SLOVENSKI STANDARD
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Technical specifications for centrifugal pumps - Class III (ISO 9908:1993)

Technical specifications for centrifugal pumps - Class III (ISO 9908:1993)

Technische Anforderungen für Kreiselpumpen - Klasse III (IS0 9908:1993)

Spécifications techniques pour pompes centrifuges - Classe III (ISO 9908:1993)

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Spécifications techniques pour pompes centrifuges - Classe III (ISO 9908:1993)

Technische Anforderungen für Kreiselpumpen - Klasse III (ISO 9908:1993)

This European Standard was approved by CEN on 18 October 1997.

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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.

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

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

Ref. No. EN ISO 9908:1997 E

Foreword

The text of the International Standard from Technical Committee ISO/TC 115 "Pumps" of the International Organization for Standardization (ISO) has been taken over as an European Standard 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of an identical text or by endorsement, at the latest by May 1998, and conflicting national standards shall be withdrawn at the latest by May 1998.

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.

Endorsement notice

The text of the International Standard ISO 9908:1993 has been approved by CEN as a European Standard without any modification.

INTERNATIONAL STANDARD

ISO 9908

First edition
1993-11-01

Technical specifications for centrifugal pumps — Class III

Spécifications techniques pour pompes centrifuges — Classe III

Reference number
ISO 9908:1993(E)

Contents

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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.

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.

International Standard ISO 9908 was prepared by Technical Committee ISO/TC 115, *Pumps*, Sub-Committee SC 1, *Dimensions and technical specifications of pumps*.

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

Introduction

This International Standard is the third of a set dealing with technical specifications of centrifugal pumps; they are designated as Classes I, II and III. Class I (see ISO 9905) comprises the most severe and Class III (this International Standard) the least severe requirements. For requirements for Class II centrifugal pumps, see ISO 5199.

The selection of the class to be used is made in accordance with the technical requirements for the application for which the pump is intended. **The class chosen is to be agreed between purchaser and manufacturer/supplier.**

The safety requirements of the field of application are furthermore to 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 with the different requirements of the pump application. It may happen that pumps built in accordance with Classes I, II and III may work beside each other in one plant.

Further text covering specific applications or industry requirements are dealt with later in separate standards.

Criteria for the selection of a pump of the required class for a certain application may be based on:

— reliability,

— operating conditions,

— environmental conditions.

Throughout this International Standard, text written in bold letters indicates where a decision may be required by the purchaser, or where agreement is required between the purchaser and manufacturer/supplier.

Technical specifications for centrifugal pumps — Class III

1 Scope

1.1 This International Standard covers Class III requirements for centrifugal pumps of single stage, multistage, horizontal or vertical construction (coupled or close-coupled) with any drive and any installation for general application.

1.2 This International Standard includes design features concerned with installation, maintenance and safety of such pumps including baseplate, coupling and auxiliary piping but excluding the driver, if it is not an integral part of the pump.

1.3 Where the application of this International Standard has been called for:

a) 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.

b) pumps not complying with all requirements of this International Standard may be offered for consideration, provided that all deviations are stated.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 76:1987, *Rolling bearings — Static load ratings.*

ISO 281:1990, *Rolling bearings — Dynamic load ratings and rating life.*

ISO 2372:1974, *Mechanical vibration of machines with operating speeds from 10 to 200 rev/s — Basis for specifying evaluation standards.*

ISO 2548:1973, *Centrifugal, mixed flow and axial pumps — Code for acceptance tests — Class C (It is planned to combine ISO 2548 with ISO 3555 during their next revision to create a new International Standard).*

ISO 3069:1974, *End suction centrifugal pumps — Dimensions of cavities for mechanical seals and for soft packing.*

ISO 3555:1977, *Centrifugal, mixed flow and axial pumps — Code for acceptance tests — Class B (It is planned to combine ISO 3555 with ISO 2548 during their next revision to create a new International Standard).*

ISO 7005-1:1992, *Metallic flanges — Part 1: Steel flanges.*

ISO 7005-2:1988, *Metallic flanges — Part 2: Cast iron flanges.*

ISO 7005-3:1988, *Metallic flanges — Part 3: Copper alloy and composite flanges.*

ISO 9905:—[1], *Technical specifications for centrifugal pumps — Class I.*

1) To be published.

