

SVENSK STANDARD

SS-EN ISO 3381:2011



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Järnvägar – Akustik – Mätning av buller invändigt i spårfordon (ISO 3381:2005)

Railway applications – Acoustics – Measurement of noise inside railbound vehicles (ISO 3381:2005)

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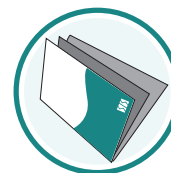
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Denna standard ersätter SS-EN ISO 3381:2005, utgåva 1.

The European Standard EN ISO 3381:2011 has the status of a Swedish Standard. This document contains the official English version of EN ISO 3381:2011.

This standard supersedes the Swedish Standard SS-EN ISO 3381:2005, edition 1.

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EUROPEAN STANDARD

EN ISO 3381

NORME EUROPÉENNE

EUROPÄISCHE NORM

March 2011

ICS 17.140.30; 45.020

Supersedes EN ISO 3381:2005

English Version

Railway applications - Acoustics - Measurement of noise inside railbound vehicles (ISO 3381:2005)

Applications ferroviaires - Acoustique - Mesurage du bruit à l'intérieur des véhicules circulant sur rails (ISO 3381:2005)

Bahnanwendungen - Akustik - Geräuschmessungen in spurgebundenen Fahrzeugen (ISO 3381:2005)

This European Standard was approved by CEN on 31 January 2011.

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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-CENELEC Management Centre has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: Avenue Marnix 17, B-1000 Brussels

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Foreword

The text of ISO 3381:2005 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 3381:2011 by Technical Committee CEN/TC 256 “Railway applications” the secretariat of which is held by DIN.

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 September 2011, and conflicting national standards shall be withdrawn at the latest by September 2011.

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 3381:2005.

This document has been prepared under a mandate given to CEN/CENELEC/ETSI by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive 2008/57/EC.

For relationship with EU Directive 2008/57/EC, see informative Annex ZA, which is an integral part of this document.

The “Recast” Directive 2008/57/EC of the European Parliament and of the Council on the interoperability of the rail system within the Community was published on 17th June 2008. The two previous EU directives 96/48/EC and 2001/16/EC on the interoperability of the High Speed and Conventional rail systems within the Community will therefore be repealed with effect from 19th July 2010. At this date the harmonised standards for the railway field will have to refer to the new Directive.

Annex ZA is amended to address this need.

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 3381:2005 has been approved by CEN as a EN ISO 3381:2011 without any modification.

1 Scope

This European Standard specifies the conditions for obtaining reproducible and comparable measurement results of levels and spectra of noise inside all kinds of vehicles on rails or other types of fixed track, hereinafter conventionally called “train”, except for track maintenance vehicles in operation.

This standard is applicable for:

- type testing;
- periodic monitoring testing.

The results may be used, for example:

- to characterise the noise inside these vehicles;
- to compare the internal noise of various vehicles on a particular track section.

The test procedures specified in this European Standard are of engineering grade (grade 2, with a precision of ± 2 dB), that is the preferred one for noise declaration purposes, as defined in EN ISO 12001.

The standard describes tests during different operating conditions, i.e. driving, accelerating, decelerating and standstill. The chosen operating conditions are decided by the relevant authority or the train owner/operator. It is not mandatory to perform tests at all conditions.

Infrasound and messages intelligibility are not treated in this standard.

The procedures specified for accelerating and decelerating tests are of survey grade.

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.

EN 60942, *Electroacoustics — Sound calibrators (IEC 60942:2003)*

EN 61260, *Electroacoustics — Octave-band and fractional-octave-band filters (IEC 61260:1995)*

EN 61672-1:2003, *Electroacoustics — Sound level meters — Part 1: Specifications (IEC 61672-1:2002)*

3 Terms and definitions

For the purposes of this European Standard, the following terms and definitions apply.

3.1

type test for noise emission of railbound vehicles

type test

measurement performed to prove that, or to check if, a vehicle delivered by the manufacturer complies with the noise specifications

3.2**monitoring test for noise emission of railbound vehicles**

monitoring test

measurement performed to check that the noise of one or more vehicles, taken among individual units in a consignment of vehicles, is within prescribed limits or to check if the noise of the vehicle has changed since initial delivery or after modification

3.3**roughness** r

root mean square (RMS) value of the amplitude variation of the running surface of a rail in the direction of motion (longitudinal level) measured over a rail length, expressed in μm

3.4**roughness level** L_r

level given by the equation:

$$L_r = 10 \lg (r/r_0)^2 \text{ dB} \quad (1)$$

where

L_r is the roughness level in dB;

r is the RMS roughness in μm ;

r_0 the reference roughness; $r_0 = 1 \mu\text{m}$.

This definition applies to values measured either as a wavelength spectrum or in a particular wavelength band centred at λ (expressed in m)

3.5**sound pressure** $p(t)$

root mean square (RMS) value of a fluctuating pressure superimposed on the static atmospheric pressure measured over a certain time period, expressed in Pa

3.6**sound pressure level** L_p

level given by the equation:

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

where

L_p is the sound pressure level in dB;

$p(t)$ is the RMS sound pressure in Pa;

p_0 the reference sound pressure; $p_0 = 20 \mu\text{Pa}$.

NOTE Definitions from 3.6 to 3.11 apply to values measured either as a frequency spectrum or in a particular frequency band of centre f (expressed in Hz).

3.7

A-weighted sound pressure level

L_{pA}

sound pressure level obtained by using the frequency weighting A (see EN 61672-1), given by the following equation:

$$L_{pA} = 10 \lg (p_A(t)p_0)^2 \text{ dB} \quad (3)$$

where

L_{pA} is the A-weighted sound pressure level in dB;

$p_A(t)$ is the RMS A-weighted sound pressure in Pa;

p_0 the reference sound pressure; $p_0 = 20 \mu\text{Pa}$.

3.8

AF-weighted maximum sound pressure level

L_{pAFmax}

maximum value of the A-weighted sound pressure level determined during the measurement time interval T by using time weighting fast F

[EN 61672-1]

3.9

A-weighted equivalent continuous sound pressure level

$L_{pAeq,T}$

A-weighted sound pressure level given by the following equation:

$$L_{pAeq,T} = 10 \lg \left(\frac{1}{T} \int_0^T \frac{p_A^2(t)}{p_0^2} dt \right) \text{ dB} \quad (4)$$

where

$L_{pAeq,T}$ is the A-weighted equivalent continuous sound pressure level in dB;

T is the measurement time interval in s;

$p_A(t)$ is the A-weighted instantaneous sound pressure in Pa;

p_0 the reference sound pressure; $p_0 = 20 \mu\text{Pa}$.

3.10

A-weighted short-term equivalent continuous sound pressure level

$L_{pAeq,1s}$

A-weighted equivalent continuous sound pressure level (see 3.9) where the measurement time interval T is one second ($T = 1\text{s}$)

3.11

A-weighted equivalent continuous impulsive sound pressure level

$L_{pAeq,T}$

A-weighted equivalent continuous sound pressure level determined by using time weighting impulse I (see EN 61672-1) given by the following equation: