



SLOVENSKI STANDARD

SIST EN 14462:2005

01-maj-2005

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Surface treatment equipment - Noise test code for surface treatment equipment including its ancillary handling equipment - Accuracy grades 2 and 3

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Oberflächenbehandlungsgeräte (Geräuschmessverfahren) für
Oberflächenbehandlungsgeräte einschließlich ihrer Be- und Entladeeinrichtungen -
Genauigkeitsklassen 2 und 3

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Equipements de traitement de surface - Code d'essai acoustique pour équipements de traitement de surface y compris les équipements de manutention auxiliaires - Classes de précision 2 et 3

Ta slovenski standard je istoveten z: EN 14462:2005

ICS:

17.140.20	Emisija hrupa naprav in opreme	Noise emitted by machines and equipment
25.220.01	Površinska obdelava in prevleke na splošno	Surface treatment and coating in general

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EUROPEAN STANDARD

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treatment equipment including its ancillary handling equipment -
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für Oberflächenbehandlungsgeräte einschließlich ihrer Be-
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This European Standard was approved by CEN on 22 December 2004.

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 Central Secretariat 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 Central Secretariat has the same status as the official versions.

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Foreword

This document (EN 14462:2005) has been prepared by Technical Committee CEN/TC 271 "Surface treatment equipment — Safety", 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of an identical text or by endorsement, at the latest by August 2005, and conflicting national standards shall be withdrawn at the latest by August 2005.

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 Directive(s).

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this document.

It augments the "C"-type safety standards prepared by CEN/TC 271. Its purpose is to provide a means of determination, declaration and verification of noise emission for the equipment within the scope of this document. The determination of noise emission values is a prerequisite for a manufacturer to assess the noise reduction obtained at the design stage.

This document includes a Bibliography.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

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Introduction

This noise test code provides manufacturers and third parties with the means to carry out noise emission measurements, determine values for noise declaration purposes under the Machinery Directive 98/79/EC and provides the means for their verification.

Noise emission characteristics include both emission sound pressure levels at workstations and sound power levels. The determination of these characteristics is necessary for:

- manufacturers to declare the noise emitted;
- comparing the noise emitted by machines;
- purposes of noise control at the source during the design stage;
- estimation of noise emission (exposure) at the workplace or workstation.

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1 Scope

This document specifies all the information necessary to carry out efficiently and under standardised conditions the determination, declaration and verification of the airborne noise emission of surface treatment machines as stated in Annex A. Surface treatment machines include but are not limited to

- machines for cleaning and pre-treatment of industrial item surfaces,
- machinery for coating and colour mixing,
- coating plants

and

- dryers, ovens and evaporating equipment.

This document describes the determination of emission sound pressure levels at work stations or other specified positions as well as the determination of sound power levels for surface treatment machines as stated in Annex A. This can be small single units (e.g. handheld atomising spraying equipment) and also complex machines with large dimensions (e.g. machines for cleaning and pre-treatment of industrial item surfaces, spray booths, dryers), which could also be linked.

In case of very large machines as defined in 3.10 the determination of sound power level may be very complicated or cannot be done with a reasonable amount of work. Therefore in this document, the measurement for very large machines is simplified by determining an averaged emission sound pressure level instead of the sound power level.

This document specifies noise measurement methods, installation/mounting and operation conditions that shall be used for the test. The use of this document ensures the reproducibility of the determination of the noise emission characteristics within specified limits determined by the grade of accuracy of the basic noise measurement method used (see 5.1 and 6.1). Noise measurement methods allowed by this document are engineering methods (grade 2) and survey methods (grade 3).

For continuous flow dryers for paper, board and foil (see EN 13023).

This document applies to surface treatment machines manufactured after the date of issue of this document.

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 1539, *Dryers and ovens, in which flammable substances are released — Safety requirements.*

EN 1953, *Atomising and spraying equipment for coating materials — Safety requirements.*

EN 12215, *Coating plants — Spray booths for application of organic liquid coating materials — Safety requirements.*

prEN 12581, *Coating plants — Dip and electrophoretic coating machinery for application of organic liquid coating materials — Safety requirements.*

prEN 12621, *Machinery for the supply and/or circulation of coating materials under pressure — Safety requirements.*

prEN 12753, *Thermal cleaning plants (incinerators) for exhaust gas from surface treatment plants — Safety requirements.*

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prEN 12757-1, *Mixing machinery for coating material — Safety requirements — Part 1: Mixing machinery for use in vehicle refinishing.*

prEN 12921-1, *Machines for surface cleaning and pretreatment of industrial items using liquids or vapours — Part 1: Common safety requirements.*

prEN 12921-2, *Machines for surface cleaning and pretreatment of industrial items using liquids or vapours — Part 2: Safety of machines using water based cleaning liquids.*

prEN 12921-3, *Machines for surface cleaning and pretreatment of industrial items using liquids or vapours — Part 3: Safety of machines using flammable cleaning liquids.*

prEN 12921-4, *Machines for surface cleaning and pretreatment of industrial items using liquids or vapours — Part 4: Safety of machines using halogenated solvents.*

prEN 12981, *Coating plants — Spray booths for application of organic powder coating material — Safety requirements.*

