

**Acoustics - Noise emitted by machinery and equipment -
Determination of emission sound pressure levels at a
work station and at other specified positions in an
essentially free field over a reflecting plane with
negligible environmental corrections**

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

<p>Käesolev Eesti standard EVS-EN ISO 11201:2010 sisaldab Euroopa standardi EN ISO 11201:2010 ingliskeelset teksti.</p> <p>Standard on kinnitatud Eesti Standardikeskuse 31.08.2010 käskkirjaga ja jõustub sellekohase teate avaldamisel EVS Teatajas.</p> <p>Euroopa standardimisorganisatsioonide poolt rahvuslikele liikmetele Euroopa standardi teksti kättesaadavaks tegemise kuupäev on 15.05.2010.</p> <p>Standard on kättesaadav Eesti standardiorganisatsioonist.</p>	<p>This Estonian standard EVS-EN ISO 11201:2010 consists of the English text of the European standard EN ISO 11201:2010.</p> <p>This standard is ratified with the order of Estonian Centre for Standardisation dated 31.08.2010 and is endorsed with the notification published in the official bulletin of the Estonian national standardisation organisation.</p> <p>Date of Availability of the European standard text 15.05.2010.</p> <p>The standard is available from Estonian standardisation organisation.</p>
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English Version

Acoustics - Noise emitted by machinery and equipment -
Determination of emission sound pressure levels at a work
station and at other specified positions in an essentially free field
over a reflecting plane with negligible environmental corrections
(ISO 11201:2010)

Acoustique - Bruit émis par les machines et équipements -
Détermination des niveaux de pression acoustique
d'émission au poste de travail et en d'autres positions
spécifiées dans des conditions approchant celles du champ
libre sur plan réfléchissant avec des corrections
d'environnement négligeables (ISO 11201:2010)

Akustik - Geräuschabstrahlung von Maschinen und
Geräten - Bestimmung von Emissions-Schalldruckpegeln
am Arbeitsplatz und an anderen festgelegten Orten in
einem im Wesentlichen freien Schallfeld über einer
reflektierenden Ebene mit vernachlässigbaren
Umgebungskorrekturen (ISO 11201:2010)

This European Standard was approved by CEN on 22 April 2010.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
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Foreword

This document (EN ISO 11201:2010) 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 November 2010, and conflicting national standards shall be withdrawn at the latest by November 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 11201:2009.

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.

For relationship with EU Directive, 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, Bulgaria, Croatia, 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.

Endorsement notice

The text of ISO 11201:2010 has been approved by CEN as a EN ISO 11201:2010 without any modification.

Annex ZA (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 Union 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 corresponding 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.

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Introduction

This International Standard specifies a method for determining the emission sound pressure levels at a work station and at other well defined positions, in the vicinity of a machine or piece of equipment, in an essentially free field over a reflecting plane. It is one of a series (ISO 11200^[15] to ISO 11205^[19]) which specifies various methods for determining the emission sound pressure level at a work station and at other specified positions of a machine or equipment. ISO 11200^[15] gives guidance on the choice of the method to be used to determine the emission sound pressure levels of machinery and equipment.

The method specified in this International Standard differs from those in other International Standards in the ISO 11200^[15] to ISO 11205^[19] series in not applying any environmental correction. Requirements to be fulfilled by the environment are specified for accuracy grade 1 (precision) and grade 2 (engineering) measurements indoors and outdoors.

Precision measurements with accuracy grade 1 can generally be carried out in hemi-anechoic test rooms or outdoors provided that requirements on environmental conditions are met. With the specifications defined in the following it should be possible in some cases to provide such conditions in industrial ambience on larger plane areas outdoors free from reflecting objects.

ISO 11201:1995 provided results of accuracy grade 2 only. This edition of this International Standard provides a method of accuracy grade 2 that is essentially identical to that given in ISO 11201:1995. It also provides a more precise method of accuracy grade 1. Users and drafters of noise test codes referring to this International Standard should indicate clearly which method (accuracy grade 1 or accuracy grade 2) is used.

In general, the emission sound pressure levels are less than or equal to those that occur when the machinery or equipment is operating in its normal surroundings. This is because the sound pressure levels are determined by excluding the effects of background noise, as well as the effects of reflections other than those from the reflecting plane on which the machine under test is placed. For determination or calculation of the sound pressure level at the operator's position with the machine operating in a room, both sound power level and sound pressure level are required (as well as information on the room properties or reflections and noise from other sound sources or machines). A method of calculating the sound pressure levels in the vicinity of a machine operating alone in a workroom is given in ISO/TR 11690-3^[20]. Commonly observed differences are 1 dB to 5 dB, but in extreme cases the difference may be even greater.

Acoustics — Noise emitted by machinery and equipment — Determination of emission sound pressure levels at a work station and at other specified positions in an essentially free field over a reflecting plane with negligible environmental corrections

1 Scope

1.1 General

This International Standard specifies a method for determining the emission sound pressure levels of machinery or equipment, at a work station and at other specified positions nearby, in an essentially free field over a reflecting plane. A work station is occupied by an operator and may be located in open space, in the room where the source under test operates, in a cab fixed to the source under test, or in an enclosure remote from the source under test. One or more specified positions may be located in the vicinity of a work station, or in the vicinity of an attended or unattended machine. Such positions are sometimes referred to as bystander positions.

