



**SLOVENSKI STANDARD**  
**SIST EN ISO 5199:2004**  
**01-september-2004**

---

HM b] bY'gdYVWZ\_UWY'nUWbIf]Z [ UbY' fdU\_YË'FUnfYX'≠fIGC') %- .&\$\$&L

Technical specifications for centrifugal pumps - Class II (ISO 5199:2002)

Technische Anforderungen an Kreiselpumpen - Klasse II (ISO 5199:2002)

Spécifications techniques pour pompes centrifuges - Classe II (ISO 5199:2002)

**Ta slovenski standard je istoveten z: EN ISO 5199:2002**

[SIST EN ISO 5199:2004](https://standards.iteh.ai/catalog/standards/sist/88ae69cd-9463-4126-ad12-62f2851314cd/sist-en-iso-5199-2004)

<https://standards.iteh.ai/catalog/standards/sist/88ae69cd-9463-4126-ad12-62f2851314cd/sist-en-iso-5199-2004>

**ICS:**

23.080            1] æ ^            Pumps

**SIST EN ISO 5199:2004**            **en**

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

[SIST EN ISO 5199:2004](#)

<https://standards.iteh.ai/catalog/standards/sist/88ae69cd-9463-4126-ad12-62f2851314cd/sist-en-iso-5199-2004>

EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**EN ISO 5199**

March 2002

ICS 22.080

Supersedes EN 25199:1992

English version

**Technical specifications for centrifugal pumps - Class II (ISO 5199:2002)**

Spécifications techniques pour pompes centrifuges -  
Classe II (ISO 5199:2002)

Technische Anforderungen an Kreiselpumpen - Klasse II  
(ISO 5199:2002)

This European Standard was approved by CEN on 11 March 2002.

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 Management Centre 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 Management Centre has the same status as the official versions.

**iTeh STANDARD PREVIEW**

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

[SIST EN ISO 5199:2004](https://standards.iteh.ai/catalog/standards/sist/88ae69cd-9463-4126-ad12-62f2851314cd/sist-en-iso-5199-2004)

<https://standards.iteh.ai/catalog/standards/sist/88ae69cd-9463-4126-ad12-62f2851314cd/sist-en-iso-5199-2004>



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

**Management Centre: rue de Stassart, 36 B-1050 Brussels**

EN ISO 5199:2002 (E)

<b>CORRECTED 2003-09-24</b>
-----------------------------

## Foreword

This document (ISO 5199:2002) has been prepared by Technical Committee ISO/TC 115 "Pumps" in collaboration with 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 September 2002, and conflicting national standards shall be withdrawn at the latest by September 2002.

This document supersedes EN 25199:1992.

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, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

### Endorsement notice

[SIST EN ISO 5199:2004](https://standards.iteh.ai/catalog/standards/sist/68ac09cd-9765-4126-ad12-62f2851314cd/sist-en-iso-5199-2004)

The text of ISO 5199:2002 has been approved by CEN as EN ISO 5199:2002 without any modifications.

<https://standards.iteh.ai/catalog/standards/sist/68ac09cd-9765-4126-ad12-62f2851314cd/sist-en-iso-5199-2004>

NOTE Normative references to International Standards are listed in Annex ZA (normative).

## Annex ZA (normative)

### Normative references to international publications with their relevant European publications

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 (including amendments).

NOTE Where an International Publication has been modified by common modifications, indicated by (mod.), the relevant EN/HD applies.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN</u>	<u>Year</u>
ISO 2858	1975	End-suction centrifugal pumps (rating 16 bar) - Designation, nominal duty point and dimensions	EN 22858	1993
ISO 3274	1996	Geometrical product specifications (GPS) - Surface texture: Profile method - Nominal characteristics of contact (stylus) instruments	EN ISO 3274	1997
ISO 3661	1977	End-suction centrifugal pumps - Baseplate and installation dimensions	EN 23661	1993
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	EN ISO 3744	1995
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	EN ISO 3746	1995
ISO 9906	1999	Rotodynamic pumps - Hydraulic performance acceptance tests - Grades 1 and 2	EN ISO 9906	1999