EN 13355, *Coating plants — Combined booths — Safety requirements.*

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

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

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

EN ISO 3747, *Acoustics — Determination of sound power levels of noise sources using sound pressure — Comparison method for use in situ (ISO 3747:2000).*

EN ISO 4871:1996, *Acoustics — Declaration and verification of noise emission values of machinery and equipment (ISO 4871:1996).*

EN ISO 9614-1, *Acoustics — Determination of sound power levels of noise sources using sound intensity — Part 1: Measurement at discrete points (ISO 9614-1:1993).*

EN ISO 9614-2, *Acoustics — Determination of sound power levels of noise sources using sound intensity — Part 2: Measurement by scanning (ISO 9614-2:1996).*

EN ISO 11201, *Acoustics — Noise emitted by machinery and equipment — Measurement of emission sound pressure levels at a work station and at other specified positions — Engineering method in an essentially free field over a reflecting plane (ISO 11201:1995).*

EN ISO 11202, *Acoustics — Noise emitted by machinery and equipment — Measurement of emission sound pressure levels at a work station and at other specified positions — Survey method in situ (ISO 11202:1995).*

EN ISO 11204, *Acoustics — Noise emitted by machinery and equipment — Measurement of emission sound pressure levels at a work station and at other specified positions — Method requiring environmental corrections (ISO 11204:1995).*

3 Terms and definitions

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

3.1

emission sound pressure, p

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

[EN ISO 11200:1995]

3.2

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 EN 61672-1. It is expressed in decibels. The reference sound pressure is 20 μPa

[EN ISO 11200:1995]

The emission sound pressure level of surface treatment equipment is determined at specified positions in accordance with this document

3.3

average emission sound pressure level \bar{L}_p

energy-average of the emission sound pressure levels L_p at several microphone positions around the machine

3.4

sound power, W

rate per unit time at which airborne sound energy is radiated by a source. It is expressed in watts

[EN ISO 3740:2000]

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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 reference sound power is 1 μW (10^{-12} W).

Frequency weighting or the width of the frequency band used shall be indicated, for example, A-weighted sound power level (L_{WA})

[EN ISO 3740:2000]

3.6

work station, operator's position

position in the vicinity of the machine under test which is intended for an operator

[EN ISO 11200:1995]

3.7

specified position

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

[EN ISO 11200:1995]

3.8

reference box

hypothetical surface which is the smallest rectangular parallelepiped that just encloses the source and terminates on the reflecting plane or planes

[EN ISO 3744:1995]

EN 14462:2005 (E)**3.9****measurement surface**

hypothetical surface of area S , enveloping the source, on which the measurement points are located. The measurement surface terminates on one or more reflecting planes

[EN ISO 3744:1995]

3.10**very large machines**

very large machines in the meaning of this document are machines with dimensions of about 15 m in length or more or about 5 m in height or more. Machines extending over several floors are regarded as very large machines, in every case

3.11**work cycle**

operation of a machine producing a periodic fluctuation of noise emission or a series of working processes with different noise emissions. One characteristic work cycle can be defined as operating conditions for the machine under test

4 Description of machinery family

This document is applicable to the surface treatment of the machines listed in Annex A.

5 Emission sound pressure level determination

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5.1 Selection of measurement method

A-weighted emission sound pressure levels L_{pA} at the work station and other specified positions and – if required in the relevant Annex – C-weighted peak emission sound pressure levels shall be determined in accordance with one of the basic noise emission standards;

- EN ISO 11201 (grade 2: engineering);
- EN ISO 11202 (grade 3: survey);
- EN ISO 11204 (grade 2 or grade 3).

The application of EN ISO 11201 (grade 2) is recommended for machinery which can be tested in an essentially free field over a reflecting plane (e.g. outdoor test location or adequate test room).

If machines cannot be measured in an essentially free field over a reflecting plane the emission sound pressure level should be determined according to EN ISO 11204 (with accuracy grade 2). Where this document is not applicable, EN ISO 11204 (with accuracy grade 3) or EN ISO 11202 (grade 3) shall be applied.

Grade 2 (engineering) shall be used whenever possible.

5.2 Selection of relevant work station(s) and other specified positions

The positions where the emission sound pressure levels are to be determined, are specified in the Annex A for the particular machine groups.

If fixed work stations other than those specified in Annex A exist, the emission sound pressure levels in addition shall be determined at these positions.

When no identified or fixed work stations exist, one or more measuring points shall be arranged on a measuring path surrounding the machine at a distance of 1 m (distance from the reference box) and a height of 1,6 m above the floor or access platform. For machines comprising several floors additional measuring paths are necessary for

each floor. If the machine is placed near to a boundary surface with a distance less than 2 m the measuring path shall end at this surface.

