



SLOVENSKI STANDARD
oSIST prEN 1151-1:2009
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Pumps - Rotodynamic pumps - Circulation pumps having a rated power input not exceeding 200 W for heating installations and domestic hot water installations - Part 1: General requirements, testing, marking

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Pumpen - Kreiselpumpen - Umwälzpumpen mit elektrischer Leistungsaufnahme bis 200 W für Heizungsanlagen und Brauchwassererwärmungsanlagen für den Hausgebrauch - Teil 1: Allgemeine Anforderungen, Prüfung, Kennzeichnung

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Pompes - Pompes rotodynamiques - Circulateurs de puissance absorbée n'excédant pas 200 W, destinés au chauffage central et à la distribution d'eau chaude sanitaire domestique - Partie 1: Exigences générales, essais, marquage

Ta slovenski standard je istoveten z: prEN 1151-1

ICS:

23.080 1] æ\ ^ Pumps

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

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Will supersede EN 1151-1:2006

English Version

Pumps - Rotodynamic pumps - Circulation pumps having a rated power input not exceeding 200 W for heating installations and domestic hot water installations - Part 1: General requirements, testing, marking

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This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 197.

If this draft becomes a European Standard, 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.

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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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Foreword

This document (prEN 1151-1:2009) has been prepared by Technical Committee CEN/TC 197 “Pumps”, the secretariat of which is held by AFNOR.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 1151-1:2006.

EN 1151 consists of the following parts under the general title Pumps — Rotodynamic pumps — Circulation pumps having a rated power input not exceeding 200 W for heating installations and domestic hot water installations:

- Part 1: General requirements, testing, marking
- Part 2: Noise test code (vibro-acoustics) for measuring structure and fluid-borne noise

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Introduction

For the purpose of this document, circulation pumps having a rated power input ≤ 200 W are generally considered for domestic use and circulation pumps having a rated power input > 200 W are considered for professional/commercial use.

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1 Scope

This part of EN 1151 establishes general principles for the construction, use and testing of circulation pumps of the glandless type, having a rated power input $P_1 \leq 200$ W, intended to be used in heating installations and domestic hot water service installations.

NOTE The requirements of this document may apply to circulation pumps for domestic use having a rated power input above 200 W up to and including 300 W. However, this decision depends on agreement between the supplier and purchaser.

Circulation pumps with a rated power input above 200 W for professional/commercial use are excluded from the scope of this document.

This document applies to:

- a) A.C. circulation pumps having a rated power input $P_1 \leq 200$ W intended for use in ordinary heating water systems with a maximum permissible inlet temperature of $T_F \leq 110$ °C and a maximum outlet working pressure $p_{2\max o} \leq 6$ bar.
- b) A.C. circulation pumps having a rated power input $P_1 \leq 200$ W intended for use in domestic hot water installations with a permissible inlet temperature of $T_F \leq 65$ °C and a maximum outlet working pressure $p_{2\max o} \leq 10$ bar.

This document applies to circulation pumps, which are manufactured after the date of issue of this document.

This document covers the performance of circulation pumps. All known hazards which are likely to occur at normal installation and operation are covered by the European Standards EN 809 and EN 60335-2-51.

As regards safety for electrotechnical parts of circulation pumps, EN 60335-2-51 applies.

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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 1151-2:2006, *Pumps — Rotodynamic pumps — Circulation pumps having a rated power input not exceeding 200 W for heating installations and domestic hot water installations — Part 2: Noise test code (vibro-acoustics) for measuring structure- and fluid-borne noise*

EN 60034-1, *Rotating electrical machines - Part 1: Rating and performance (IEC 60034-1:2004)*

EN 60335-2-51:2003, *Household and similar electrical appliances — Safety — Part 2-51: Particular requirements for stationary circulation pumps for heating and service water installations (IEC 60335-2-51:2002)*

EN ISO 12100-2:2003, *Safety of machinery — Basic concepts, general principles for design — Part 2: Technical principles (ISO 12100-2:2003)*

ISO 9906:1999, *Rotodynamic pumps — Hydraulic performance acceptance tests — Grades 1 and 2*

HD 472 S1:1989, *Nominal voltages for low voltage public electricity supply systems*

3 Terms and definitions

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

- 3.1
circulation pump**
centrifugal pump which circulates heating water and/or domestic hot water, as determined by its type
- NOTE A **circulation pump** is a pumping device consisting of a hydraulic, a mechanical and an electric part including a motor with or without speed control.
- 3.2
rated power input**
maximum electrical power input at nominal voltage at normal operational conditions
- 3.3
minimum power input**
minimum electrical power input at nominal voltage at normal operational conditions
- 3.4
glandless pump
circulation pump** (3.1) where the rotor of the motor is in direct contact with the water being pumped
- 3.5
speed setting**
setting attained (for pumps with different settings) when the speed of the electric motor is changed
- 3.6
range of operation**
range of the $H(Q)$ characteristic specified by the manufacturer for normal operation of the pump
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- 3.7
maximum inlet pressure (static pressure)**
highest inlet pressure to which the pump is subjected during operation
- NOTE All pressures in this document are gauge pressures except for the **differential pressure** (3.8) measured in 6.2.6.2.
- 3.8
differential pressure**
gain in pressure between the pump inlet and pump outlet
- NOTE All pressures in this document are gauge pressures except for the **differential pressure** (3.8) measured in 6.2.6.2.
- 3.9
maximum outlet working pressure**
sum of **maximum inlet pressure** (3.7) and maximum **differential pressure** (3.8) at rated conditions
- 3.10
differential pressure controlled circulation pump**
speed controlled **circulation pump** (3.1) adapting in time the pressure to the demand
- 3.11
non-controlled circulation pump
circulation pump** (3.1) having no adaption in time the pressure to the demand

