



# SLOVENSKI STANDARD

## SIST EN 13023:2004+A1:2010

01-maj-2010

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### Metode za merjenje hrupa pri strojih za tiskanje, obdelavo in izdelavo papirja in dodatni opremi - Razreda točnosti 2 in 3

Noise measurement methods for printing, paper converting, paper making machines and auxiliary equipment - Accuracy grades 2 and 3

Geräuschmessverfahren für Druck- und Papierverarbeitungs-, Papierherstellungs- und Ausrüstungsmaschinen - Genauigkeitsklassen 2 und 3

Méthodes de mesurage du bruit émis par les machines d'impression, de transformation, de fabrication et de finition du papier - Classes de précision 2 et 3

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Ta slovenski standard je istoveten z: **EN 13023:2003+A1:2010**

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#### **ICS:**

17.140.20	Emisija hrupa naprav in opreme	Noise emitted by machines and equipment
37.100.10	Reprodukcijska oprema	Reproduction equipment
85.100	Oprema za papirno industrijo	Equipment for the paper industry

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EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**EN 13023:2003+A1**

March 2010

ICS 17.140.20; 37.100.10; 85.100

Supersedes EN 13023:2003

English Version

Noise measurement methods for printing, paper converting,  
paper making machines and auxiliary equipment - Accuracy  
grades 2 and 3

Méthodes de mesurage du bruit émis par les machines  
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Geräuschmessverfahren für Druck- und  
Papierverarbeitungs-, Papierherstellungs- und  
Ausrüstungsmaschinen - Genauigkeitsklassen 2 und 3

This European Standard was approved by CEN on 25 March 2003 and includes Amendment 1 approved by CEN on 7 February 2010.

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

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**EN 13023:2003+A1:2010 (E)****Foreword**

This document (EN 13023:2003+A1:2010) has been prepared by Technical Committee CEN/TC 198 "Printing and paper machinery - 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of an identical text or by endorsement, at the latest by September 2010, and conflicting national standards shall be withdrawn at the latest by September 2010.

This document includes Amendment 1, approved by CEN on 2010-02-07.

This document supersedes EN 13023:2003.

The start and finish of text introduced or altered by amendment is indicated in the text by tags  $\boxed{A_1}$   $\boxed{A_1}$ .

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 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).

$\boxed{A_1}$  For relationship with EU Directive(s), see informative Annexes ZA and ZB, which are integral parts of this document.  $\boxed{A_1}$

Annexes A to J are normative.

This document contains a bibliography.

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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 United Kingdom.

## 1 Scope

This standard specifies all the information necessary to carry out efficiently and under standardized conditions the determination, declaration and verification of airborne noise emission from printing and paper converting machines covered by the EN 1010 series and from paper making and finishing machines covered by the EN 1034 series. It specifies noise measurement methods and installation and operating conditions to be used for the test.

This standard applies to those machines listed in the normative annexes A to J. The principles of this noise test code should be applied as far as possible also for the determination of noise emission of machines and machine parts not listed in the normative annexes A to J. In such cases, all information relating to assembly, installation and operating conditions as well as the arrangement of work stations should be recorded and reported in the test report.

Noise emission characteristics include emission sound pressure levels at work stations and the sound power level. Declared noise emission values permit comparison of printing and paper machines on the market.

The use of this noise test code ensures the reproducibility of the determination of the characteristic noise emissions within specific limits. These limits are determined by the accuracy grade of the noise measuring method used. Noise measurements specified by this standard are carried out by the engineering method (accuracy grade 2) and the survey method (accuracy grade 3).

## 2 Normative references

**[A1]** 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. **[A1]**

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**[A1]** ~~deleted text~~ **[A1]** <https://standards.iteh.ai/catalog/standards/sist/3c4fd612-31b4-44f7-864d-81cf585f4a21/sist-en-13023-2004a1-2010>

**[A1]** EN ISO 216:2007, *Writing paper and certain classes of printed matter — Trimmed sizes — A and B series, and indication of machine direction (ISO 216:2007)* **[A1]**

**[A1]** EN ISO 3740:2000, *Acoustics — Determination of sound power levels of noise sources — Guidelines for the use of basic standards (ISO 3740:2000)* **[A1]**

