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**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**

**AMENDMENT 1**

*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*

*AMENDEMENT 1*



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

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# 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

## AMENDMENT 1

### 1.1

Replace NOTE 1 with the following:

"The contents of this document and related International Standards are summarised in ISO 11200:2014, Table 1."

### 1.2

In the last sentence, delete "ISO 2204 and".

### Clause 2 Normative references

Replace the references (including the footnotes) with the following.

ISO 3740:2019, *Acoustics — Determination of sound power levels of noise sources — Guidelines for the use of basic standards*

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 3743-2:2018, *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*

ISO 3745:2012, *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 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*

### Clause 3

Replace all definitions with the following.

#### 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* (3.5) of the source itself and the *emission sound pressure levels* (3.3) at the *work station* (3.8) and/or at other *specified positions* (3.10) (if any) in the vicinity of the source.

[SOURCE: ISO 12001:1996, 3.3]

#### 3.2 emission sound pressure

$p$

sound pressure, at a *work station* (3.8) or another *specified position* (3.10) 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 1 to entry: 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* (3.2),  $p$ , to the square of a reference value,  $p_0$ , expressed in decibels

$$L_p = 10 \lg \frac{p^2}{p_0^2} \text{ dB}$$

where the reference value,  $p_0$ , is 20  $\mu\text{Pa}$

Note 1 to entry: The emission sound pressure level is determined at a *work station* (3.8) or another *specified position* (3.10) 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 series ISO 11200 to ISO 11205.

#### 3.3.1 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* (3.2),  $p$ , 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

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

where the reference value,  $p_0$ , is 20  $\mu\text{Pa}$

Note 1 to entry: For simplicity of notation, the subscript  $T$  is omitted throughout the following text.

Note 2 to entry: If specific frequency and time weightings as specified in IEC 61672-1 and/or specific frequency bands are applied, this is indicated by appropriate subscripts; e.g.  $L_{pA}$  denotes the A-weighted emission sound pressure level.

Note 3 to entry: The formula is equivalent to that for the environmental noise descriptor “equivalent continuous sound pressure level” (ISO 1996-1). However, the emission quantity defined above is used to characterize the noise emitted by a source 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

$p_{\text{peak}}$

greatest absolute *emission sound pressure* (3.2) during a stated time interval

Note 1 to entry: Peak emission sound pressure is expressed in pascals.

Note 2 to entry: A peak emission sound pressure may arise from a positive or negative sound pressure.

### 3.3.3

#### peak emission sound pressure level

$L_{p,\text{peak}}$

ten times the logarithm to the base 10 of the ratio of the square of the *peak emission sound pressure* (3.3.2),  $p_{\text{peak}}$ , to the square of a reference value,  $p_0$ , expressed in decibels

$$L_{p,\text{peak}} = 10 \lg \frac{p_{\text{peak}}^2}{p_0^2} \text{ dB}$$

where the reference value,  $p_0$ , is 20  $\mu\text{Pa}$

Note 1 to entry: The peak emission sound pressure level is usually C-weighted and denoted by  $L_{pC,\text{peak}}$

### 3.3.4

#### single event emission sound pressure level

$L_E$

ten times the logarithm to the base 10 of the ratio of the integral of the square of the *emission sound pressure* (3.2),  $p$ , of an isolated single sound event (burst of sound or transient sound) of specified duration  $T$  (or specified measurement time interval  $T = t_2 - t_1$  covering the single event) to the square of a reference value,  $p_0$ , normalized to reference time interval  $T_0 = 1 \text{ s}$ , expressed in decibels

$$L_E = 10 \lg \left[ \frac{\frac{1}{T_0} \int_{t_1}^{t_2} p^2(t) dt}{p_0^2} \right] \text{ dB}$$

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

Note 1 to entry: The above formula is equivalent to that for the environmental noise descriptor “sound exposure level” (ISO/TR 25417:2007, 2.7). However, the emission quantity defined above is used to characterize the noise emitted by a source under test and assumes that standardized measurement, mounting, and operating conditions as well as a controlled acoustical environment are used for the measurements.

### 3.4 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, reproduced in ISO/TR 25417:2007, 2.8, modified — Note 2 to entry has been deleted and Note 3 to entry has been renumbered as Note 2 to entry.]

### 3.5 sound power level

$L_W$

ten times the logarithm to the base 10 of the ratio of the *sound power* (3.4) 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 should be 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.

### 3.6 free sound field over a reflecting plane

free sound field in the halfspace above an infinite reflecting plane in the absence of any other obstacles

### 3.7 reference box

hypothetical rectangular parallelepiped terminating on the reflecting plane(s) on which the noise source under test is located, that just encloses the source including all the significant sound-radiating components and any test table on which the source may be mounted

### 3.8 work station

operator's position

position in the vicinity of the machine under test which is intended for the *operator* (3.9)

### 3.9 operator

individual whose *work station* (3.8) is in the vicinity of a machine and who is performing a work task associated with that machine

### 3.10 specified position

position defined in relation to a machine, including, but not limited to, an *operator's position* (3.8)

Note 1 to entry: The position can be a single, fixed point, or a combination of points along a path or on a surface located at a specified distance from the machine, as described in the relevant noise test code, if one exists.

Note 2 to entry: Positions located in the vicinity of a *work station* (3.8), or in the vicinity of an unattended machine, may be identified as “bystander positions”.

Note 3 to entry: Throughout the text of this International Standard, the word “work station” applies to possible specified positions listed in 1.4.

**3.11****operational period**

interval of time during which a specified process is accomplished by the source under test

EXAMPLE For a dishwasher, when washing or rinsing or drying.

**3.12****operational cycle**

specific sequence of *operational periods* (3.11) occurring while the source under test performs a complete work cycle, where each operational period is associated with a specific process that can occur only once or be repeated during the operational cycle

EXAMPLE For a dishwasher, when washing and rinsing and drying.

*Clause 4*

In the 2nd paragraph, replace “standard deviations of reproducibility” with “standard deviation of reproducibility of the applied method and the standard deviation of the operating and mounting conditions”.

*Annex A*

Replace Annex A with the following Bibliography.

**Bibliography**

- [1] ISO 1996-1, *Acoustics — Description, measurement and assessment of environmental noise — Part 1: Basic quantities and assessment procedures*
- [2] ISO 4871, *Acoustics — Declaration and verification of noise emission values of machinery and equipment*
- [3] ISO 7779, *Acoustics — Measurement of airborne noise emitted by information technology and telecommunications equipment*
- [4] ISO 9295, *Acoustics — Determination of high-frequency sound power levels emitted by machinery and equipment*
- [5] ISO 11200:2014, *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*
- [6] ISO 11200:2014/Amd.1:2018, *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 / Amendment 1*
- [7] ISO 11201, *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*
- [8] ISO 11202, *Acoustics — Noise emitted by machinery and equipment — Determination of emission sound pressure levels at a work station and at other specified positions applying approximate environmental corrections*
- [9] ISO 11204, *Acoustics — Noise emitted by machinery and equipment — Determination of emission sound pressure levels at a work station and at other specified positions applying accurate environmental corrections*