/DIS 3740:2017)

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Acoustics — Determination of sound power levels of noise sources — Guidelines for the use of basic standards

Acoustique — Détermination des niveaux de puissance acoustique émis par les sources de bruit — Guide pour l'utilisation des normes de base

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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

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

This third edition cancels and replaces the second edition (ISO 3740:2000), which has been technically revised.

Introduction

For many users of machinery and equipment the control of noise is a major issue which requires effective exchange of acoustical information in particular on the sources noise emission. In this context the main flow of information goes from the manufacturer to the purchaser. However, also installers and users of the machinery or equipment are interested to get comprehensive information about the sound sources ability to generate airborne sound. Therefore the sound power level, as the major parameter to characterise machines as sound sources, need to be determined by measurements..

Such measurements, however, are only useful if first the conditions under which they are carried out are specified, second they yield defined acoustical quantities, and third they are relying on the application of standardized instruments.

Sound power levels are used for

— declaration of the noise emitted under defined conditions,

— verification of declared values,

— comparison of the noise emitted by machinery of various types and sizes,

— comparison with limits specified in a purchasing contract or a regulation,

— engineering work to control the noise emission of machinery,

— prediction of noise exposure of workers in work shops or in the environment

International Standards describing basic methods for determining the sound power level are

— ISO 3741 to ISO 3747 (sound power level determination using sound pressure level measurements),

— ISO 9614-1 to ISO 9614-3 (sound power level determination using sound intensity measurements),

— ISO/TS 7849-1 and ISO/TS 7849-2 (sound power level determination using vibration measurements).

These standards specify the different methods for the determination of the sound power level and the achievable accuracy specified as the standard deviation of reproducibility of the method. Operating and mounting conditions however, are dealt with only in a very general manner including the uncertainty associated to these conditions. Specific and detailed requirements on the machinery or equipment under test are given in noise test codes prepared by machinery specific standards committees. They not only provide the necessary detailed information on the operating, installation and mounting conditions but also identify basic measurement standard that can be used and how a noise emission declaration and verification can be made.

To help technical committees in drafting noise test codes or to assist manufacturers of machines and equipment in determining the sound power level if a noise test code is not currently available, ISO 3740 introduces the series of twelve International Standards describing various methods for determining sound power levels of machinery and equipment taking into account the broad variety of practical situations for the sources under test (types of machinery and equipment), test environments, measurement instruments and the accuracy desired.

Some machinery and equipment emit high-frequency noise which might be broad-band noise or narrow-band noise and discrete tones. ISO 9295 specifies four methods for the determination of sound power levels emitted by machinery and equipment in the frequency range covered by the 16 kHz octave band. In 5.6.4 ISO 9295 is briefly described.

Acoustics — Determination of sound power levels of noise sources — Guidelines for the use of basic standards

1 Scope

This International Standard gives guidance for the use of a series of twelve basic International Standards describing various methods for determining sound power levels from all types of machinery and equipment. It provides guidance on the selection of one or more of these standards which are appropriate to any particular type of sound source, measurement environment and desired accuracy. The guidance given applies only to airborne sound. It is for use in the preparation of noise test codes (see ISO 12001) and also in noise emission testing where no specific noise test code exists. Such standardized noise test codes will recommend the application of the basic International Standard(s) and will give detailed requirements on mounting and operating conditions for a particular family to which the machine under test belongs, in accordance with general principles given in the basic standards.

This International Standard is not intended to replace any of the details of, or add any additional requirements to, the individual test methods in the basic standards referred to.

NOTE 1 Two quantities which complement each other can be used to describe the sound emission of machinery and equipment. One is the emission sound pressure level at a specified position and the other is the sound power level. The International Standards which describe the basic methods for determining emission sound pressure levels at the work station and at other specified positions are the series ISO 11200 to ISO 11205.

NOTE 2 The sound energy level mentioned in the ISO 3740 series of standards is not addressed in this guide as it is not mentioned in any legal requirement and therefore not used in practical measurement. Its use is limited to very special cases of impulsive noise sources.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 3741:2010, *Acoustics — Determination of sound power levels and sound energy levels of noise sources using sound pressure — Precision methods for reverberation test rooms*

ISO 3743-1:2010, *Acoustics — Determination of sound power levels and sound energy levels of noise sources using sound pressure — Engineering methods for small movable sources in reverberant fields – Part 1: Comparison method for a hard-walled test room*

ISO 3743-2:1994[1], *Acoustics — Determination of sound power levels of noise sources using sound pressure — Engineering methods for small, movable sources in reverberant fields — Part 2: Methods for special reverberation test rooms*

ISO 3744:2010, *Acoustics — Determination of sound power levels and sound energy levels of noise sources using sound pressure — Engineering methods for an essentially free field over a reflecting plane*

[1] Revision of ISO 3743-2:1994 currently under preparation.