EN ISO 3744:1994, *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 3746:1995, *Acoustics — Determination of sound power levels of noise sources using sound pressure — Survey method using an enveloping measurement surface over a reflecting plane for accuracy grade 3 (ISO 3746:1995)*

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

EN ISO 9614-1:1995, *Acoustics — Determination of sound-power levels of noise sources using sound intensity — Part 1: Measurement at discrete points (ISO 9614-1:1993)*

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

EN ISO 11200:1995, *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 (ISO 11200:1995)*

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EN ISO 11202:1995, *Acoustics — Noise emitted by machinery and equipment — Measurement of emission sound pressure levels at a work station and at other specified positions — Survey method for measurements accuracy grade 3 under operating conditions (ISO 11202:1995)*

EN ISO 11203:1995, *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 (ISO 11203:1995)*

EN ISO 11204:1995, *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 **Error! Reference source not found.**, the following term and definition applies in addition to the definitions given in the basic standards for the determination of emission sound pressure levels at work stations and other specified positions (EN ISO 11200:1995, EN ISO 11202:1995, EN ISO 11203:1995 and EN ISO 11204:1995) and in the basic standards for the determination of sound power levels (EN ISO 3740:2000, EN ISO 3744:1995, EN ISO 3746:1995 and EN ISO 9614-1:1995 and ISO 9614-2:1996).

**3.1**  
**large machines**  
large machines within the meaning of this standard are machines where the greatest linear dimension exceeds 15 m

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**4 Description of machines**

The machines described in this standard include the equipment or parts covered by the normative annexes A to J or as described in the measurement reports, which contribute significantly to noise emission.

For machines not listed in the normative annexes A to J, a description of auxiliary devices shall be provided where these devices are required for the correct operation of the machines and are therefore subject to the noise measurement methods.

**5 Emission sound pressure level determination**

The measuring points for determining the emission sound pressure level at work stations and other specified positions are defined in the normative annexes A to J. All microphone positions are at a height of 1,6 m above the floor or access level.

Emission sound pressure levels shall be determined in accordance with EN ISO 11204 (with accuracy grade 2). Where this standard is not applicable, EN ISO 11204 (with accuracy grade 3) or EN ISO 11202:1995 shall be applied. The test report shall state the reasons why it was not possible to apply a grade 2 method.

Where measuring is made difficult due to strong environmental influences such as sound reflections from walls and high levels of noise from other sources, EN ISO 11203 (with accuracy grades 2 or 3) may be applied if the sound power level has been determined in accordance with EN ISO 9614-1 or EN ISO 9614-2.

Where emission sound pressure levels are determined in frequency bands, EN ISO 11204 shall be applied. The work station should preferably be used as the measuring point or, if this cannot be defined, the point with the highest sound pressure level measured at a distance of 1 m from the machine surface and at a height of 1,6 m above the floor or access level. **[A<sub>1</sub>]** The C-weighted peak emission sound pressure level ( $L_{pCpeak}$ ) shall be determined where this exceeds 63 Pa (130 dB in relation to 20  $\mu$ Pa). **[A<sub>1</sub>]**



## 6 Sound power level determination

### 6.1 General method

**A1** If at any workstation the A-weighted emission sound pressure level exceeds 80 dB(A) the sound power level has to be determined additionally. This shall be done in accordance with EN ISO 3744, EN ISO 9614-1 (with accuracy grade 2) or EN ISO 9614-2 (with accuracy grade 2). **A1** Where these standards are not applicable, EN ISO 3746, EN ISO 9614-1 (with accuracy grade 3) or EN ISO 9614-2 (with accuracy grade 3) shall be used. The test report shall state the reasons why it was not possible to apply a grade 2 method for determining the sound power level.

### 6.2 Alternative method for large machines

For large machines, instead of the sound power level, it is permissible to determine and declare emission sound pressure levels at specified measurement points around the machine.

Such measuring points are specified along a path around the machine at a height of 1,6 m above the floor or access level and at a distance of 1 m from the machine. They shall be spaced so that the difference in emission sound pressure levels between adjacent points does not exceed 5 dB(A).

NOTE Where the emission sound pressure levels around the machine vary by less than 5 dB e.g. when the sound radiation is very uniform, measurements should be made at 4 characteristic positions at least.

For determining the emission sound pressure level, the method described in clause 5 shall be used.

