



SLOVENSKI STANDARD
SIST EN ISO 13710:2005
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petrolne, petrokemijske in zemeljske plinove industrije - Reciprocirajoče pozitivne
pompe (ISO 13710:2004)

Petroleum, petrochemical and natural gas industries - Reciprocating positive
displacement pumps (ISO 13710:2004)

Erdöl-, petrokemische und Erdgasindustrie - Osziellierende Verdrängerpumpen (ISO
13710:2004)

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Industries pétrolière, pétrochimique et du gaz naturel - Pompes volumétriques
alternatives (ISO 13710:2004)

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ICS:

23.080

23.080

Pumps

75.180.20

75.180.20 Predelovalna oprema

Processing equipment

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en

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN ISO 13710

July 2004

ICS 23.080; 75.180.20

English version

Petroleum, petrochemical and natural gas industries -
Reciprocating positive displacement pumps (ISO 13710:2004)

Industries pétrolière, pétrochimique et du gaz naturel -
Pompes volumétriques alternatives (ISO 13710:2004)

This European Standard was approved by CEN on 1 June 2004.

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 Central Secretariat 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 Central Secretariat has the same status as the official versions.

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COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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EN ISO 13710:2004 (E)

Foreword

This document (EN ISO 13710:2004) 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 January 2005, and conflicting national standards shall be withdrawn at the latest by January 2005.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

Endorsement notice

The text of ISO 13710:2004 has been approved by CEN as EN ISO 13710:2004 without any modifications.

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INTERNATIONAL
STANDARD

ISO
13710

First edition
2004-07-01

**Petroleum, petrochemical and natural gas
industries — Reciprocating positive
displacement pumps**

*Industries pétrolière, pétrochimique et du gaz naturel — Pompes
volumétriques alternatives*

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

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 document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 13710 was prepared by Technical Committee ISO/TC 115, *Pumps*, Subcommittee SC 3, *Installation and special application*, in collaboration with ISO/TC 67, *Materials, equipment and offshore structures for petroleum, petrochemical and natural gas industries*, Subcommittee SC 6, *Processing equipment and systems*.

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ISO 13710:2004(E)**Introduction**

This International Standard was developed from API Std 674, 2nd edition, 1995, with the intent that the 3rd edition of API Std 674 will be the same as this International Standard.

Users of this International Standard should be aware that further or differing requirements may 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 may be particularly appropriate where there is innovative or developing technology. Where an alternative is offered, the vendor should identify any variations from this International Standard and provide details.

This International Standard requires the purchaser to specify certain details and features.

A bullet (•) at the beginning of a paragraph indicates that either a decision is required or further information is to be provided by the purchaser. This information should be shown on data sheets or stated in the enquiry or purchase order (see examples in Annex D).

In this International Standard, where practical, US Customary (USC) units are included in brackets for information.

Annex A lists typical materials standards used in pumps.

Annex B contains a form in which are listed the vendor drawing and data requirements (VDDR).

Annex C specifies techniques for pulsation and vibration control.

Annex D contains typical data sheets.

Annex E describes pump system interaction and explains the differences between NPIP and NPSH.

Annex F contains an inspector's checklist.

Annex G specifies requirements for the lubrication system.

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Petroleum, petrochemical and natural gas industries — Reciprocating positive displacement pumps

1 Scope

This International Standard specifies requirements for reciprocating positive-displacement pumps and pump units for use in the petroleum, petrochemical and natural gas industries. It is applicable to both direct-acting and power-frame types.

This International Standard is not applicable to controlled-volume pumps and rotary pumps.

NOTE For controlled-volume pumps see API Std 675; for rotary pumps see API Std 676.

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 (all parts), *Pipe threads where pressure-tight joints are made on the threads*

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, *Rolling bearings — Dynamic load ratings and rating life*

ISO 286-2, *ISO system of limits and fits — Part 2: Tables of standard tolerance grades and limit deviations for holes and shafts*

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

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

ISO 1328-1, *Cylindrical gears — ISO system of accuracy — Part 1: Definitions and allowable values of deviations relevant to corresponding flanks of gear teeth*

ISO 1940-1, *Mechanical vibration — Balance quality requirements of rigid rotors — Part 1: Determination of permissible residual imbalance*

ISO 3448, *Industrial liquid lubricants — ISO viscosity classification*

ISO 5753, *Rolling bearings — Radial internal clearance*

ISO 6708, *Pipework components — Definition and selection of DN (nominal size)*

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

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

ISO 8501-1, *Preparation of steel substrates before application of paints and related products — Visual assessment of surface cleanliness — Part 1: Rust grades and preparation grades of uncoated steel substrates and of steel substrates after overall removal of previous coatings*

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

ISO 13707, *Petroleum and natural gas industries — Reciprocating compressors*

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

IEC 60034 (all parts), *Rotating electrical machines*

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

EN 287 (all parts), *Qualification test of welders — Fusion welding¹⁾*

EN 288 (all parts), *Specification and approval of welding procedures for metallic materials*

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

ABMA 7, *Shaft and housing fits for metric radial ball and roller bearings (except tapered roller bearings) conforming to basic boundary plan²⁾*

AGMA 2015-1, *Accuracy classification system — Tangential measurements for cylindrical gears³⁾*

AGMA 6010, *Standard for spur, helical, herringbone, and bevel enclosed drives*

AGMA 6091, *Standard for gearmotor, shaft mounted and screw conveyor drives*

AGMA 9002, *Bores and keyways for flexible couplings (inch series)*

API Std 526, *Flanged steel pressure relief valves⁴⁾*

API Std 541, *Form-wound squirrel cage induction motors — 250 horsepower and larger*

API Std 546, *Brushless synchronous machines — 500 kVA and larger*

API Std 611, *General-purpose steam turbines for petroleum, chemical, and gas industry services*

API Std 677, *General-purpose gear units for petroleum, chemical and gas industry services*

API RP 686, *Machinery installation and installation design*

ASA S2.19, *Mechanical vibration — Balance quality requirements of rigid rotors — Part 1: Determination of permissible residual unbalance, including marine applications⁵⁾*

1) Comité Européen de Normalisation, 36, rue de Stassart, B-1050 Brussels, Belgium.