**EN ISO 5199:2002 (E)**

ISO 9614-1	1993	Acoustics - Determination of sound power levels of noise sources using sound intensity - Part 1: Measurements at discrete points	EN ISO 9614-1	1995
ISO 9614-2	1996	Acoustics - Determination of sound power levels of noise sources using sound intensity - Part 2: Measurement by scanning	EN ISO 9614-2	1996

## **iTeh STANDARD PREVIEW (standards.iteh.ai)**

[SIST EN ISO 5199:2004](https://standards.iteh.ai/catalog/standards/sist/88ae69cd-9463-4126-ad12-62f2851314cd/sist-en-iso-5199-2004)

<https://standards.iteh.ai/catalog/standards/sist/88ae69cd-9463-4126-ad12-62f2851314cd/sist-en-iso-5199-2004>

INTERNATIONAL  
STANDARD

ISO  
5199

Second edition  
2002-03-15

---

---

**Technical specifications for centrifugal  
pumps — Class II**

*Spécifications techniques pour pompes centrifuges — Classe II*

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

[SIST EN ISO 5199:2004](https://standards.iteh.ai/catalog/standards/sist/88ae69cd-9463-4126-ad12-62f2851314cd/sist-en-iso-5199-2004)

<https://standards.iteh.ai/catalog/standards/sist/88ae69cd-9463-4126-ad12-62f2851314cd/sist-en-iso-5199-2004>



Reference number  
ISO 5199:2002(E)

© ISO 2002

## ISO 5199:2002(E)

**PDF disclaimer**

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

## iTeh STANDARD PREVIEW (standards.iteh.ai)

[SIST EN ISO 5199:2004](https://standards.iteh.ai/catalog/standards/sist/88ae69cd-9463-4126-ad12-62f2851314cd/sist-en-iso-5199-2004)

<https://standards.iteh.ai/catalog/standards/sist/88ae69cd-9463-4126-ad12-62f2851314cd/sist-en-iso-5199-2004>

© ISO 2002

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office  
Case postale 56 • CH-1211 Geneva 20  
Tel. + 41 22 749 01 11  
Fax + 41 22 749 09 47  
E-mail [copyright@iso.ch](mailto:copyright@iso.ch)  
Web [www.iso.ch](http://www.iso.ch)

Printed in Switzerland



## Contents

	Page
Foreword.....	v
Introduction.....	vi
<b>1 Scope .....</b>	<b>1</b>
<b>2 Normative references .....</b>	<b>1</b>
<b>3 Terms and definitions .....</b>	<b>2</b>
<b>4 Design .....</b>	<b>6</b>
4.1 General.....	6
4.2 Prime movers .....	7
4.3 Critical speed, balance and vibration .....	8
4.4 Pressure-containing parts .....	9
4.5 Branches (nozzles) and miscellaneous connections .....	11
4.6 External forces and moments on flanges (inlet and outlet).....	11
4.7 Branch (nozzle) flanges .....	12
4.8 Impellers .....	12
4.9 Wear rings or equivalent components .....	12
4.10 Running clearance.....	12
4.11 Shafts and shaft sleeves.....	12
4.12 Bearings .....	14
4.13 Shaft sealing .....	15
4.14 Labelling .....	18
4.15 Couplings .....	18
4.16 Baseplate.....	19
4.17 Special tools.....	20
<b>5 Materials .....</b>	<b>20</b>
5.1 Selection of materials.....	20
5.2 Material composition and quality.....	20
5.3 Repairs.....	20
<b>6 Shop inspection and tests .....</b>	<b>20</b>
6.1 General.....	20
6.2 Inspection.....	20
6.3 Tests.....	21
6.4 Final inspection .....	22
<b>7 Preparation for dispatch .....</b>	<b>22</b>
7.1 Shaft seals .....	22
7.2 Preservation for transport and storage.....	22
7.3 Securing of rotating parts for transport .....	23
7.4 Openings .....	23
7.5 Piping and auxiliaries.....	23
7.6 Identification .....	23
<b>Annex A (normative) Centrifugal pump — Data sheet.....</b>	<b>24</b>
<b>Annex B (informative) External forces and moments on branches .....</b>	<b>27</b>
<b>Annex C (normative) Enquiry, proposal, purchase order .....</b>	<b>40</b>
<b>Annex D (normative) Documentation after purchase order .....</b>	<b>41</b>
<b>Annex E (informative) Examples of seal arrangements .....</b>	<b>42</b>
<b>Annex F (informative) Piping arrangements for seals.....</b>	<b>45</b>