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## 7 Assembly and installation conditions (standards.iteh.ai)

The machine shall be assembled and installed in accordance with the manufacturer's instructions. If the conditions of installation are not known or if several modes of installation are possible, the type of installation used for noise measurement shall be specified in the test report.

The assembly and installation conditions of the machine shall be identical for determining both sound power levels and also emission sound pressure levels at the measuring points specified in the normative annexes A to J.

Care shall be taken that any electrical connections, piping or air ducts connected to the machine do not significantly increase noise emission.

## 8 Operating conditions

Operating conditions with significant noise emission are stipulated in the normative annexes A to J. Operating conditions shall be identical for determining both the emission sound pressure level at the specified measuring points and also the sound power level. Where there are no operating conditions defined in the normative annexes A to J, it is understood that operating conditions with significance for noise emission do not exist. If the operating conditions specified in the annexes cannot be adhered to partly or completely, the operating conditions that differ shall be recorded and documented in the test report.

There are basically two different types of operating conditions:

- a) Where the normal running of the machine leads to a constant noise emission, this operating condition shall be used for noise measurements.
- b) For variable operating conditions, either one or more typical operating conditions or one characteristic work cycle comprising, amongst other things, the time required for converting and finishing the product (printed sheet, folded box, book block etc.) shall be defined.

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Where work cycles are used for measuring and fluctuations of the A-weighted sound pressure level occurring during such cycles exceed 5 dB(A), the cycles are divided into operational subcycles during which specific operating conditions exist, for example operation under no load or operation under full load. Where subdividing the work cycle into subcycles is not possible, the time averaged level  $L_{pA}$  and, if required,  $L_{pCpeak}$  shall be determined for the whole work cycle and be reported.

On machines with varying applications (such as combined machines, production lines), separate noise measurements shall be taken for the specific applications intended in accordance with the annexes to this standard.

The noise emission shall be measured, unless otherwise stated in the normative annexes A to J, with the machine operating at 100 % of the maximum speed specified by the manufacturer.

**9 Measurement uncertainty**

The measurement uncertainty of the noise emission values will comply with the accuracy grade of the method applied. Accuracy grades are specified in the standards for determining emission sound pressure levels (see clause 5) and sound power levels (see clause 6).

**10 Information to be recorded**

The information to be recorded covers all the technical requirements of the noise test code. Any deviations from the noise test code or from the basic standards upon which it is based are to be recorded together with the technical justification for such deviations.

**11 Information to be reported**

The test report of the noise measurements shall include the following information, in addition to the designation (see clause 12),

- a) type, classification and technical data, dimensions, as well as manufacturer, machine serial number and year of manufacture of the machine tested;
- b) any installation and operating conditions relevant to noise emission during the test (see clauses 7 and 8) that are not specified in the normative annexes A to J;
- c) basic standards applied for the determination of the noise emission (see clauses 5 and 6), giving, where applicable, reasons for not using accuracy grade 2 methods;
- d) measurement results
  - emission sound pressure level at work station  $L_{pA}$  and other specified positions
  - if required, A-weighted sound power level  $L_{WA}$  or emission sound pressure level  $L_{pA}$  on a measuring path according to 6.2
  - if required, impulse noise index according to EN ISO 11204 at measuring points
  - if required,  $L_{pCpeak}$  at measuring points
  - if required, emission sound pressure level in frequency bands
  - when work cycles are split into subcycles, measuring results shall be provided for each subcycle.

- e) locations of work stations and of measuring points if they deviate from the normative annexes A to J or are not specified there;
- f) place, date and person responsible for test.

## 12 Declaration and verification of noise emission values

The declaration of the noise emission values is the sole responsibility of the manufacturer or his appointed representative. The method for noise declaration described in EN ISO 4871 shall be applied using the dual number declaration (see annex B.2 of EN ISO 4871:1996). If machine-specific values for the uncertainty  $K$  are unavailable, respective values shall be taken from A.2.2 of EN ISO 4871:1996, i.e.  $K_{pA} = K_{WA} = 2,5$  dB for grade 2 and  $K_{pA} = K_{WA} = 4$  dB for grade 3 measurements.

