SVENSK STANDARD
SS-EN ISO 11205:2009

Fastställd/Approved: 2009-08-24
Publicerad/Published: 2009-09-23
Utgåva/Edition: 2
Språk/Language: engelska/English
ICS: 14.020; 17.140.01

Akustik – Buller från maskiner och utrustning – Mätning på plats av emissionsljudtrycksnivå vid operatörsplats eller annan specifik plats med hjälp av ljudintensitet – Teknisk metod (ISO 11205:2003)

Acoustics – Noise emitted by machinery and equipment – Engineering method for the determination of emission sound pressure levels in situ at the work station and at other specified positions using sound intensity (ISO 11205:2003)

SWEDISH STANDARDS INSTITUTE

Hitta rätt produkt och ett leveranssätt som passar dig

Standarder
Genom att följa gällande standard både effektiviserar och säkrar du ditt arbete. Många standarder ingår dessutom ofta i paket.

Tjänster
Abonnemang är tjänsten där vi uppdaterar dig med aktuella standarder när förändringar sker på dem du valt att abonnera på. På så sätt är du säker på att du alltid arbetar efter rätt utgåva.
e-nav är vår online-tjänst som ger dig och dina kollegor tillgång till standarder ni valt att abonnera på dygnet runt. Med e-nav kan samma standard användas av flera personer samtidigt.

Leveranssätt
Du väljer hur du vill ha dina standarder levererade. Vi kan erbjuda dig dem på papper och som pdf.

Andra produkter
Vi har böcker som underlättar arbetet att följa en standard. Med våra böcker får du ökad förståelse för hur standarder ska följas och vilka fördelar den ger dig i ditt arbete. Vi tar fram många egna publikationer och fungerar även som återförsäljare. Det gör att du hos oss kan hitta över 500 unika titlar. Vi har även tekniska rapporter, specifikationer och "workshop agreement". Matriser är en översikt på standarder och handböcker som bör läsas tillsammans. De finns på sis.se och ger dig en bra bild över hur olika produkter hör ihop.

Standardiseringsprojekt
Du kan påverka innehållet i framtida standarder genom att delta i någon av SIS ca 400 Tekniska Kommittéer.

Find the right product and the type of delivery that suits you

Standards
By complying with current standards, you can make your work more efficient and ensure reliability. Also, several of the standards are often supplied in packages.

Services
Subscription is the service that keeps you up to date with current standards when changes occur in the ones you have chosen to subscribe to. This ensures that you are always working with the right edition.
e-nav is our online service that gives you and your colleagues access to the standards you subscribe to 24 hours a day. With e-nav, the same standards can be used by several people at once.

Type of delivery
You choose how you want your standards delivered. We can supply them both on paper and as PDF files.

Other products
We have books that facilitate standards compliance. They make it easier to understand how compliance works and how this benefits you in your operation. We produce many publications of our own, and also act as retailers. This means that we have more than 500 unique titles for you to choose from. We also have technical reports, specifications and workshop agreements. Matrices, listed at sis.se, provide an overview of which publications belong together.

Standardisation project
You can influence the content of future standards by taking part in one or other of SIS's 400 or so Technical Committees.

Europastandarden EN ISO 11205:2009 gäller som svensk standard. Detta dokument innehåller den officiella engelska versionen av EN ISO 11205:2009.

Denna standard ersätter SS-EN ISO 11205:2004, utgåva 1 och SS-EN ISO 11205:2004/AC:2006, utgåva 1.

The European Standard EN ISO 11205:2009 has the status of a Swedish Standard. This document contains the official English version of EN ISO 11205:2009.

This standard supersedes the Swedish Standard SS-EN ISO 11205:2004, edition 1 and SS-EN ISO 11205:2004/AC:2006, edition 1.

Upplysningar 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 upplysningar om svensk och utländsk standard.

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

SIS Förlag AB, SE 118 80 Stockholm, Sweden. Tel: +46 8 555 523 10. Fax: +46 8 555 523 11.
E-mail: sis.sales@sis.se Internet: www.sis.se

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN ISO 11205

August 2009

ICS 17.140.01

Supersedes EN ISO 11205:2003

English Version

Acoustics - Noise emitted by machinery and equipment - Engineering method for the determination of emission sound pressure levels in situ at the work station and at other specified positions using sound intensity (ISO 11205:2003)

Acoustique - Bruits émis par les machines et les équipements - Méthode d'expertise pour la détermination par intensimétrie des niveaux de pression acoustique d'émission in situ au poste de travail et en d'autres positions spécifiées (ISO 11205:2003)

Akustik - Geräuschabstrahlung von Maschinen und Geräten - Verfahren der Genauigkeitsklasse 2 zur Bestimmung von Emissions-Schalldruckpegeln am Arbeitsplatz und an anderen festgelegten Orten unter Einsatzbedingungen aus Schallintensitätsmessungen (ISO 11205:2003)

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

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 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 Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, 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

Ref. No. EN ISO 11205:2009: E

Contents

Page

Foreword

The text of ISO 11205:2003 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 11205:2009 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 11205:2003.

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.

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, 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 11205:2003 has been approved by CEN as a EN ISO 11205:2009 without any modification.

