

Centrifugal pumps for petroleum, petrochemical and natural gas industries

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EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

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English Version

**Centrifugal pumps for petroleum, petrochemical and natural gas
industries (ISO 13709:2009)**

Pompes centrifuges pour les industries du pétrole, de la
pétrochimie et du gaz naturel (ISO 13709:2009)

Kreiselpumpen für den Einsatz in der Erdöl-,
petrochemischen und Erdgasindustrie (ISO 13709:2009)

This European Standard was approved by CEN on 10 October 2009.

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EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: Avenue Marnix 17, B-1000 Brussels

Foreword

This document (EN ISO 13709:2009) has been prepared by Technical Committee ISO/TC 115 "Pumps" in collaboration with Technical Committee CEN/TC 12 "Materials, equipment and offshore structures for petroleum, petrochemical and natural gas industries" 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of an identical text or by endorsement, at the latest by June 2010, and conflicting national standards shall be withdrawn at the latest by June 2010.

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.

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Endorsement notice

The text of ISO 13709:2009 has been approved by CEN as a EN ISO 13709:2009 without any modification.

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Introduction

It is necessary that users of this International Standard be aware that further or differing requirements can be needed for individual applications. This International Standard is not intended to inhibit a vendor from offering, or the purchaser from accepting, alternative equipment or engineering solutions for the individual application. This can be particularly appropriate where there is innovative or developing technology. Where an alternative is offered, it is necessary that the vendor identify any variations from this International Standard and provide details.

A bullet () at the beginning of a clause or subclause indicates that either a decision is required or the purchaser is required to provide further information. It is necessary that this information should be indicated on data sheets or stated in the enquiry or purchase order (see examples in Annex N).

In this International Standard, where practical, US Customary, or other, units are included in parentheses for information.

Centrifugal pumps for petroleum, petrochemical and natural gas industries

1 Scope

This International Standard specifies requirements for centrifugal pumps, including pumps running in reverse as hydraulic power recovery turbines, for use in petroleum, petrochemical and gas industry process services.

This International Standard is applicable to overhung pumps, between-bearings pumps and vertically suspended pumps (see Table 1). Clause 9 provides requirements applicable to specific types of pump. All other clauses of this International Standard are applicable to all pump types. Illustrations are provided of the various specific pump types and the designations assigned to each specific type.

Relevant industry operating experience suggests pumps produced to this International Standard are cost effective when pumping liquids at conditions exceeding any one of the following:

· discharge pressure (gauge)	1 900 kPa (275 psi; 19,0 bar)
· suction pressure (gauge)	500 kPa (75 psi; 5,0 bar)
· pumping temperature	150 °C (300 °F)
· rotative speed	3 600 r/min
· rated total head	120 m (400 ft)
· impeller diameter, overhung pumps	330 mm (13 in)

NOTE For sealless pumps, reference can be made to API Std 685. For heavy duty pump applications in industries other than petroleum, petrochemical and gas processing, reference can be made to ISO 9905.

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.

ISO 7-1, *Pipe threads where pressure-tight joints are made on the threads — Part 1: Dimensions, tolerances and designation*

ISO 228-1, *Pipe threads where pressure-tight joints are not made on the threads — Part 1: Dimensions, tolerances and designation*

ISO 261, *ISO general purpose metric screw threads — General plan*

ISO 262, *ISO general purpose metric screw threads — Selected sizes for screws, bolts and nuts*

ISO 281:2007, *Rolling bearings — Dynamic load ratings and rating life*

ISO 286 (all parts), *ISO system of limits and fits*

ISO 724, *ISO general-purpose metric screw threads — Basic dimensions*

ISO 965 (all parts), *ISO general-purpose metric screw threads — Tolerances*

ISO 1940-1, *Mechanical vibration — Balance quality requirements for rotors in a constant (rigid) state — Part 1: Specification and verification of balance tolerances*

ISO 3117, *Tangential keys and keyways*

ISO 4200, *Plain end steel tubes, welded and seamless — General tables of dimensions and masses per unit length*

ISO 5753, *Rolling bearings — Radial internal clearance*

ISO 7005-1, *Metallic flanges — Part 1: Steel flanges for industrial and general service piping systems*

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

ISO 8501 (all parts), *Preparation of steel substrates before application of paints and related products — Visual assessment of surface cleanliness*

ISO 9606 (all parts), *Approval testing of welders — Fusion welding¹⁾*

ISO 9906, *Rotodynamic pumps — Hydraulic performance acceptance tests²⁾*

ISO 10438:2007 (all parts), *Petroleum, petrochemical and natural gas industries — Lubrication, shaft-sealing and control-oil systems and auxiliaries*

ISO 10441, *Petroleum, petrochemical and natural gas industries — Flexible couplings for mechanical power transmission — Special-purpose applications*

ISO 10721-2, *Steel structures — Part 2: Fabrication and erection*

ISO 11342, *Mechanical vibration — Methods and criteria for the mechanical balancing of flexible rotors*

ISO 14120, *Safety of machinery — Guards — General requirements for the design and construction of fixed and movable guards*

ISO 14691, *Petroleum, petrochemical and natural gas industries — Flexible couplings for mechanical power transmission — General-purpose applications*

ISO 15156-1, *Petroleum and natural gas industries — Materials for use in H₂S-containing environments in oil and gas production — Part 1: General principles for selection of cracking-resistant materials*

ISO 15609 (all parts), *Specification and qualification of welding procedures for metallic materials — Welding procedure specification*

ISO 15649, *Petroleum and natural gas industries — Piping*

ISO/TR 17766, *Centrifugal pumps handling viscous liquids — Performance corrections*

ISO 21049:2004, *Pumps — Shaft sealing systems for centrifugal and rotary pumps*

1) Some parts of ISO 9606 are under revision and some revised parts have been published with *Qualification test of welders* as the main title.

2) To be published. (Revision of ISO 9906:1999)

IEC 60034-1, *Rotating electrical machines — Part 1: Rating and performance*

IEC 60034-2-1, *Rotating electrical machines — Part 2-1: Standard methods for determining losses and efficiency from tests (excluding machines for traction vehicles)*

IEC 60079 (all parts), *Electrical apparatus for explosive gas atmospheres*³⁾

EN 953, *Safety of machinery — Guards — General requirements for the design and construction of fixed and movable guards*

EN 13445 (all parts), *Unfired pressure vessels*

EN 13463-1, *Non-electrical equipment for use in potentially explosive atmospheres — Part 1: Basic method and requirements*

ANSI/ABMA 7, *Shaft and Housing Fits for Metric Radial Ball and Roller Bearings (Except Tapered Roller Bearings) Conforming to Basic Boundary Plan* ⁴⁾

ANSI/AGMA 9000, *Flexible Couplings — Potential Unbalance Classification*⁵⁾

ANSI/AGMA 9002, *Bores and Keyways for Flexible Couplings (Inch Series)*

ANSI/AMT B15.1, *Safety Standard for Mechanical Power Transmission Apparatus*⁶⁾

ANSI/API Std 541, *Form-Wound Squirrel-Cage Induction Motors — 500 Horsepower and Larger*

ANSI/API Std 611, *General-Purpose Steam Turbines for Petroleum, Chemical, and Gas Industry Services*

ANSI/API Std 670, *Machinery Protection Systems*

ANSI/API Std 671/ISO 10441, *Special Purpose Couplings for Petroleum, Chemical and Gas Industry Services*

ANSI/ASME B1.1, *Unified Inch Screw Threads, UN and UNR Thread Form*⁷⁾

ANSI/ASME B16.1, *Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125 and 250*

ANSI/ASME B16.5, *Pipe Flanges and Flanged Fittings: NPS 1/2 through NPS 24 Metric/Inch Standard*

ANSI/ASME B16.11, *Forged Steel Fittings, Socket-Welding and Threaded*

ANSI/ASME B16.42, *Ductile Iron Pipe Flanges and Flanged Fittings, Classes 150 and 300*

ANSI/ASME B16.47, *Larger Diameter Steel Flanges: NPS 26 Through NPS 60*

ANSI/ASME B18.18.2M, *Inspection and Quality Assurance for High-Volume Machine Assembly Fasteners*

ANSI/ASME B31.3, *Process Piping*

ANSI/HI 1.6, *Centrifugal Tests*⁸⁾

3) Many parts of this standard have *Explosive atmospheres* as the main title.

4) American Bearing Manufacturers Association, 2025 M Street, NW, Suite 800, Washington, DC 20036, USA.

5) American Gear Manufacturers Association, 1500 King Street, Suite 201, Alexandria, VA 22314, USA.

6) American National Standards Institute, 1819 L Street, Suite 600, Washington, D.C. 20036, USA.

7) American Society of Mechanical Engineers, Three Park Avenue, New York, NY 10016-5990, USA.

8) Hydraulic Institute, 9 Sylvan Way, Parsippany, NJ 07054, USA.

ANSI/HI 2.6, *American National Standard for Vertical Pump Tests*

API Std 547, *General-Purpose Form-Wound Squirrel Cage Induction Motors — 250 Horsepower and Larger*

API Std 677, *General-Purpose Gear Units for Petroleum, Chemical and Gas Industry Services*

ASME, *Boiler and pressure vessel code BPVC, Section V, Nondestructive Examination*

ASME, *Boiler and pressure vessel code BPVC, Section VIII, Rules for Construction of Pressure Vessels*

ASME, *Boiler and pressure vessel code BPVC, Section IX, Welding and Brazing Qualifications*

DIN 910, *Heavy-duty hexagon head screw plugs*⁹⁾

IEEE 841, *IEEE Standard for Petroleum and Chemical Industry — Severe Duty Totally Enclosed Fan-Cooled (TEFC) Squirrel Cage Induction Motors — Up to and Including 500 hp*¹⁰⁾

MSS SP-55, *Quality Standard for Steel Castings for Valves, Flanges and Fittings and Other Piping Components — Visual Method for Evaluation of Surface Irregularities*¹¹⁾

NACE MR0103, *Materials Resistant to Sulfide Stress Cracking in Corrosive Petroleum Refining Environments*¹²⁾

NFPA 70:2008, *National Electrical Code*¹³⁾

SSPC SP 6, *Commercial Blast Cleaning*¹⁴⁾

3 Terms and definitions

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

3.1

axially split

split with the principal joint parallel to the shaft centreline

3.2

allowable operating region

portion of a pump's hydraulic coverage over which the pump is allowed to operate, based on vibration within the upper limit of this International Standard or temperature rise or other limitation, specified by the manufacturer

3.3

barrel pump

horizontal pump of the double-casing type

9) Deutsches Institut für Normung, Burggrafenstrasse 6, Berlin, Germany D-10787.

10) Institute of Electrical & Electronics Engineers, 445 Hoes Lane, Piscataway, NJ 08855-1331, USA.

11) Manufacturers Standardization Society of The Valve and Fittings Industry Inc., 127 Park Street N.E., Vienna, VA 22180-4602, USA.

12) National Association of Corrosion Engineers, Houston, Texas, USA.

13) National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02269-9101, USA.

14) Society for Protective Coatings, 40 24th Street, 6th Floor, Pittsburgh, PA 15222-4643, USA.