3.12 hydraulic power

conventional expression of the arithmetic product of the flow, Q , the head, H , and a constant

NOTE For the purpose of this document, the **hydraulic power** is expressed by:

$$P_{\text{hyd}} = 2,72 \times Q \times H$$

where:

P_{hyd} is the hydraulic power [W]

Q is the flow [m³/h]

H is the differential head [m]

2,72 is the conversion factor assuming water temperature 20 °C and gravity of 9,81 m/s²

3.13 system curve

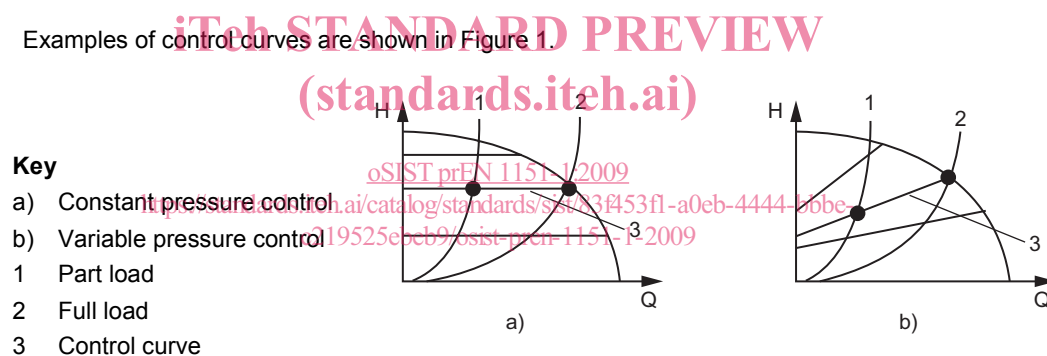
graphical representation of relationship between flow and head ($H = f(Q)$), resulting from friction

3.14 control curve

graphical representation of relationship between flow and head ($H = f(Q)$), obtained by changing the speed of the motor automatically depending on load

NOTE 1 For pumps with multiple control curves, the applicable curve is selected depending on the heating system.

NOTE 2 Examples of control curves are shown in Figure 1.



NOTE The “Dots” shows the **operating points** (3.19) at full load and part load operation.

Figure 1 — Control curve examples

3.15 non-control curve

graphical representation of relationship between flow and head ($H = f(Q)$), obtained by non-automatic operation of the pump at different loads

3.16 maximum setting

curve, which gives the maximum **hydraulic power** (3.12)

NOTE This curve could be either a **control curve** (3.14) or a **non-control curve** (3.15) if that exists.

3.17 reference control curve

theoretical **control curve** (3.14) used for standardized measurements and calculation of **compensated power input** (3.20)

prEN 1151-1:2009 (E)**3.18****load profile**

relationship between flow and running time of the **circulation pump** (3.1)

3.19**operating point**

point in the Q - H plane characterizing the intersection between a **system curve** (3.13) and either a **control curve** (3.14) or a **non-control curve** (3.15)

3.20**compensated power input**

calculated power, compensating for deviations between measured head values and head values on the **reference control curve** (3.17)

3.21**averaged compensated power input**

$P_{L,avg}$

compensated power input (3.20) weighted on the **load profile** (3.18)

3.22**control performance criteria**

criteria for the ability of a **circulation pump** (3.1) to operate at a specific **control curve** (3.14)

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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
H_{meas}	Measured head (water gauge)	m
H_{calc}	Calculated head (water gauge)	m
H_{ref}	Reference head (water gauge)	m
H_{max}	Maximum head (water gauge)	m
$H_{100\%}$	Head (water gauge) at maximum hydraulic power	m
P_1	Power input	W
$P_{1, \text{rated}}$	Rated power input	W
$P_{1, \text{min}}$	Minimum power input	W
P_L	Compensated power input	W
$P_{L, \text{avg}}$	Average compensated power input	W
P_{meas}	Measured power input	W
P_{hyd}	Hydraulic power	W
p	Pressure	bar
$p_{1\text{max o}}$	Maximum inlet pressure	bar
p_{1-2}	Differential pressure	Pa
$p_{2\text{max o}}$	Maximum outlet working pressure	bar
Q	Flow rate	m^3/h
$Q_{100\%}$	Flow rate at maximum hydraulic power	m^3/h
Q_{max}	Maximum flow rate	m^3/h
T	Temperature	$^{\circ}\text{C}$
T_F	Fluid temperature at inlet port	$^{\circ}\text{C}$
v	Average velocity of water	m/s
ρ	Density	kg/m^3

5 Performance and safety requirements

5.1 Hydraulic characteristics

The hydraulic characteristics of the circulation pump shall be in accordance with the data published by the manufacturer.

For non-controlled circulation pumps with different speed settings, the non-control curve of each setting shall be given (see 6.2 for test arrangement).

For differential pressure controlled circulation pumps, the control curves, or the area indicated by the maximum and the minimum control curve, shall be given (see 6.2 for test arrangement).

5.1.1 $Q_{100\%}$ and $H_{100\%}$

($Q_{100\%}, H_{100\%}$) is the operational point where hydraulic power is maximum.