Emission sound pressure levels are determined as A-weighted levels. Additionally, levels in frequency bands and C-weighted peak emission sound pressure levels can be determined in accordance with this International Standard, if required.

NOTE 1 The contents of the series ISO 11200^[15] to ISO 11205^[19] are summarized in ISO 11200^[15].

With the method specified in this International Standard, results of accuracy grade 1 (precision grade) or accuracy grade 2 (engineering grade) are obtained. Corrections are applied for background noise, but not for the acoustic environment. Instructions are given for the mounting and operation of the source under test and for the choice of microphone positions for the work station and for other specified positions. One purpose of the measurements is to permit comparison of the performance of different units of a given family of machines, under defined environmental conditions and standardized mounting and operating conditions.

NOTE 2 The data obtained can also be used for the declaration and verification of emission sound pressure levels as specified in ISO 4871^[8].

1.2 Types of noise and noise sources

The method specified in this International Standard is suitable for all types of noise (steady, non-steady, fluctuating, isolated bursts of sound energy, etc.) defined in ISO 12001.

The method specified in this International Standard is applicable to all types and sizes of noise sources.

NOTE Throughout this International Standard the words “machine” and “source under test” are used to represent either a machine or a piece of equipment.

1.3 Test environment

The type of test environment influences the accuracy of the determination of emission sound pressure levels. For the application of this International Standard, an essentially free field over a reflecting plane (indoors or outdoors) is required.

1.4 Work station and other specified positions

This International Standard is applicable to work stations and other specified positions where emission sound pressure levels are to be determined.

Appropriate positions where measurements may be made include the following:

- a) work station located in the vicinity of the source under test; this is the case for many industrial machines and domestic appliances;
- b) work station within a cab which is an integral part of the source under test; this is the case for many industrial trucks and earth-moving machines;
- c) work station within a partial or total enclosure (or behind a screen) supplied by the manufacturer as an integral part of the source under test;
- d) work station partially or totally enclosed by the source under test — this situation may be encountered with some large industrial machines;
- e) bystander positions occupied by individuals not responsible for the operation of the source under test, but who may be in its immediate vicinity, either occasionally or continuously;
- f) other specified positions, not necessarily work stations or bystander positions.

The work station may also lie on a specified path along which an operator moves (see 9.4).

2 Normative references

The following referenced documents are indispensable for the application 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 3744, *Acoustics — Determination of sound power levels of noise sources using sound pressure — Engineering method in an essentially free field over a reflecting plane*

ISO 3745, *Acoustics — Determination of sound power levels of noise sources using sound pressure — Precision methods for anechoic and hemi-anechoic rooms*

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

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

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

IEC 60942:2003, *Electroacoustics — Sound calibrators*

IEC 61260:1995, *Electroacoustics — Octave-band and fractional-octave-band filters* (amended by IEC 61260/Amd.1:2001)

IEC 61672-1:2002, *Electroacoustics — Sound level meters — Part 1: Specifications*

ISO/IEC Guide 98-3:2008, *Uncertainty of measurement — Part 3: Guide to the expression of uncertainty in measurement (GUM:1995)*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply. More detailed definitions can be found in noise test codes for specific types of machines.

3.1 emission

(acoustics) airborne sound radiated by a well-defined noise source (e.g. the machine under test)

NOTE Noise emission descriptors can be incorporated into a product label and/or product specification. The basic noise emission descriptors are the sound power level of the source itself and the emission sound pressure levels at a work station and/or at other specified positions (if any) in the vicinity of the source.

3.2 emission sound pressure

p
sound pressure, at a work station or another specified position near a noise source, when the source is in operation under specified operating and mounting conditions on a reflecting plane surface, excluding the effects of background noise as well as the effects of reflections other than those from the plane or planes permitted for the purpose of the test

NOTE Emission sound pressure is expressed in pascals.

3.3 emission sound pressure level

L_p
ten times the logarithm to the base 10 of the ratio of the square of the emission sound pressure, p , to the square of a reference value, p_0 , expressed in decibels

$$L_p = 10 \lg \frac{p^2}{p_0^2} \text{ dB} \quad (1)$$

where the reference value, p_0 , is 20 μPa

NOTE The emission sound pressure level is determined at a work station or another specified position in accordance with either a noise test code for a specific family of machines or, if no noise test code exists, one of the standards of the ISO 11200^[15] to ISO 11205^[19] series.

3.4 time-averaged emission sound pressure level

$L_{p,T}$
ten times the logarithm to the base 10 of the ratio of the time average of the square of the emission sound pressure, p , during a stated time interval of duration, T (starting at t_1 and ending at t_2), to the square of a reference value, p_0 , expressed in decibels

$$L_{p,T} = 10 \lg \left[\frac{\frac{1}{T} \int_{t_1}^{t_2} p^2(t) dt}{p_0^2} \right] \text{ dB} \quad (2)$$

where the reference value, p_0 , is 20 μPa