SLOVENSKI STANDARD
SIST EN 16644:2015

01-marec-2015

Nadomešča:
SIST EN 1151-2:2007
SIST EN 1151-2:2007/AC:2008

Črpalke - Centrifugalne črpalke - Obtočne črpalke z naznačeno vhodno močjo do največ 200 W za grelne in gospodinjske toplovodne napeljave - Oznaka preskusa hrupa (vibro-akustičnega) pri merjenju hrupa konstrukcije in hrupa tekočine

Pumps - Rotodynamic pumps - Glandless circulators having a rated power input not exceeding 200 W for heating installations and domestic hot water installations - Noise test code (vibro-acoustics) for measuring structure- and fluid-borne noise

Pumpen - Kreiselpumpen - Umwälzpumpen in Nassläuferbauart mit elektrischer Leistungsaufnahme bis 200 W für Heizungsanlagen und Brauchwassererwärmungsanlagen für den Hausgebrauch - Geräuschprüfvorschrift (vibro -akustisch) zur Messung von Körperschall und Flüssigkeitsschall

Pompes - Pompes rotodynamiques - Circulateurs sans presse-étoupe de puissance absorbée n'excédant pas 200 W, destinés au chauffage central et à la distribution d'eau chaude sanitaire domestique - Code d'essai sonore (vibro-acoustique) pour le mesurage des bruits de structure et hydrauliques

Ta slovenski standard je istoveten z: **EN 16644:2014**

ICS:

23.080	Črpalke	Pumps

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English Version

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This European Standard was approved by CEN on 2 November 2014.

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COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

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Foreword

This document (EN 16644:2014) 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of an identical text or by endorsement, at the latest by June 2015 and conflicting national standards shall be withdrawn at the latest by June 2015.

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 1151-2:2006.

This standard replaces EN 1151-2:2006 as a result of the withdrawal of EN 1151-1 and the issuing of the EN 16297 series as its replacement and is expanded to include cooling systems.

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, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

This document covers the measurement of fluid and structure-borne noise as induced by small glandless circulators having a rated input of ≤ 200 W. It has been prepared in response to the need of having uniform procedures as requirements for noise levels especially in residential housing, tightened by national and European regulations. The issue of airborne noise is covered by other standards.

1 Scope

This European Standard specifies a test code for the vibro-acoustic characterization of glandless circulators with pump housing having a rated power input $P_1 \leq 200W$, intended to be used in heating installations, domestic hot water service installations and cooling systems, and is limited to glandless circulators with threaded connections of 11/2 inch. The test code comprises the test rig, the measurement method and the test conditions.

This European Standard applies to glandless circulators, which are manufactured after the date of issue of this European Standard.

The characterization principle is based on measuring the structure-borne and the fluid-borne power transmitted respectively by vibration and pressure fluctuations in the pipe connected to a glandless circulator.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 16297-1:2012, *Pumps — Rotodynamic pumps — Glandless circulators — Part 1: General requirements and procedures for testing and calculation of energy efficiency index (EEI)*

EN 50160, *Voltage characteristics of electricity supplied by public distribution networks*

ISO 2016, *Capillary solder fittings for copper tubes — Assembly dimensions and tests*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 16297-1:2012 and the following apply.

3.1
speed setting
setting attained (for pumps with different settings) when the speed of the electric motor is changed

3.2
fluid-borne intensity
I_{fb}
time averaged rate of flow of the acoustic energy per cross section of fluid transmitted lengthways the straight pipe by internal pressure fluctuations

Note 1 to entry: Its sign can be positive or negative indicating the sense of energy propagation.

Note 2 to entry: Fluid-borne intensity is expressed in W/m^2.

3.3
fluid-borne power
P_{fb}
net acoustic power emitted by a source of pressure fluctuations in the connected straight pipe ⟨glandless circulators⟩

Note 1 to entry: Fluid-borne power is always positive.

Note 2 to entry: Fluid-borne power is expressed in W.

3.4
structure-borne intensity
I_{sb}
time averaged rate of flow of the vibrational energy per unit of length transmitted lengthways the straight pipe by vibration

Note 1 to entry: Its sign can be positive or negative indicating the sense of energy propagation.

Note 2 to entry: I_{sb} is an average of the structure borne intensity over the pipe wall thickness and is therefore expressed in W/m.

3.5
structure-borne power
P_{sb}
net vibration power emitted by a source of vibration in the connected straight pipe ⟨glandless circulators⟩

Note 1 to entry: Structure-borne power is always positive.

Note 2 to entry: Structure-borne power is expressed in W.

3.6
coefficient of fluid-borne energy reflection
R_{fb}
ratio between the net fluid-borne power reflected by pipework discontinuities and the net fluid borne power emitted in a straight pipe by a pump ⟨glandless circulators⟩

Note 1 to entry: Pipework discontinuities covers bends, obstructions, section changes, pipe fixations etc.

Note 2 to entry: This coefficient is always positive and is non-dimensional.

3.7
coefficient of structure-borne energy reflection
R_{sb}
ratio between the net structure-borne power reflected by pipework discontinuities and the net structure borne power emitted in a straight pipe by a pump ⟨glandless circulators⟩

Note 1 to entry: Pipework discontinuities covers bends, obstructions, section changes, pipe fixations etc.

Note 2 to entry: This coefficient is always positive and is non-dimensional.

