



SLOVENSKI STANDARD
SIST EN 12639:2001
01-september-2001

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Liquid pumps and pump units - Noise test code - Grade 2 and grade 3 of accuracy

Flüssigkeitspumpen und -pumpenaggregate - Geräuschmessung - Genauigkeitsklassen 2 und 3

Pompes et groupes motopompes pour liquide - Code d'essai acoustique - Classes de précision 2 et 3

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Ta slovenski standard je istoveten z: **EN 12639:2000**

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ICS:

17.140.20	Emisija hrupa naprav in opreme	Noise emitted by machines and equipment
23.080	!j æ\ ^	Pumps

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en

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EUROPEAN STANDARD

EN 12639

NORME EUROPÉENNE

EUROPÄISCHE NORM

February 2000

ICS 17.140.20; 23.080

English version

Liquid pumps and pump units - Noise test code - Grade 2 and grade 3 of accuracy

Pompes et groupes motopompes pour liquide - Code d'essai acoustique - Classes de précision 2 et 3

Flüssigkeitspumpen und -pumpenaggregate - Geräuschmessung - Genauigkeitsklassen 2 und 3

This European Standard was approved by CEN on 3 December 1999.

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.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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

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Foreword

This European Standard has been prepared by Technical Committee CEN/TC 197, Pumps, the Secretariat of which is held by AFNOR.

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 2000, and conflicting national standards shall be withdrawn at the latest by August 2000.

This European Standard 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 standard.

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

In this European Standard annexes A and B are normative. Annex ZA is informative.

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Introduction

The noise emitted by a pump unit can be radiated by the casing of the pump, the driving system (e.g. motor, gear box, coupling), the piping system and all the connected structures.

On site the perceived noise can be significantly increased by reverberation effects or by the radiation of extraneous sources.

Depending on the type of pump it may be useful to know:

- a) the noise of the pumping system (including piping);
- b) the noise of the pump unit, including the driver and the transmission elements but excluding the noise of the piping system;
- c) the noise emitted by the pump alone, excluding the noise from the driver, transmission elements and the pipings;
- d) the noise emitted by each of those elements in respect to a given requirement or in view of an efficient sound proofing of the installation.

This European Standard describes methods for the determination of the noise emitted by a pump unit (case b) or a pump alone (case c). Noise emission is expressed in terms of the sound power level of the machine and the emission sound pressure level at the relevant work station (see 6.2).

This European Standard is intended to enable the manufacturer to:

- show the effectiveness of noise reduction;
- declare the noise emission levels.

This European Standard is a type C standard as stated in EN 292. The machinery concerned and the extent to which noise is covered are indicated in the scope of this standard.

When provisions of this type C standard are different from those which are stated in A or B standards, the provisions of this type C standard take precedence.

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1 Scope

This European Standard specifies all the information necessary to carry out efficiently and under standardized conditions the determination, declaration and verification of the airborne noise emission of liquid pumps or pump units (see 4.1). It specifies the noise measurement methods and the operating and mounting conditions that shall be used for the test.

Noise emission characteristics include emission sound pressure levels at specified positions and the sound power level. The determination of these quantities is necessary for:

- declaring the noise emission values;
- purpose of noise control at source at the design stage.

NOTE The determination of these quantities is also necessary for comparing the noise emitted by liquid pumps on the market.

The use of this European Standard ensures the reproducibility of the determination of the airborne noise emission characteristics within specified limits determined by the grade of accuracy of the basic airborne noise measurement method used. Noise measurement methods according to this European Standard are engineering methods (grade 2) and survey methods (grade 3).

This European Standard does not deal with the characterization of the structure-borne sound and liquid-borne noise generated by liquid pumps.

This European Standard is intended to complement EN 809.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 292-1:1991, *Safety of machinery — Basic concepts, general principles for design — Part 1: Basic terminology, methodology.*

EN 292-2:1991, *Safety of machinery — Basic concepts, general principles for design — Part 2: Technical principles and specifications.*

EN 292-2/A1:1995, *Safety of machinery — Basic concepts, general principles for design — Part 2: Technical principles and specifications — Amendment A1.*

prEN 12723 :1999, *Liquid pumps — General terms for pumps and installations — Definitions, quantities, letter symbols and units.*

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EN ISO 3743-1:1995, *Acoustics — Determination of sound power levels of noise sources — Engineering methods for small, movable sources in reverberant fields — Part 1: Comparison method in hard-walled test rooms (ISO 3743-1:1994).*

EN ISO 3743-2:1996, *Acoustics — Determination of sound power levels of noise sources using sound pressure — Engineering methods for small, movable sources in reverberant fields — Part 2: Methods for special reverberation test rooms (ISO 3743-2:1994).*

EN ISO 3744:1995, *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* (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 11203:1995, *Acoustics — Noise emitted by machinery and equipment — Determination of emission sound pressure levels at the work station and at other specified positions from the sound power level* (ISO 11203:1995).