3 Definitions

For the purposes of this International Standard, the definitions given in ISO 9905 and the following definitions apply.

3.1 rated conditions: Conditions (driver excluded) that define the (guarantee) point necessary to meet all defined operating conditions, taking into account any necessary margins.

NOTE 1 This definition differs slightly from that given in ISO 9905.

3.2 rated driver output: The maximum permissible driver power output under site operating conditions.

3.3 pressure-temperature rating: Relationship between pressure and temperature given in the form of a graph (see figure 1).

4 Design

4.1 General

Whenever the documents include contradicting technical requirements, they apply in the following sequence:

a) purchase order (or enquiry if no order is placed) (see annex B);

b) data sheet (see annex A);

c) this International Standard;

d) other standards to which reference is made in the order (or enquiry if no order is placed).

4.1.1 Characteristic curve

The characteristic curve shall indicate the allowable operating range of the pump.

4.1.2 Net positive suction head (NPSH)

The NPSHR shall be based on cold water as specified in ISO 2548 and ISO 3555. The NPSHA must exceed NPSHR by a margin of at least 0,5 m. The basis for use in performance curves is that NPSH corresponding to a drop of 3 % of the total head of the first stage of the pump (NPSH3).

4.1.3 Installation

The pumps should preferably be suitable for outdoor installation under normal environmental conditions. If they are suitable only for indoor installation this information shall be clearly stated in the manufacturer/supplier's documentation.

For outdoor installation, the range of environmental conditions shall be specified by the purchaser.

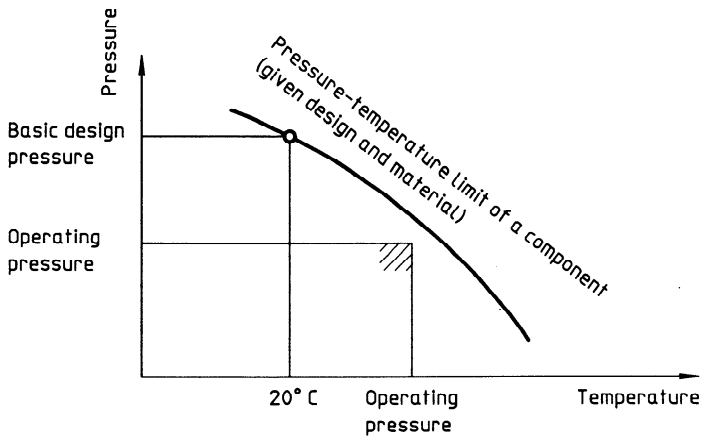

Figure 1 — Relationship between temperature and pressure

4.2 Prime movers

4.2.1 Defined operating conditions

Prime movers required as driver for coupled pumps shall have power output ratings at least equal to the percentage of rated pump power input given in figure 2 for the range of 1 kW to 100 kW. **For pump power input outside this range, the percentage is to be agreed upon between manufacturer/supplier and purchaser.** Where the prime mover has an output rating covering the power requirements at any operating conditions of the impeller diameter installed, no extra margins are required.

4.2.2 Undefined operating conditions

Prime movers as drivers for close-coupled pumps shall have power output ratings covering the power requirements at any operating conditions of the impeller diameter installed. These conditions eliminate the need for extra margins.