If machines are installed in several machine units separated from each other and if the distance between two units exceeds 2 m, each unit shall be considered to be an individual machine when defining the measuring points. Such machines shall always be considered as very large machines (see 5.3).

The measuring points shall be arranged on all sides of the reference box where the measuring path can be defined. The distance between single measuring points shall be less than 7 m. A more dense arrangement is required if the sound pressure level difference of neighbouring measuring points is more than 5 dB (A).

The microphone positions shall be located according to the following procedure:

the measuring path on each side of the machine shall be considered on its own and so subdivided that the result is the smallest possible number of equal-sized sections with a maximum length of 7 m. The microphone positions shall be located in the middle of each section. If additional measuring points are required these shall be located on both ends of the chosen sections.

When the application of the provisions of this clause leads to microphone positions that are not practical or may be dangerous, closest positions that are practical or not dangerous shall be chosen.

An example for the arrangement of measuring points is shown in Annex C.

The A-weighted emission sound pressure level L_{pA} shall be determined at all defined measuring points in accordance with the relevant basic standard. The highest measured value on each floor and the position of the corresponding measuring point shall be reported.

5.3 Selection of measuring points for very large machines

For very large machines (3.10), instead of the sound power level the emission sound pressure levels shall be determined at several positions in the following way:

The measuring points shall be arranged on a measuring path as described in 5.2. For machines comprising several floors one measuring path is required for every floor. The measuring points shall be located according to the procedure described in 5.2.

The A-weighted emission sound pressure level L_{pA} shall be determined at all defined measuring points in accordance with the relevant basic standard. The energy-average of the emission sound pressure levels L_{pA} at all microphone positions – average emission sound pressure level \bar{L}_{pA} – shall be the characteristic value for description of noise emission.

5.4 Measurement uncertainties

The measurement uncertainties for the individual measurement method are those indicated in the corresponding basic standards (see 5.1) in terms of standard deviation of reproducibility. The resulting uncertainty K_A for A-weighted levels which shall be considered for noise emission declaration is given in Clause 11.

6 Sound power level determination

6.1 Selection of measurement method

A-weighted sound power levels L_{WA} shall be determined in accordance with one of the basic noise emission standards:

- EN ISO 3744 (grade 2: engineering);
- EN ISO 3746 (grade 3: survey);

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- EN ISO 3747 (grade 2 and 3: engineering and survey);
- EN ISO 9614-1 (grades 1, 2, 3);
- EN ISO 9614-2 (grades 2, 3).

Grade 2 (engineering) shall be used whenever possible. When EN ISO 3744 or EN ISO 3746 is used the measurement surface shall be the parallelepiped one.

NOTE EN ISO 3740 gives guidance to the choice of the most appropriate measurement method. EN ISO 3744 (grade 2) or EN ISO 3746 (grade 3) are appropriate methods for many applications when machines can be measured outdoors or in an industrial working room. In an approximately reverberant field EN ISO 3747 allows the determination of sound power levels with grade 2 by using a reference sound source (comparison method).

In cases of extremely bad environmental conditions (reverberant field and/or high levels of extraneous noise) intensity methods according to EN ISO 9614-1 (measurement at discrete points) or according to EN ISO 9614-2 (scanning method) can be the only applicable method.

6.2 Method for very large machines

If the determination of the sound power level is required for declaration purposes and the machine is very large (see definition 3.10), emission sound pressure levels shall be determined according to 5.3 instead of the sound power level.

In this case the average emission sound pressure level \bar{L}_{pA} shall be determined and declared.

6.3 Measurement uncertainty

The measurement uncertainties for the individual measurement method are those indicated in the corresponding basic standards (see 6.1) in terms of standard deviation of reproducibility. The resulting uncertainty K_A for A-weighted levels which shall be considered for noise emission declaration is given in 11 da-

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7 Installation and mounting conditions

In general, complex machines for surface treatment consisting of the different components will be mounted at the destination; thus the installation conditions are given.

If individual machines of smaller dimensions are measured in rooms, outside or within test rooms the machine shall be installed, mounted and linked in accordance with the manufacturer's written instructions (to ensure the intended use). The installation chosen for noise measurement shall be indicated in the information to be recorded.

The installation and mounting conditions shall be identical for the determination of both sound power level and emission sound pressure levels at specified positions, and for declaration purposes.

8 Operating conditions

Since noise emissions depend on the corresponding operation mode of the machines, the operating conditions are specified in general in order to obtain comparable measuring results. The test shall be carried out under normal operating conditions including all sources of noise, normally present when the machine is under operation (e.g. pump, fan, conveyor).

Therefore, Annex A of this document defines the operating conditions for the machines under test. When, for a particular machine listed in Annex A, operating conditions defined in Annex A cannot be used, the reason shall be given and the conditions actually used shall be recorded, reported and declared.

In case of multi-purpose machines, the operating conditions shall be those of the purpose which gives the highest noise emissions. In case of different working processes that together constitute a characteristic working cycle, it is this cycle that is defined as the operating conditions.