ISO 3745:2012[2], *Acoustics — Determination of sound power levels and sound energy levels of noise sources using sound pressure — Precision methods for anechoic test rooms and hemi-anechoic test rooms*

ISO 3746:2010, *Acoustics — Determination of sound power levels and sound energy levels of noise sources using sound pressure — Survey method using an enveloping measurement surface over a reflecting plane*

ISO 3747:2010, *Acoustics — Determination of sound power levels and sound energy levels of noise sources using sound pressure — Engineering/survey methods for use in situ in a reverberant environment*

ISO 4871, *Acoustics — Declaration and verification of noise emission values of machinery and equipment*

ISO 5725 (all parts), *Accuracy (trueness and precision) of measurement methods and results*

ISO/TS 7849-1:2009, *Acoustics — Determination of airborne sound power levels emitted by machinery using vibration measurement — Part 1: Survey method using a fixed radiation factor*

ISO/TS 7849-2:2009, *Acoustics — Determination of airborne sound power levels emitted by machinery using vibration measurement — Part 2: Engineering method including determination of the adequate radiation factor*

ISO 9295: 2015, Acoustics — Determination of high-frequency sound power levels emitted by machinery and equipment

ISO 9614-1:1993, *Acoustics — Determination of sound power levels of noise sources using sound intensity — Part 1: Measurement at discrete points*

ISO 9614-2:1996, *Acoustics — Determination of sound power levels of noise sources using sound intensity — Part 2: Measurement by scanning*

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

ISO 12001:1996[3], *Acoustics — Noise emitted by machinery and equipment — Rules for the drafting and presentation of a noise test code*

ISO/IEC Guide 98-3, *Uncertainty in measurement — Part 3: Guide to the expression of uncertainty in measurement (GUM:1995)*

IEC 60942, *Electroacoustics — Sound calibrators*

IEC 61043, *Electroacoustics — Instruments for the measurement of sound intensity — Measurement with pairs of pressure sensing microphones*

IEC 61672-1:2013, *Electroacoustics — Sound level meters — Part 1: Specifications*

ISO/TR 25417:2007, *Acoustics — Definitions of basic quantities and terms*

ISO 80000-8:2007, *Quantities and units — Part 8: Acoustics*

[2] Amendment 1 of ISO 3745:2012 is currently under preparation.

[3] Revision of ISO 12001:1996 is currently under preparation.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply. More detailed definitions may be found in the ISO 3741, ISO 3743-1, ISO 3743-2, ISO 3744, ISO 3745, ISO 3746 and ISO 3747 group, in ISO 9614-1 to ISO 9614-3, ISO/TS 7849-1, ISO/TS 7849-2, and in noise test codes for specific types of machinery and equipment.

3.1
emission
⟨acoustics⟩ airborne sound radiated by a well-defined noise source (e.g. the machine under test) under specified operating and mounting conditions

Note 1 to entry: Emission values may be incorporated into a product label and/or product specification. The basic noise emission quantities are the sound power level of the source itself and the emission sound pressure levels at the work station and/or at other specified positions (if any) in the vicinity of the source.

[SOURCE: ISO 12001:1996, 3.3]

3.2
sound power
P
through a surface, product of the sound pressure, p, and the component of the particle velocity, u_n, at a point on the surface in the direction normal to the surface, integrated over that surface

Note 1 to entry: Sound power is expressed in watts.

Note 2 to entry: The quantity relates to the rate per time at which airborne sound energy is radiated by a source.

[SOURCE: ISO 80000-8:2007, 8-16]

3.3
sound power level
L_W
ten times the logarithm to the base 10 of the ratio of the sound power of a source, P, to a reference value, P_0, expressed in decibels

$$L_W = 10 \lg \frac{P}{P_0} \text{ dB}$$

where the reference value, P_0, is 1 pW

Note 1 to entry: If a specific frequency weighting as specified in IEC 61672-1 and/or specific frequency bands are applied, this is indicated by appropriate subscripts; e.g. L_{WA} denotes the A-weighted sound power level.

Note 2 to entry: This definition is technically in accordance with ISO 80000-8:2007, 8-23.

[SOURCE: ISO/TR 25417:2007, 2.9, ISO 3744:2010, 3.21]

3.4
structure vibration generated sound
airborne sound caused by structure vibration in the audible frequency range

Note 1 to entry: For the purposes of this part of ISO/TS 7849, structure vibration generated sound is determined either from the vibratory velocity or the vibratory acceleration of the surface of the solid structure.

[SOURCE: ISO/TS 7849-1:2009, 3.1]