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

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

4) American Petroleum Institute, 1220 L Street NW, Washington, DC 20005-4070, USA.

5) Acoustical Society of America, 35 Pinelawn Road, Suite 114 East, Melville, NY 11747, USA.

- ASME Boiler and pressure vessel code, Section V, *Non-destructive examination*⁶⁾
- ASME Boiler and pressure vessel code, Section VIII, *Rules for construction of pressure vessels, division 1*
- ASME Boiler and pressure vessel code, Section IX, *Welding and brazing qualifications*
- ASME B1.1, *Unified inch screw threads, UN and UNR thread form*
- ASME B16.1, *Cast iron pipe flanges and flanged fittings classes 25, 125 and 250*
- ASME B16.5, *Pipe flanges and flanged fittings NPS 1/2 through NPS 24*
- ASME B16.11, *Forged fittings socket welding and threaded*
- ASME B16.42, *Ductile iron pipe flanges and flanged fittings classes 150 and 300*
- ASME B16.47, *Large diameter steel flanges NPS 26 through NPS 60*
- AWS D1.1, *Structural welding code — Steel*⁷⁾
- DIN 910, *Heavy-duty hexagon head screw plugs*⁸⁾
- HI 6.6, *Reciprocating pump tests*⁹⁾
- HI 8.1-8.5, *Direct acting (steam) pumps — Nomenclature, definitions, applications, and operation*
- IEEE 841, *Standard for the petroleum and chemical industry — Severe duty totally enclosed fan-cooled (TEFC) squirrel cage induction motors — up to and including 370 kW (500 hp)*¹⁰⁾
- NACE MR0175, *Sulfide stress cracking resistant metallic materials for oilfield equipment*¹¹⁾
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- NFPA 70:2002, *National Electrical Code*¹²⁾
- SSPC SP 6, *Surface preparation specification*¹³⁾

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

7) American Welding Society, 550 North LeJeune Road, Miami, FL 33136, USA.

8) Deutsches Institut für Normung E.V., Burggrafenstrasse 6, 10787 Berlin, Germany.

9) Hydraulics Institute, 9 Sylvan Way, Parsippany, NJ 07054, USA.

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

11) National Association of Corrosion Engineers, 1440 South Creek Drive, Houston, TX 77084-4906, USA.

12) National Fire Protection Association, 1 Battery March Park, Quincy, MA 02269-9101, USA.

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

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3 Terms and definitions

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

3.1

acoustical simulation

process whereby the acoustical characteristics of fluids and the reciprocating-pump dynamic flow influence are modelled

3.2

alarm point

preset value of a measured parameter at which an alarm is activated to warn of a condition that requires corrective action

3.3

anchor bolt

bolt used to attach the mounting plate to the support structure

NOTE The support structure is usually a concrete foundation or steel structure.

cf. **hold-down bolt** (3.6)

3.4

direct-acting pump

reciprocating pump consisting of a piston-powered drive end connected directly to a liquid end to which power is directly transmitted by the action of the motive fluid on the piston

NOTE A direct-acting pump can use steam, air, or gas as the motive fluid.

3.5

flammable liquid

liquid that has a closed-cup flash point below 37,8 °C (100 °F), as determined by recommended test procedures and apparatus

NOTE Suitable test procedures are e.g. those set forth in NFPA 30.

3.6

hold-down bolt

mounting bolt

bolt that holds the equipment to the mounting plate

3.7

inlet reference point

position, upstream of any pulsation suppression device, at which the purchaser's connection is made

NOTE At the inlet reference point the specified inlet conditions, such as inlet pressure, inlet temperature and NPIP, apply.

3.8

local

(of a device) mounted on the equipment mounting plate

3.9

maximum allowable speed

highest speed at which the manufacturer's design permits continuous operation

cf. **speed** (3.40)

3.10**maximum allowable temperature**

maximum continuous liquid temperature permitted by the manufacturer's design when handling the specified liquid at the specified maximum operating pressure

3.11**maximum allowable working pressure****MAWP**

maximum continuous pressure permitted by the manufacturer's design when handling the specified liquid at the specified maximum operating temperature

3.12**maximum continuous speed**

highest speed at which the machine, as built and tested, is capable of continuous operation with the specified liquid at any of the specified operating conditions

cf. **speed** (3.40)

3.13**minimum allowable liquid temperature**

lowest liquid temperature permitted by the manufacturer's design

3.14**minimum allowable speed**

lowest operating speed at which the manufacturer's design permits continuous operation

cf. **speed** (3.40)

3.15**mounting plate**

baseplate, skid or soleplate on which the equipment is mounted

NOTE See 7.4 for mounting plate specifications.

3.16**net positive inlet pressure****NPIP**

minimum instantaneous pressure determined at the pump inlet reference point during pulsating pressure, minus the vapour pressure of the liquid at the maximum operating temperature

3.17**net positive inlet pressure available****NPIPA**

NPIP determined by the vendor from the NPSHA and system data

3.18**net positive inlet pressure required****NPIPR**

minimum NPIP required by the pump to achieve the required performance with the specified liquid

3.19**NPIPR test**

running test conducted to validate the NPIPR

3.20**net positive suction head****NPSH**

total absolute suction pressure, determined at the underside of the mounting plate, minus the vapour pressure of the liquid

NOTE It is expressed as head of water, in metres (feet).