ISO TR 7849:1987, *Acoustics — Estimation of airborne noise emitted by machinery using vibration measurement*.

3 Terms and definitions

For the purposes of this standard, the definitions given in prEN 12723:1999 apply. Further definitions are given in the standards which are designated in clause 2.

3.1 pump

in general pumps (pump alone) are defined as being terminated by their inlet and outlet branches as well as in general their shaft ends

3.2 pump unit

pump units comprise the pump types as described above and their driver (e.g. electric motor, steam turbine) including transmission elements (e.g. coupling, gear), baseplates and any auxiliary equipment¹⁾

4 Pump family and pump configuration

4.1 Pumps covered by this standard comprise liquid pumps of the rotodynamic and positive displacement, rotary and reciprocating types.

4.2 This standard provides two possibilities of measurement, either pump alone (see Table 1), or pump units (see Table 2). In these two cases the pumps shall be installed:

- on site (see 7.2.1); or <https://standards.iteh.ai/catalog/standards/sist/c962d8ac-9457-43d7-a977-f3da098d98f2/sist-en-12639-2001>
- on shop test stand (see 7.2.2); or
- in a specific facility intended for acoustic measurement (see 7.2.3).

4.3 Safety guards, e.g. coupling guards, insulation hoods, etc., if any, shall be installed during noise emission determination.

¹⁾ Supplied with the pump.

5 Sound power level determination

5.1 General

One of the following grade 2 of accuracy methods for determining the sound power level shall be used:

- EN ISO 3743-1 or EN ISO 3743-2;
- EN ISO 3744;
- EN ISO 9614-1 or EN ISO 9614-2.

If it has been shown that the applicability requirements of these grade 2 standards cannot be attained, e.g. too much background noise, then one of the following grade 3 methods shall be used:

- EN ISO 3746;
- EN ISO 9614-1 or EN ISO 9614-2.

NOTE 1 EN ISO 3743-1 is based upon a hard-walled room and low background noise. This standard gives specifications to sound pressure level measurement in octave bands, in order to calculate the sound power level.

NOTE 2 EN ISO 3743-2 is based upon special reverberation test room. This standard gives specifications to A-weighted sound pressure level measurement in order to calculate the sound power level.

NOTE 3 EN ISO 3744 is based upon a nonreverberant environment and low background noise. This standard specifies a method to calculate the sound power level from the measured A-weighted sound pressure levels or sound pressure levels in octave or third octave bands.

NOTE 4 EN ISO 3746 is less demanding; it only gives specifications to the measurement of A-weighted sound pressure levels and provides A-weighted sound power levels with grade 3 of accuracy.

NOTE 5 EN ISO 9614 can be used in all environments including reverberation and extraneous noise sources to a large extent. It gives specifications to sound intensity and sound pressure measurement. Depending on the level of the reverberation and extraneous noise it provides the sound power level either as A-weighted overall level or in octave or third octave band. For grade 3 measurements only the overall A-weighted sound power level is available.

NOTE 6 EN ISO 9614-1 requires measurements of sound intensity and simultaneously sound pressure level (at discrete points). In this case the number of points is generally higher than the number of points used for the standards based on sound pressure measurements.

NOTE 7 EN ISO 9614-2 requires measurement of sound intensity and simultaneously sound pressure level by scanning. This can be made on partial or global surface depending on the configuration of the machine. The method generally reduces the measurement time.

NOTE 8 ISO TR 7849 is an ISO Technical Report which can be used only when the prescriptions of the other methods are not fulfilled. This method is based upon measurement of vibration velocity of the relevant parts of the pump or pump unit. It provides an estimation of the A-weighted sound power level or sound power level in octave or third octave bands.

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For selection of the basic standard for determination of the sound power level of a pump, Table 1 for pumps (pump alone) and Table 2 for pump units shall be used.

The reflecting plane shall be either a hard plane or a surface of water.

