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Liquid pumps and pumps units — Noise test code — Grades 2 and 3 of accuracy

Pompes et groupes motopompes pour liquides — Code d'essai acoustique — Classes de précision 2 et 3

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by the European Committee for Standardization (CEN) Technical Committee CEN/TC 197, *Pumps*, in collaboration with ISO Technical Committee TC 115, *Pumps*, in accordance with the agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This third edition cancels and replaces the second edition (ISO 20361:2015), which has been technically revised. The main changes compared to the previous edition are as follows:

— addition of Clause 7 on measurement uncertainty;

— addition of information in Clause 8 on noise test situation and background noise;

— change of title of previous Clause 9 (now Clause 10).

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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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 can be useful to know the following:

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 piping;

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 document 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 document is intended to enable the manufacturer to

— show the effectiveness of noise reduction, and

— declare the noise emission levels.

This document is a type-C standard as stated in ISO 12100.

This document is of relevance, in particular, for the following stakeholder groups representing the market players with regard to machinery safety:

— machine manufacturers (small, medium and large enterprises);

— health and safety bodies (regulators, accident prevention organizations, market surveillance, etc.).

Others can be affected by the level of machinery safety achieved with the means of the document by the above-mentioned stakeholder groups:

— machine users/employers (small, medium and large enterprises);

— machine users/employees (e.g. trade unions, organizations for people with special needs);

— service providers, e.g. for maintenance (small, medium and large enterprises);

— consumers (in case of machinery intended for use by consumers).

The above-mentioned stakeholder groups have been given the possibility to participate at the drafting process of this document. The machinery concerned and the extent to which hazards, hazardous situations or hazardous events are covered are indicated in the Scope of this document.

When requirements of this type-C standard are different from those which are stated in type-A or type-B standards, the requirements of this type-C standard take precedence over the requirements of the other standards for machines that have been designed and built according to the requirements of this type-C standard.

The machinery concerned and the extent to which noise is covered are indicated in the scope of this document.

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Liquid pumps and pumps units — Noise test code — Grades 2 and 3 of accuracy

1 Scope

This document 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, and

— purpose of noise control at source at the design stage.

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

The use of this document 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 document are engineering methods (grade 2) and survey methods (grade 3).

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

NOTE This document is specified in EN 809+A1 for noise measurements of the pump (or pump unit).

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 3743-1:2010, *Acoustics — Determination of sound power levels and sound energy levels of noise sources using sound pressure — Engineering methods for small movable sources in reverberant fields — Part 1: Comparison method for a hard-walled test room*

ISO 3743-2:2018, *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 3744:2010, *Acoustics — Determination of sound power levels and sound energy levels of noise sources using sound pressure — Engineering methods for an essentially free field over a reflecting plane*

ISO 3746:2010, *Acoustics — Determination of sound power levels and sound energy levels of noise sources using sound pressure — Survey method using an enveloping measurement surface over a reflecting plane*

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

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

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

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 17769-1:2012, *Liquid pumps and installation — General terms — Definitions, quantities, letter symbols and units*

ISO 17769-2:2012, *Liquid pumps and installation — General terms — Definitions, quantities, letter symbols and units*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 17769-1, ISO 17769-2 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1
pump
equipment that is defined as being terminated by its inlet and outlet branches as well as in general its shaft ends

3.2
pump unit
equipment that is comprised of the *pump* (3.1) and its driver (e.g. electric motor, steam turbine) including transmission elements (e.g. coupling, gear), baseplates, and any auxiliary equipment supplied with the pump

4 Pump family and pump configuration

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

4.2 This document 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 8.2.2), or

— on shop test stand (see 8.2.3), or

— in a specific facility intended for acoustic measurement (see 8.2.4).

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

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:

— ISO 3743-1 or ISO 3743-2;

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