The noise declaration shall mention explicitly the fact that the noise emission values have been obtained in accordance with the machine-specific noise test code and indicate which standards have been used. Any deviation from the noise test code shall be clearly indicated in the declaration.

The method used and the grade of accuracy attained shall be stated. The noise designation shall contain the following information:

- the term "noise test "
- the EN number
- the letters and numbers identifying the relevant normative annex applied
- the grade of accuracy attained ("grade" 2 or 3).

EXAMPLE Designation for a noise test carried out in accordance with this standard, annex H.2.2, accuracy grade 2:

**Noise test EN 13023 H.2.2 - Grade 2**

Verification shall be carried out as far as possible using the same assembly and installation and operating conditions and with the machine in a condition comparable to the one used for the initial determination of noise emission values. It shall be carried out in accordance with EN ISO 4871.

NOTE Additional noise emission data such as sound power levels in octave bands may also be given in the noise declaration. In this case, care should be taken to present additional noise emission data in such a form as to prevent confusion with the declared noise emission values.

## Annex A (normative)

### Machines for processing raw material

#### Barking drums

Operating condition of machine	Filling degree	Position of outlet weir with 60 % to 70 % of front side
Measuring point(s) at work station(s) and other specified positions	Arrangement	Delivery side: 3 m from centre of front side (fixed work station not defined)
Additional technical data	Machine data	<ul style="list-style-type: none"> <li>— length in m and</li> <li>— diameter in mm and</li> <li>— inclination angle of drum in °</li> <li>— type of drum bearing: steel rollers and/or rubber rollers otherwise: to be specified</li> <li>— barking drums type of barking drums and arrangement of barking drums</li> <li>— speed in rev/min with above filling degree</li> </ul>
	Material processed	<ul style="list-style-type: none"> <li>— type and length of logs</li> <li>— diameter range of logs</li> </ul>

## Annex B (normative)

### Machines for the preparation of wood pulp

#### Wood grinders

Operating condition of machine	Tool	Sharpening of grinding tool: optimum
	Water jet pressure	10 bar
Measuring point(s) at work station(s) and other specified positions	Arrangement	<ul style="list-style-type: none"> <li>— press grinder: 1 m in front of charging point</li> <li>— continuous grinder: 1 m from centre of discharging point</li> </ul>
Additional technical data	Machine data	<ul style="list-style-type: none"> <li>— stone dimensions diameter in m and width in m</li> <li>— circumferential speed in m/s</li> <li>— specification of wood density</li> <li>— power specification</li> <li>— date of last sharpening of stone</li> </ul>
	Material processed	— type of wood

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## Annex C (normative)

### Machines for the preparation of cellulose

#### Pulp digesters with chip inlet

Operating condition of machine	Performance	Nominal performance
Measuring point(s) at work station(s) and other specified positions	Arrangement	1 m in front of charging point
Additional technical data	Machine data	<ul style="list-style-type: none"> <li>— volume of digester in m<sup>3</sup></li> <li>— type of charging unit</li> <li>— specification of individual blow-in vapour throughput in tonnes per hour</li> <li>— charging time in min</li> </ul>

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## Annex D (normative)

### Machines for the preparation of stock

#### D.1 Disintegrators

Operating condition of machine	Performance	Nominal performance
	Material processed	Type of fibres: as required
Measuring point(s) at work station(s) and other specified positions	Arrangement	1 m in front of centre of charging point
Additional technical data	Machine data	<ul style="list-style-type: none"> <li>— type of digester single-shaft digester or double-shaft digester</li> <li>— nominal throughput in tonnes per day</li> <li>— individual power input rate in kW at nominal throughput</li> <li>— stock density (percentage of dry fibres)</li> </ul>

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#### D.2 Pulpers

Operating condition of machine	Performance	Nominal performance
	Material processed	Type of fibres: as required
Measuring point(s) at work station(s) and other specified positions	Arrangement	Measuring points: 1 m in front of centre of charging point and 1 m in front of centre of control desk
Additional technical data	Machine data	<ul style="list-style-type: none"> <li>— type of shredding: horizontal or vertical</li> <li>— nominal volume in m<sup>3</sup></li> <li>— diameter of vessel in m</li> <li>— type of operation: continuous or intermittent</li> <li>— throughput in tonnes per day</li> <li>— stock density (discharge density) (percentage of dry fibres)</li> </ul>