INTERNATIONAL STANDARD

ISO 21049

First edition
2004-02-01

Pumps — Shaft sealing systems for centrifugal and rotary pumps

Pompes — Dispositifs d'étanchéité de l'arbre pour pompes centrifuges et rotatives

Reference number
ISO 21049:2004(E)

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.org
Web www.iso.org

Published in Switzerland

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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 21049 was prepared by Technical Committee ISO/TC 115, *Pumps*, Subcommittee SC 3, *Installation and special applications*, in collaboration with Technical Committee ISO/TC 67, *Materials, equipment and offshore structures for petroleum, petrochemical and natural gas industries*, SC 6, *Processing equipment and systems*.

Introduction

This International Standard is based on the accumulated knowledge and experience of manufacturers and users of equipment in the petroleum, natural gas and chemical industries, but its use is not restricted to these industries.

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.

The purpose of this International Standard is to assist purchasers with the selection and operation of mechanical seals for pumps.

This International Standard is a stand-alone seal standard and is referenced normatively in ISO 13709. It is applicable to both new and retrofitted pumps, and to pumps other than ISO 13709 pumps (e.g. ASME B73.1, ASME B73.2 and API 676 pumps).

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

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

Pumps — Shaft sealing systems for centrifugal and rotary pumps

1 Scope

This International Standard specifies requirements and gives recommendations for sealing systems for centrifugal and rotary pumps used in the petroleum, natural gas and chemical industries. It is applicable mainly for hazardous, flammable and/or toxic services where a greater degree of reliability is required for the improvement of equipment availability and the reduction of both emissions to the atmosphere and life-cycle sealing costs. It covers seals for pump shaft diameters from 20 mm (0,75 in) to 110 mm (4,3 in).

This International Standard is also applicable to seal spare parts and can be referred to for the upgrading of existing equipment. A classification system for the seal configurations covered by this International Standard into categories, types, arrangements and orientations is provided.

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

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

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

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

ISO 13709, *Centrifugal pumps for petroleum, petrochemical and natural gas industries*

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

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

IEC 60529, *Degrees of protection provided by enclosures (IP code)*

AISI, *Standards, codes and specifications of the American Iron and Steel Institute* [1)]

API RP 520 (all parts), *Sizing, selection, and installation of pressure-relieving devices in refineries* [2)]

API Std 526, *Flanged steel pressure relief valves*

ASME V, *ASME Boiler and pressure vessel code, Section V, Non-destructive examination* [3)]

ASME VIII, *ASME Boiler and pressure vessel code, Section VIII, Rules for the construction of pressure vessels*

ASME IX, *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 B1.20.1, *Pipe threads, general purpose, inch*

ASME B16.11, *Forged fittings, socket-welding and threaded*

ASME B16.20, *Metallic gaskets for pipe flanges — Ring joint, spiral-wound, and jacketed*

ASME B73.1, *Specification for horizontal end suction centrifugal pumps for chemical process*

ASME B73.2, *Specification for vertical in-line centrifugal pumps for chemical process*

ASME PTC 8.2, *Centrifugal pumps, performance test codes*

AWS D1.1, *Structural welding code — Steel* [4)]

EN 287 (all parts), *Approval testing of welders — Fusion welding* [5)]

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

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

EPA Method 21, Appendix A of Title 40, Part 60 of the U.S. Code of Federal Regulations, *Environmental Protection Agency, United States* [6)]

NEMA 250, *Enclosures for electrical equipment (1 000 volts maximum)* [7)]

NFPA 70, *National Electrical Code* [8)]

Title 1, Part A, Section 112, *U.S. National Emission Standards for Hazardous Air Pollutants (NESHAPs) (Clean Air Act Amendment)* [9)]

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1) Available from the American Iron and Steel Institute: 1140 Connecticut Ave., Suite 705, Washington, D.C. 20036, USA.

2) Available from the American Petroleum Institute, 1220 L Street, NW, Washington, D.C. 20005-4070, USA.

3) Available from the American Society of Mechanical Engineers: Three Park Avenue, New York, NY 10016-5990, USA.

4) Available from the American Welding Society, 550 N.W. Le Jeune Rd, Miami, FL 33126, USA.

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

6) Available from the National Archives and Records Administration, 700 Pennsylvania Avenue, N.W., Washington, D.C. 20408, USA.

7) Available from the National Electrical Manufacturers Association, 1300 North 17th Street, Rosslyn, VA 22209, USA.

8) Available from the National Fire Protection Association, 1 Batterymarch Park, P.O. Box 9101, Quincy, MA 02269-9101, USA.

9) Environmental Protection Agency, Ariel Rios Building, 1200 Pennsylvania Avenue, N.W., Mail Code 3213A, Washington, D.C. 20460, USA.