**ISO 5199:2002(E)**

<b>Annex G</b> (informative) <b>Designation examples using references from annexes E and F</b> .....	<b>53</b>
<b>Annex H</b> (informative) <b>Checklist</b> .....	<b>55</b>
<b>Bibliography</b> .....	<b>57</b>

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

[SIST EN ISO 5199:2004](https://standards.iteh.ai/catalog/standards/sist/88ae69cd-9463-4126-ad12-62f2851314cd/sist-en-iso-5199-2004)

<https://standards.iteh.ai/catalog/standards/sist/88ae69cd-9463-4126-ad12-62f2851314cd/sist-en-iso-5199-2004>

## 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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 5199 was prepared by Technical Committee ISO/TC 115, *Pumps*, Subcommittee SC 1, *Dimensions and technical specifications of pumps*.

This second edition cancels and replaces the first edition (ISO 5199:1986), which has been technically revised.

Annexes A, C and D form a normative part of this International Standard. Annexes B, E, F, G and H are for information only.

[SIST EN ISO 5199:2004](https://standards.iteh.ai/catalog/standards/sist/88ae69cd-9463-4126-ad12-62f2851314cd/sist-en-iso-5199-2004)

<https://standards.iteh.ai/catalog/standards/sist/88ae69cd-9463-4126-ad12-62f2851314cd/sist-en-iso-5199-2004>

## ISO 5199:2002(E)

## Introduction

This International Standard is one of a set dealing with technical specifications of centrifugal pumps; they are designated as Classes I, II and III. Class I comprises the most severe and Class III the least severe requirements.

The selection of the class to be used is in accordance with the technical requirements for the application for which the pump is intended. The class chosen should be agreed between the purchaser and supplier. Furthermore, additional safety requirements concerning the field of application should be taken into account.

However, it is not possible to standardize the class of technical requirements for centrifugal pumps for a certain field of application, because each field of application comprises different requirements. All classes (I, II and III) can be used in accordance to the different requirements of the pump application. So it may happen that pumps built in accordance with Classes I, II and III may work beside one another in the one plant.

Further requirements covering specific applications or industries may be dealt with in separate standards.

Criteria for the selection of the required class of a pump for a certain application may include

- reliability,
- required operating life,
- operating conditions,
- environmental conditions, and
- local ambient conditions.

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

[SIST EN ISO 5199:2004](https://standards.iteh.ai/catalog/standards/sist/88ae69cd-9463-4126-ad12-62f2851314cd/sist-en-iso-5199-2004)

<https://standards.iteh.ai/catalog/standards/sist/88ae69cd-9463-4126-ad12-62f2851314cd/sist-en-iso-5199-2004>

Cross-references in boldface and the checklist in annex H indicate where a decision may be required by the purchaser, or where agreement is required between the purchaser and the manufacturer/supplier.

# Technical specifications for centrifugal pumps — Class II

## 1 Scope

**1.1** This International Standard specifies the requirements for Class II centrifugal pumps of single-stage, multistage, horizontal or vertical construction, with any drive and any installation for general application. Pumps used in the chemical process industries (e.g. those conforming to ISO 2858) are typical of those covered by this International Standard.

**1.2** This International Standard includes design features concerned with installation, maintenance and safety for these pumps including baseplate, couplings and auxiliary piping, but it does not specify any requirements for the driver other than those related to its rated power output.

**1.3** Where application of this International Standard has been called for and requires a specific design feature, alternative designs may be offered which meet the intent of this International Standard provided that the alternative is described in detail.