Acoustics — Noise emitted by machinery and equipment — Engineering method for the determination of emission sound pressure levels *in situ* at the work station and at other specified positions using sound intensity

1 Scope

This International Standard specifies an engineering method (grade 2 accuracy) to determine the emission sound pressure level of machines *in situ*, at the work station or at other specified positions, using sound intensity. It is an alternative to ISO 11201, ISO 11202 and ISO 11204 for *in situ* measurements. It is applicable to all kinds of test environments provided that the requirements on background noise and field indicators are fulfilled.

This International Standard is applicable to equipment emitting stationary broadband noise. The noise can differ between operational cycles and can be with or without discrete frequency or narrow band components.

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 7574-1, *Acoustics — Statistical methods for determining and verifying stated noise emission values of machinery and equipment — Part 1: General considerations and definitions*

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 61043:2003, *Electroacoustics — Instruments for the measurement of sound intensity — Measurements with pairs of pressure sensing microphones*

3 Terms and definitions

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

3.1
sound intensity
$\vec{I}$
time-averaged instantaneous flow of sound energy per unit of area and per unit time in the direction of the local instantaneous acoustic particle velocity in a temporally stationary sound field

$$\vec{I} = \lim_{T\to\infty} \frac{1}{T} \int_0^T p(t)\vec{u}(t)\,\mathrm{d}t$$

where

$p(t)$ is the instantaneous sound pressure at a point, in pascals;

$\vec{u}(t)$ is the associated instantaneous particle velocity at the same point, in metres per second;

T is the integration period, in seconds;

NOTE The sound intensity is a vectorial quantity. It is expressed in watts per square metre.

3.2
sound intensity vector
$\vec{I}_{xyz}$
vector sum of three measured orthogonal intensity components

NOTE It is expressed in watts per square metre.

3.3
level of the sound intensity vector
L_{Ixyz}
ten times the logarithm to the base 10 of the ratio of the modulus of the sound intensity vector to the reference intensity I_0, in decibels, as given by

$$L_{Ixyz} = 10 \lg \left(\frac{\left| \vec{I}_{xyz} \right|}{I_0} \right) \text{dB}$$

NOTE The reference sound intensity is $I_0 = 10^{-12}$ W/m^2.

3.4
sound field pressure-intensity indicator or field indicator
F_{pIxyz}
difference, in decibels, between the time-averaged measured sound pressure level, L'_p, and the level of the sound intensity vector, L_{Ixyz}, given by

$$F_{pIxyz} = L'_p - L_{Ixyz}$$

NOTE 1 When the indicator is determined for each of the Cartesian coordinates x, y and z, it is denoted F_{pIx}, F_{pIy} and F_{pIz} respectively.

NOTE 2 In ISO 9614-1 the notation F_2 is used.

3.5
pressure-residual intensity index
δ_{pI0}
difference, in decibels, between the indicated sound pressure level and the sound intensity level when the intensity probe is placed and oriented in a sound field such that the sound intensity is zero

EXAMPLE This can be achieved in an acoustic coupler, or other suitable unit that has been designed for the probe so that the microphones are transverse to the direction of propagation of plane sound waves.

3.6
emission sound pressure level
L_p
sound pressure level at a specified position near a machine, when the machine is in operation under specified operating and mounting conditions on a reflecting plane surface, excluding the effects of background noise as well as the effect of reflections other than those from the plane or planes permitted for the purpose of the test

NOTE It is expressed in decibels.

3.7
specified position
position defined in relation to a machine, including, but not limited to, an operator's position

NOTE 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 test code, if any. Positions located in the vicinity of a work station, or in the vicinity of an unattended machine, may be identified as "bystander positions".

3.8
dynamic capability index
L_{d}
difference, in decibels, between the pressure-residual intensity index and the bias error factor, K

$$L_{\mathrm{d}} = \delta_{pI0} - K$$

NOTE The value of K is 10 dB in this International Standard.

3.9
hemi-free field intensity correction
K_5
correction to account for the fact that the sound intensity level is slightly smaller than the sound pressure level in a hemi-free field

NOTE 1 In this International Standard, K_5 = 1 dB.

NOTE 2 By introducing this correction, the risk of a small systematic underestimate of the emission sound pressure level is minimized, see references [9] to [16] in the Bibliography. K_5 is frequency independent and thus also valid for A-weighted sound pressure levels with the notation K_{5A}.

4 Measurement uncertainty

A single value of an emission sound pressure level of a noise source determined according to the procedures of this International Standard is likely to differ from the true value at a fixed position by an amount within the range of the measurement uncertainty. The uncertainty in measurements of emission sound pressure levels arises from several factors which affect the results, some associated with environmental conditions in the measurement room and others with experimental techniques. A method for the determination of the measurement uncertainty from information on the various influence parameters is specified in the GUM.

Until more specific knowledge is available, the estimation of the measurement uncertainty might be based on existing information on the standard deviations of reproducibility and repeatability according to ISO 7574-1. Extensive measurement data are necessary in order to establish standard deviations of reproducibility and repeatability of emission sound pressure levels at individual positions; in any case, these standard deviations are likely to vary considerably between the many types of different machinery and equipment to which this International Standard is applied. It is therefore not possible to provide information that is universally applicable, and reference can only be made to noise test codes for relevant data on individual types of machines.

A typical value for the standard deviation of reproducibility is given in Table 1. From this, and with additional information on the standard deviation of repeatability, the total standard deviation and an estimate of the expanded measurement uncertainty for a coverage probability of approximately 95 % corresponding to a coverage factor of two, may be derived, as indicated.