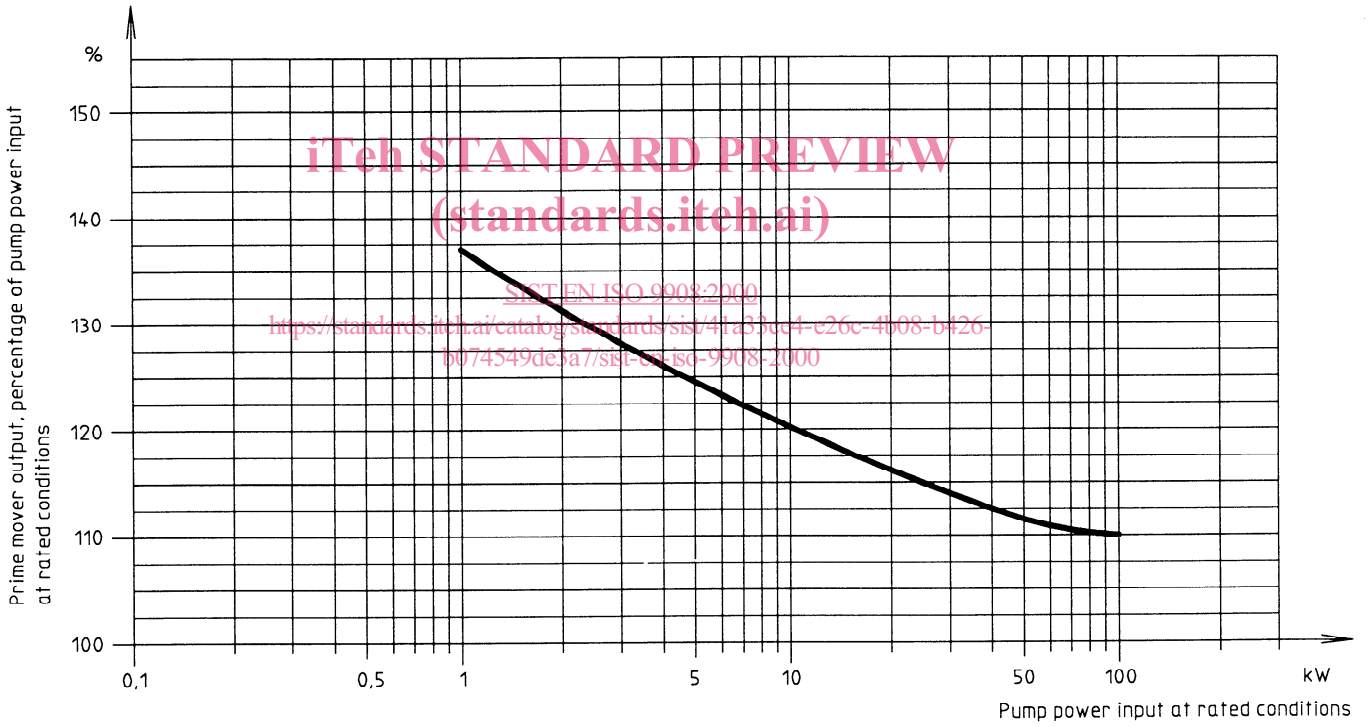

Figure 2 — Driver output percentage of rated pump power required in the range 1 kW to 100 kW

4.3 Critical speed, balance and vibration

4.3.1 Critical speed

Under operating conditions, the actual first lateral critical speed of the rotor when coupled to the drive agreed upon shall be at least 10 % above the maximum allowable continuous speed including the trip speed of a turbine-driven pump. For vertical lineshaft pumps, a flexible shaft is permitted.

4.3.2 Balance and vibration

4.3.2.1 Horizontal pumps

Unfiltered vibration shall not exceed the vibration severity limits given in table 1 when measured on the manufacturer/supplier's test facilities. These values are measured radially at the bearing housing at a single operating point at rated speed (± 5 %) and rated flow (± 5 %) when operating without cavitation.

Pumps with a special impeller, for example a single channel impeller, may exceed the limits given in table 1. In such case the pump manufacturer/supplier should indicate this in his offer.

4.3.2.2 Vertical lineshaft pumps

a) Vibration readings shall be taken on the top flange of the driver mount on vertical lineshaft pumps with rigid couplings and near to the top pump bearing on vertical pumps with flexible couplings.

b) Vibration limits for both rolling and sleeve bearing pumps shall not exceed a velocity of 7,1 mm/s rms during shop test at rated speed (± 5 %), and rated flow (± 5 %) operating without cavitation.

Table 1 — Limits of vibration severity for horizontal pumps with multivane impellers

Speed of rotation n min^{-1}	Maximum rms values of the vibration velocity for the shaft centreline height h_1 [1) 2)] mm/s	
	$h_1 \leqslant 225$ mm	$h_1 > 225$ mm
$n \leqslant 1\,800$	2,8	4,5
$1\,800 < n \leqslant 4\,500$	4,5	7,1

1) Based on ISO 2372.

2) For horizontal foot-mounted pumps, h_1 is the distance between baseplate area in contact with pump feet and pump shaft centreline.