The standard written in bold letters is the preferred method and shall be used where practical. If it is not practical one of the other mentioned basic standards shall be used.

5.2 Specific considerations for reference box, measurement surface, position of microphones and intensity probe

When either EN ISO 3744, EN ISO 3746 or EN ISO 9614 is used, the following applies.

5.2.1 Reference box

The reference box is a hypothetical surface, the smallest simple volume (parallelepiped, box, cylinder ...) containing the pump unit or pump and the flanges of the machine but excluding the pipings for the pump unit and pipings, transmission elements and driver for pumps (pump alone). For EN ISO 3744 and EN ISO 3746, the reference box is a parallelepiped. The box encloses the source and terminates on the reflecting plane (hard ground or water). For examples of reference boxes see Figures 1 and 2.

NOTE Small individual components of the source which do not contribute to the sound radiation may lie outside the reference box.

5.2.2 Measurement surface and microphone positions

The measurement surface is a surface enveloping the reference box at a given distance to the box.

The distance between the measurement surface and the reference box is called the measurement distance. It depends on the basic method used:

- for EN ISO 3744 and EN ISO 3746, both of which are based on sound pressure level measurements, the distance shall be chosen equal to 1 m;

NOTE Where the background noise requirements of these standards are not met, a distance smaller than 1 m but larger than 0,25 m may be chosen.

- for EN ISO 9614-1 and EN ISO 9614-2, which are both based on a sound intensity measurement, the distance shall be:

$$d_1 \geq 0,5 \text{ m for EN ISO 9614-1;}$$

$$0,2 \text{ m} \leq d_2 \leq 0,5 \text{ m for EN ISO 9614-2.}$$

For the measurement surface see Figures 3 to 6 and annex A.

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Table 1 — Pump (pump alone) — Selection of standards for determination of sound power level

Test arrangement	Grade	Pump power input, p , in kW			
		$0,5 < p \leq 15$	$15 < p \leq 75$	$75 < p \leq 300$	$p > 300$
Specific facility ¹⁾	2	EN ISO 3744 EN ISO 3743-2 EN ISO 9614 ²⁾	EN ISO 9614 ²⁾ EN ISO 3744 EN ISO 3743-2	EN ISO 9614 ²⁾ EN ISO 3744	EN ISO 9614 ²⁾ EN ISO 3744
Shop test stand	2	EN ISO 9614 ²⁾			impractical
	3	EN ISO 9614 ²⁾ EN ISO 3746		EN ISO 9614 ²⁾	
On site	2	EN ISO 9614 ²⁾			impractical
	3	EN ISO 9614 ²⁾ EN ISO 3746		EN ISO 9614 ²⁾ ISO TR 7849	

¹⁾ A facility can be qualified as specifically designed for noise measurements if it yields grade 2 measurements.
²⁾ EN ISO 9614 means EN ISO 9614-1 or EN ISO 9614-2.

Table 2 — Pump unit — Selection of standards for determination of sound power level

Test arrangement	Grade	Driver rated power, P , in kW			
		$0,5 < P \leq 15$	$15 < P \leq 75$	$75 < P \leq 300$	$P > 300$
Specific facility ¹⁾	2	EN ISO 3744 EN ISO 3743-2 EN ISO 9614 ³⁾		EN ISO 3744 EN ISO 9614 ³⁾	EN ISO 9614 ³⁾ EN ISO 3744
Shop test stand	2	EN ISO 3744 EN ISO 3743-1 ²⁾ EN ISO 9614 ³⁾	EN ISO 3744 EN ISO 9614 ³⁾	EN ISO 9614 ³⁾ EN ISO 3744	EN ISO 9614 ³⁾
	3	EN ISO 3746 EN ISO 9614 ³⁾		EN ISO 9614 ³⁾ EN ISO 3746	EN ISO 9614 ³⁾ EN ISO 3746
On site	2	EN ISO 9614 ³⁾ EN ISO 3744			EN ISO 9614 ³⁾
	3	EN ISO 3746 EN ISO 9614 ³⁾		EN ISO 9614 ³⁾ EN ISO 3746	

¹⁾ A facility can be qualified as specifically designed for noise measurements if it yields grade 2 measurements.
²⁾ EN ISO 3743-1 may be used for pump units in a shop test stand at the condition that pipings are properly lagged.
³⁾ EN ISO 9614 means EN ISO 9614-1 or EN ISO 9614-2.