

SVENSK STANDARD

SS-EN ISO 3381:2011



Fastställt/Approved: 2011-03-21
Publicerad/Published: 2011-08-17
Utgåva/Edition: 2
Språk/Language: engelska/English
ICS: 17.140.30; 45.020; 45.060.01

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

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



Standarder får världen att fungera

SIS (Swedish Standards Institute) är en fristående ideell förening med medlemmar från både privat och offentlig sektor. Vi är en del av det europeiska och globala nätverk som utarbetar internationella standarder. Standarder är dokumenterad kunskap utvecklad av framstående aktörer inom industri, näringsliv och samhälle och befrämjar handel över gränser, bidrar till att processer och produkter blir säkrare samt effektiviserar din verksamhet.

Delta och påverka

Som medlem i SIS har du möjlighet att påverka framtida standarder inom ditt område på nationell, europeisk och global nivå. Du får samtidigt tillgång till tidig information om utvecklingen inom din bransch.

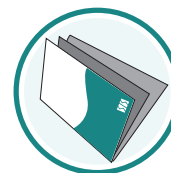
Ta del av det färdiga arbetet

Vi erbjuder våra kunder allt som rör standarder och deras tillämpning. Hos oss kan du köpa alla publikationer du behöver – allt från enskilda standarder, tekniska rapporter och standardpaket till handböcker och onlinetjänster. Genom vår webbtjänst e-nav får du tillgång till ett lättnavigerat bibliotek där alla standarder som är aktuella för ditt företag finns tillgängliga. Standarder och handböcker är källor till kunskap. Vi säljer dem.

Utveckla din kompetens och lyckas bättre i ditt arbete

Hos SIS kan du gå öppna eller företagsinterna utbildningar kring innehåll och tillämpning av standarder. Genom vår närhet till den internationella utvecklingen och ISO får du rätt kunskap i rätt tid, direkt från källan. Med vår kunskap om standarders möjligheter hjälper vi våra kunder att skapa verklig nytta och lönsamhet i sina verksamheter.

Vill du veta mer om SIS eller hur standarder kan effektivisera din verksamhet är du välkommen in på www.sis.se eller ta kontakt med oss på tel 08-555 523 00.



Standards make the world go round

SIS (Swedish Standards Institute) is an independent non-profit organisation with members from both the private and public sectors. We are part of the European and global network that draws up international standards. Standards consist of documented knowledge developed by prominent actors within the industry, business world and society. They promote cross-border trade, they help to make processes and products safer and they streamline your organisation.

Take part and have influence

As a member of SIS you will have the possibility to participate in standardization activities on national, European and global level. The membership in SIS will give you the opportunity to influence future standards and gain access to early stage information about developments within your field.

Get to know the finished work

We offer our customers everything in connection with standards and their application. You can purchase all the publications you need from us - everything from individual standards, technical reports and standard packages through to manuals and online services. Our web service e-nav gives you access to an easy-to-navigate library where all standards that are relevant to your company are available. Standards and manuals are sources of knowledge. We sell them.

Increase understanding and improve perception

With SIS you can undergo either shared or in-house training in the content and application of standards. Thanks to our proximity to international development and ISO you receive the right knowledge at the right time, direct from the source. With our knowledge about the potential of standards, we assist our customers in creating tangible benefit and profitability in their organisations.

If you want to know more about SIS, or how standards can streamline your organisation, please visit www.sis.se or contact us on phone +46 (0)8-555 523 00



Europastandarden EN ISO 3381:2011 gäller som svensk standard. Detta dokument innehåller den officiella engelska versionen av EN ISO 3381:2011.

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.

© Copyright/Upphovsrätten till denna produkt tillhör SIS, Swedish Standards Institute, Stockholm, Sverige. Användningen av denna produkt regleras av slutanvändarlicensen som återfinns i denna produkt, se standardens sista sidor.

© Copyright SIS, Swedish Standards Institute, Stockholm, Sweden. All rights reserved. The use of this product is governed by the end-user licence for this product. You will find the licence in the end of this document.

Uppllysningar om sakinnehållet i standarden lämnas av SIS, Swedish Standards Institute, telefon 08-555 520 00. Standarder kan beställas hos SIS Förlag AB som även lämnar allmänna uppllysningar om svensk och utländsk standard.

Information about the content of the standard is available from the Swedish Standards Institute (SIS), telephone +46 8 555 520 00. Standards may be ordered from SIS Förlag AB, who can also provide general information about Swedish and foreign standards.

Standarden är framtagen av kommittén för Järnvägar, SIS/TK 254.

Har du synpunkter på innehållet i den här standarden, vill du delta i ett kommande revideringsarbete eller vara med och ta fram andra standarder inom området? Gå in på www.sis.se - där hittar du mer information.

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.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

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.

CEN members are the national standards bodies of 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 United Kingdom.



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

Management Centre: Avenue Marnix 17, B-1000 Brussels

Contents

	page
Foreword	v
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Measurement quantities	4
5 Instrumentation	5
6 Test conditions	5
7 Test procedure	9
8 Test report	10
Annex A (normative) Rail roughness measurement specifications.....	11
Annex B (informative) Major influence parameters on track noise including track dynamics	17
Annex ZA (informative) Relationship between this European Standard and the Essential Requirements of EU Directive 2008/57/EC	%
Bibliography	&%

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:

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

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:

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

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: