

# SVENSK STANDARD

## SS-EN ISO 11203:2009

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### **Akustik – Buller från maskiner och utrustning – Bestämning av ljudtrycksnivå vid operatörsplats (ISO 11203:1995)**

**Acoustics – Noise emitted by machinery and equipment – Determination of emission sound pressure levels at a work station and at other specified positions from the sound power level (ISO 11203:1995)**

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Denna standard ersätter SS-EN ISO 11203, utgåva 1.

The European Standard EN ISO 11203:2009 has the status of a Swedish Standard. This document contains the official English version of EN ISO 11203:2009.

This standard supersedes the Swedish Standard SS-EN ISO 11203, edition 1.

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EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**EN ISO 11203**

August 2009

ICS 17.140.20

Supersedes EN ISO 11203:1995

English Version

**Acoustics - Noise emitted by machinery and equipment -  
Determination of emission sound pressure levels at a work  
station and at other specified positions from the sound power  
level (ISO 11203:1995)**

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 à partir du niveau de puissance acoustique (ISO  
11203:1995)

Akustik - Geräuschabstrahlung von Maschinen und  
Geräten - Bestimmung von Emissions-Schalldruckpegeln  
am Arbeitsplatz und an anderen festgelegten Orten (ISO  
11203:1995)

This European Standard was approved by CEN on 27 July 2009.

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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.

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## Foreword

The text of ISO 11203:1995 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 11203:2009 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 February 2010, and conflicting national standards shall be withdrawn at the latest by February 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 11203:1995.

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 EU Directives.

For relationship with EU Directives, see informative Annexes ZA and ZB, which are integral parts of this document.

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### Endorsement notice

The text of ISO 11203:1995 has been approved by CEN as a EN ISO 11203:2009 without any modification.

## Introduction

**0.1** This International Standard specifies methods for determining the emission sound pressure levels at a work station and at other specified positions in the vicinity of machinery and equipment from the sound power level. In general, these sound pressure levels are different from those that would be observed when the machinery or equipment is operating in its normal surroundings where the environment may influence the emission sound pressure level.

**0.2** This International Standard is one of a series (ISO 11200 to ISO 11204) which specifies various methods for determining the noise emissions of a piece of machinery or equipment, or a sub-assembly of such equipment (machine under test). ISO 11200 gives guidance on the choice of the method to be used to determine the emission sound pressure levels of machinery and equipment.

It also gives details of International Standards giving methods for the determination of sound power levels.





# Acoustics — Noise emitted by machinery and equipment — Determination of emission sound pressure levels at a work station and at other specified positions from the sound power level

## 1 Scope

### 1.1 General

This International Standard specifies two methods for determining the emission sound pressure levels of machinery and equipment, at a work station and at other specified positions nearby, by calculation from the sound power level. The principal purpose of this determination is to permit comparison of the performance of different units of a given family of machinery or equipment, under defined environmental conditions and standardized mounting and operating conditions. The data obtained may also be used for the declaration and verification of emission sound pressure levels as specified in ISO 4871.

Emission sound pressure levels are determined with the same frequency weighting and time weighting, or in the same frequency bands, as those for which sound power levels have been determined.

#### NOTES

1 The contents of this and related International Standards are summarized in table 1 of ISO 11200:1995.

2 At any given position in relation to a particular machine, and for given mounting and operating conditions, the emission sound pressure levels determined by the method of this International Standard will in general be lower than the directly measured sound pressure levels for the same machine in the typical workroom where it is used. This is due to reverberation and the contributions of other machines. A method of calculating the sound pressure levels in the vicinity of a machine operating alone in a workroom is given in ISO 11690-3. Commonly observed differences are 1 dB to 5 dB, but in extreme cases the difference may be even greater.

### 1.2 Types of noise and noise sources

This International Standard is, in principle, applicable to moving or stationary machines, for indoor or outdoor use, particularly those machines which are mass-produced. The methods given in this International Standard are not applicable to highly directional sound sources used outdoors.

This International Standard is particularly applicable to machines whose largest dimension is less than or equal to 1 m. It is also applicable to larger machines in certain cases (see 6.2.3).

This International Standard is applicable to all types of noise as defined in ISO 2204 and ISO 12001 for which methods for determining the sound power level are available.

### 1.3 Test environment

The test environment to be used is that which is specified for the determination of the sound power level in accordance with the International Standards of the ISO 3740 or ISO 9614 series.

### 1.4 Specified positions

This International Standard is applicable to work stations and other specified positions in the vicinity of the source under test where emission sound pressure levels are to be determined. It is not applicable to work stations and other defined positions which are situated inside a cab or a cabin, or behind a screen.

A work station can be a single point, corresponding to the specified position of a standing or seated operator. It can also be a specified path.

NOTE 3 More detailed specifications regarding seated, standing, stationary or moving operators, as well as information concerning bystanders, are to be found in ISO 11201.

### 1.5 Specific field of application of each method

Specific information on the field of application of each of the two methods described in this International Standard is given in 6.2.2 and 6.2.3.

## 2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 2204:1979, *Acoustics — Guide to International Standards on the measurement of airborne acoustical noise and evaluation of its effects on human beings.*

ISO 3741:1988, *Acoustics — Determination of sound power levels of noise sources — Precision methods for broad-band sources in reverberation rooms.*

ISO 3742:1988, *Acoustics — Determination of sound power levels of noise sources — Precision methods for discrete-frequency and narrow-band sources in reverberation rooms.*

ISO 3743-1:1994, *Acoustics — Determination of sound power levels of noise sources — Engineering methods for small, movable sources in reverberant fields — Part 1: Comparison method for hard-walled test rooms.*

ISO 3743-2:1994, *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.*

1) To be published.

2) To be published. (Revision of IEC 225:1966)

ISO 3744:1994, *Acoustics — Determination of sound power levels of noise sources using sound pressure — Engineering method in an essentially free field over a reflecting plane.*

ISO 3745:1977, *Acoustics — Determination of sound power levels of noise sources — Precision methods for anechoic and semi-anechoic rooms.*

ISO 3746:1995, *Acoustics — Determination of sound power levels of noise sources using sound pressure — Survey method using an enveloping measurement surface over a reflecting plane.*

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:—<sup>1)</sup>, *Acoustics — Determination of sound power levels of noise sources using sound intensity — Part 2: Measurement by scanning.*

ISO 11200:1995, *Acoustics — Noise emitted by machinery and equipment — Guidelines for the use of basic standards for the determination of emission sound pressure levels at a work station and at other specified positions.*

ISO 12001:—<sup>1)</sup>, *Acoustics — Noise emitted by machinery and equipment — Rules for the drafting and presentation of a noise test code.*

IEC 651:1979, *Sound level meters.*

IEC 804:1985, *Integrating averaging sound level meters.*

IEC 942:1988, *Sound calibrators.*

IEC 1260:—<sup>2)</sup>, *Electroacoustics — Octave-band and fractional-octave-band filters.*

## 3 Definitions

For the purposes of this International Standard, the following definitions apply. More detailed definitions may be found in noise test codes for specific types of machinery and equipment.

**3.1 emission:** Airborne sound radiated by a well-defined noise source (e.g. the machine under test).

NOTE 4 Noise emission descriptors may be incorporated in 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,  $p$ :** The sound pressure, at a 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. It 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,  $p^2(t)$ , to the square of the reference sound pressure,  $p_0^2$ , measured with a particular time weighting and a particular frequency weighting, selected from those defined in IEC 651. It is expressed in decibels. The reference sound pressure is 20  $\mu$ Pa.

NOTE 5 Examples include:

- maximum A-weighted emission sound pressure level with time-weighting F:  $L_{pAFmax}$ ;
- C-weighted peak emission sound pressure level:  $L_{pC,peak}$ .

The emission sound pressure level shall be determined at a specified position in accordance with either a test code for a specific family of machines or, if no test code exists, a method that complies with the ISO 11200 series.

**3.3.1 time-averaged emission sound pressure level,  $L_{peqT}$ :** Emission sound pressure level of a continuous steady sound that, within a measurement time interval,  $T$ , has the same mean square sound pressure as a sound under consideration which varies with time.

It is expressed in decibels and is given by the following equation:

$$L_{peqT} = 10 \lg \frac{1}{T} \int_0^T \frac{p^2(t)}{p_0^2} dt \text{ dB} \quad \dots (1)$$

A-weighted time-averaged emission sound pressure levels are denoted by  $L_{pAeqT}$ , which is usually abbreviated to  $L_{pA}$ .  $L_{pAeqT}$  shall be measured with an instrument which complies with the requirements of IEC 804.

NOTES

6 In general, the subscripts eq and  $T$  are omitted since time-averaged emission sound pressure levels are necessarily determined over a certain measurement time interval.

7 Equation (1) is identical to that for the familiar ISO environmental noise descriptor "equivalent continuous sound pressure level" defined in ISO 1996-1. However, the emission quantity defined above is used to characterize the noise emitted by a machine under test and assumes that standardized measurement and operating conditions as well as a controlled acoustical environment are used for the measurements.

**3.3.2 peak emission sound pressure level,  $L_{p,peak}$ :** Highest instantaneous value of the emission sound pressure level determined over an operational cycle. It is expressed in decibels.

**3.3.3 single-event emission sound pressure level,  $L_{p,1s}$ :** Time-integrated emission sound pressure level of an isolated single sound event of specified duration  $T$  (or specified measurement time  $T$ ) normalized to  $T_0 = 1$  s.

It is expressed in decibels and is given by the following equation:

$$L_{p,1s} = 10 \lg \frac{1}{T_0} \int_0^T \frac{p^2(t)}{p_0^2} dt \text{ dB} \quad \dots (2)$$

$$= L_{peqT} + 10 \lg \frac{T}{T_0} \text{ dB}$$

NOTE 8 The above equation is identical to that for the familiar ISO environmental noise descriptor "sound exposure level". However, the emission quantity defined above is used to characterize a noise source and assumes that a controlled environment is used for the measurements.

**3.4 sound power,  $W$ :** The rate per unit time at which airborne sound energy is radiated by a source. It is expressed in watts.

**3.5 sound power level,  $L_W$ :** Ten times the logarithm to the base 10 of the ratio of the sound power radiated by the source under test to the reference sound power. It is expressed in decibels.

The frequency weighting or the width of the frequency band used shall be indicated. The reference power is 1 pW (1 pW =  $10^{-12}$  W).

NOTE 9 For example, the A-weighted sound power level is  $L_{WA}$ .

**3.6 free field over a reflecting plane:** Sound field in a homogeneous, isotropic medium in the half space