3.8
fluid-borne power level
L_{Wfb}
logarithmic measure of the fluid-borne power emitted in the straight pipe by a source ⟨glandless circulators⟩

3.9
structure-borne power level
L_{Wsb}
logarithmic measure of the structure-borne power emitted in the straight pipe by a source ⟨glandless circulators⟩

3.10
steady state temperature period
period of time during which the variation of temperature on the motor and on the body of the glandless circulator is contained between limits specified by the manufacturer

3.11
booster pump
any type of pump that maintains the flow

4 Symbols and units

For the purpose of this document, the symbols, quantities and units given in Table 1 apply.

Table 1 — Symbols and units

Symbol	Quantity	Unit
g	Acceleration due to gravity	m/s^2
H	Head (water gauge)	m
P_1	Rated power input	W
p	Pressure	bar
$p_{2max\ o}$	Maximum outlet working pressure	bar
Q	Flow rate	m^3/h
T	Temperature	°C
T_F	Fluid temperature at inlet port	°C
v	Average velocity of water	m/s
ρ	Density	kg/m^3

5 Test rig

5.1 General

The fluid- and structure-borne powers are determined from measurement data acquired from the test rig.

Components and assembly of the test-rig are described below. To get repeatable and reproducible results of the measurements, a rig, which is in accordance with or corresponds to all specifications and assembly advice given here, shall be used.

5.2 Main components of test rig

The test rig is illustrated in Figure 1 and its main components are given in Table 2.

Table 2 — Main components of test rig

No.	Component	Purpose
1	Glandless circulator	Test object: source of pressure pulsation and vibration.
2	Vibration measurement pipe	Acquisition of vibration data allowing the determination of the structure-borne power.
3	Solid anechoic termination	Device absorbing structure-borne power.
4	Pressure pulsation measurement pipe	Acquisition of pressure fluctuation data allowing the determination of the fluid-borne power.
5	Liquid anechoic termination	Device absorbing fluid-borne power.
6	Water tank	Acoustical isolation of the regulation valve.
7	Pressure vessel	Device equalizing the system pressure.
8	Flow meter	Measurement of flow rate
9	Regulation valve	Flow rate regulation
10	Pipe supports	Connecting devices of pipework with frame.
11	Frame	Metal structure.

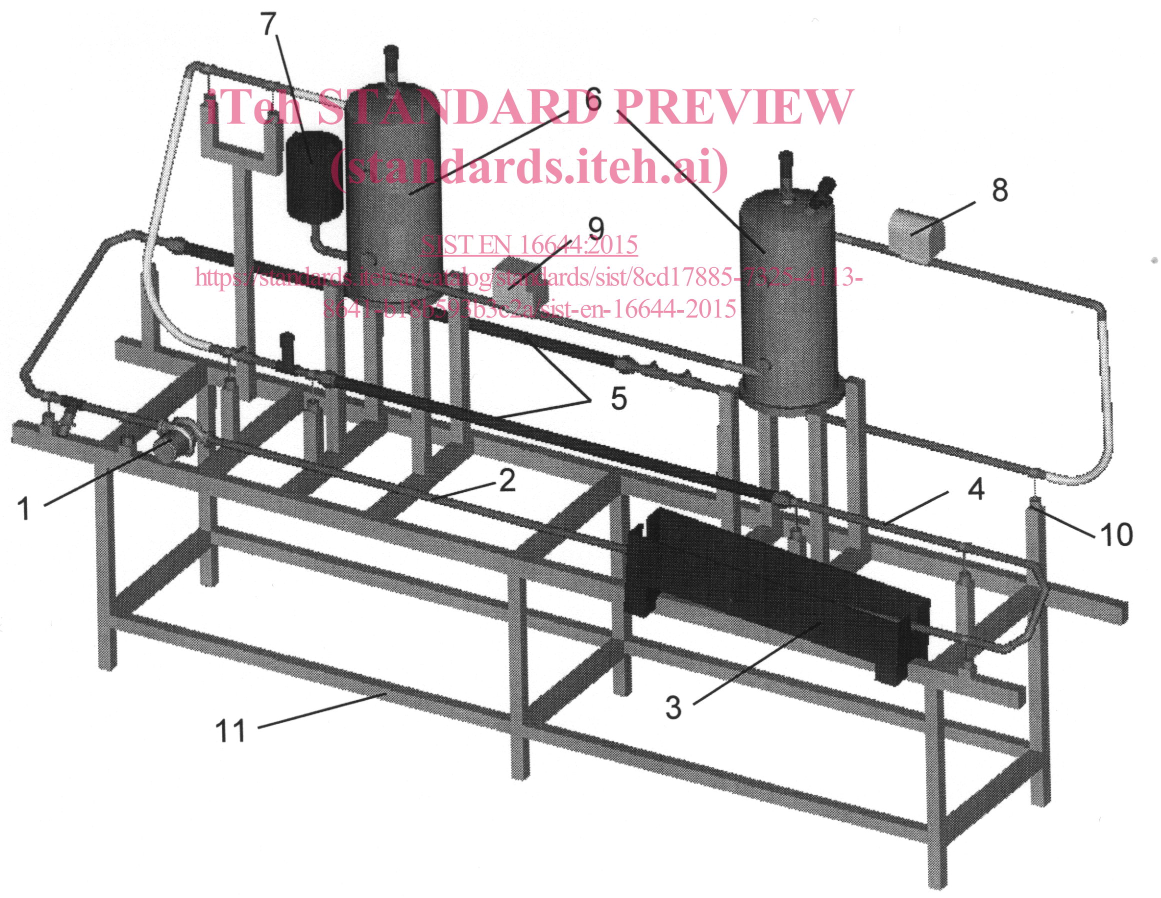

Figure 1 — Test rig