Pumps not complying with all the requirements of this International Standard may be offered for consideration provided that all deviations are stated.

iTech STANDARD PREVIEW  
(standards.iteh.ai)

## 2 Normative references

SIST EN ISO 5199:2004

<https://standards.iteh.ai/catalog/standards/sist/88ae69cd-9463-4126-ad12-63728f037181/iso-5199-2004>

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 76, *Rolling bearings — Static load ratings*

ISO 281-1, *Rolling bearings — Dynamic load ratings and rating life — Part 1: Calculation methods*

ISO 2858, *End-suction centrifugal pumps (rating 16 bar) — Designation, nominal duty point and dimensions*

ISO 3069, *End-suction centrifugal pumps — Dimensions of cavities for mechanical seals and for soft packing*

ISO 3274, *Geometrical Product Specifications (GPS) — Surface texture: Profile method — Nominal characteristics of contact (stylus) instruments*

ISO 3661, *End-suction centrifugal pumps — Baseplate and installation dimensions*

ISO 3744, *Acoustics — Determination of sound power levels of noise sources using sound pressure — Engineering method in an essentially free field over a reflecting plane*

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

ISO 7005-1, *Metallic flanges — Part 1: Steel flanges*

**ISO 5199:2002(E)**

ISO 7005-2, *Metallic flanges — Part 2: Cast iron flanges*

ISO 7005-3, *Metallic flanges — Part 3: Copper alloy and composite flanges*

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

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

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

**3 Terms and definitions**

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

**3.1****operating conditions**

all parameters (e.g. operating temperature, operating pressure) determined by a given application and pumped liquid

NOTE These parameters will influence the type of construction and construction materials.

**3.2****allowable operating range**

range of flows or heads at the specified operating conditions of the pump supplied as limited by cavitation, heating, vibration, noise, shaft deflection and other similar criteria

NOTE The upper and lower limits of the range are denoted by maximum and minimum continuous flow.

**3.3****rated conditions**

conditions (driver excluded) that define the guarantee values necessary to meet all defined operating conditions, taking into account any necessary margins

**3.4****driver rated power output**

greatest continuous driver power output permitted under defined conditions

**3.5****basic design pressure**

pressure derived from the permitted stresses at 20 °C of the material used for the pressure-containing parts

**3.6****maximum allowable working pressure**

pressure for a component on the basis of materials used and on the basis of calculation rules at the specified operating temperature

**3.7****rated inlet pressure**

inlet pressure of the operating conditions at the guarantee point

**3.8****rated outlet pressure**

outlet pressure of the pump at the guarantee point with rated flow, rated speed, rated inlet pressure and density

**3.9****pressure/temperature limit**

limiting pressure and temperature of a component at given design and material (see Figure 1)

**3.10****corrosion allowance**

that portion of the wall thickness of the parts wetted by the pumped liquid in excess of the theoretical thickness required to withstand the pressure limits given at the most severe operating conditions

**3.11****maximum allowable continuous speed**

highest speed at which the manufacturer will permit continuous operation

**3.12****trip speed**

speed at which the independent emergency overspeed devices operate to shut down a prime mover

**3.13****first critical speed**

speed of rotation at which the first (lowest) lateral natural frequency of vibration of the rotating parts corresponds to the frequency of rotation

**3.14****design radial load**

radial load of the pump rotor for which the bearing system is selected

**3.15****maximum radial load**

greatest radial load of the pump rotor resulting from operating the pump at any condition within its allowable operating range

**3.16****shaft runout**

total radial deviation indicated by a device measuring the shaft position in relation to the bearing housing, as the shaft is rotated manually in its bearings with the shaft in the horizontal position

**3.17****face runout**

total axial deviation indicated at the outer radial face of the shaft seal casing by a device attached to and rotated with the shaft when the shaft is rotated manually in its bearings in the horizontal position

NOTE The radial face is that which determines the alignment of a seal component.

**3.18****shaft deflection**

displacement of a shaft from its geometric centre in response to the radial hydraulic forces acting on the impeller

NOTE Shaft deflection does not include shaft movement caused by tilting within the bearing clearances, bending caused by impeller unbalance, or shaft runout.

**3.19****seal flush****circulation**

return of pumped liquid from high pressure area to seal cavity

NOTE This can be by external piping or internal passage and is used to remove heat generated at the seal or to maintain positive pressure in the seal cavity or treated to improve the working environment for the seal. In some cases it may be desirable to circulate from the seal cavity to a lower pressure area (e.g. the inlet).