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Petroleum and natural gas industries - Compact flanged connections with IX seal ring (ISO 27509:2020)

Táto norma obsahuje anglickú verziu európskej normy.
This standard includes the English version of the European Standard.

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EUROPEAN STANDARD

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EN ISO 27509

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English Version

Petroleum and natural gas industries - Compact flanged connections with IX seal ring (ISO 27509:2020)

Industries du pétrole et du gaz naturel - Raccordements à brides compactes avec bague d'étanchéité IX (ISO 27509:2020)

Erdöl- und Erdgasindustrie - Kompakte Flanschverbindungen mit IX Dichtungsring (ISO 27509:2020)

This European Standard was approved by CEN on 12 February 2020.

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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

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European foreword

This document (EN ISO 27509:2020) has been prepared by Technical Committee ISO/TC 67 "Materials, equipment and offshore structures for petroleum, petrochemical and natural gas industries" 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 NEN.

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of an identical text or by endorsement, at the latest by June 2021, and conflicting national standards shall be withdrawn at the latest by June 2021.

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

This document supersedes EN ISO 27509:2012.

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

Endorsement notice

The text of ISO 27509:2020 has been approved by CEN as EN ISO 27509:2020 without any modification.

INTERNATIONAL STANDARD

ISO 27509

Second edition
2020-12

Petroleum and natural gas industries — Compact flanged connections with IX seal ring

Industries du pétrole et du gaz naturel — Raccordements à brides compactes avec bague d'étanchéité IX

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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 67, *Materials, equipment and offshore structures for petroleum, petrochemical and natural gas industries*, Subcommittee SC 6, *Processing equipment and systems,* in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 12, *Materials, equipment and offshore structures for petroleum, petrochemical and natural gas industries,* in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This second edition cancels and replaces the first edition (ISO 27509:2012), which has been technically revised. It also incorporates the Technical Corrigendum ISO 27509:2012/Cor.1:2013. The main changes compared to the previous edition are as follows:

— Annexes B and D (Annex E in previous edition) have become normative annexes;

— more stringent quality requirements regarding manufacture of products and assembly instructions have been introduced. These include

  a) ultrasonic testing of products in accordance with new requirements in ASME VIII div. 2 (in Clause 7),

  b) requirements to material strength and machining strictly in accordance with given tolerances for IX seal rings (in Clause 12),

  c) new and better coating requirements for IX seal rings (in Clause 13 and Annex D),

  d) excluding use of IX seal rings to assist alignment by transfer of significant shear load during assembly (in Annex D),

  e) more comprehensive and detailed guidelines on the evaluation of damages to products and the repair of such damages (in Annex D),

  f) more comprehensive requirements to qualification of bolt tensioning procedures (in Annex D), and

g) the elastoplastic deformation of flanges by first assembly has been better explained in 5.3 and in Annex D, in order to prevent unnecessary re-machining or rejection when flange bevel angles have changed.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

This document, which is originally based on NORSOK L-005, has been developed to provide an International Standard for compact flanged connections that constitutes an alternative to conventional flanges as specified in ASME standards, European standards and other standards, with reduced mass and smaller overall dimensions, as well as increased reliability in leak tightness by means of its inherent design features and make up procedures. CFCs can also provide an alternative to other types of clamp and hub type mechanical connectors.

The use of load carrying sealing elements, traditionally referred to as "gaskets", does not conform with the requirements of this document.

This document has been developed for use in process piping systems, which are designed in accordance with codes for pressure piping, e.g. ASME B31.3. See 5.7 for more details.

The flange designs have been selected to achieve a minimum safety factor of 2,0 when subjected to a design pressure equal to ASME B16.5 pressure temperature ratings within the temperature limits of this document.

The main body of this document contains all necessary information on how to manufacture and supply flange and seal ring materials, such as

— flange dimensions and material requirements,

— seal ring dimensions and material requirements,

— bolting dimensions and material requirements,

— requirements to tolerances and surface finish, and

— requirements to designation and marking of finished products.

Annexes A, B, C and D cover the following topics:

— structural capacity equations for flange assemblies;

— how to apply the flanges to special geometries of valves and equipment nozzles;

— bolt dimensions and masses;

— installation and assembly instructions, and guidelines on how to repair damage and irregularities on sealing surfaces.

Annexes E, F and G cover the following topics:

— masses of all standard components;

— suitable dimensions of alternative metric bolting;

— additional information on bibliographical references.

In this document, the following verbal forms are used:

— "shall" indicates a requirement;

— "should" indicates a recommendation;

— "may" indicates a permission;

— "can" indicates a possibility or a capability.

INTERNATIONAL STANDARD **ISO 27509:2020(E)**

Petroleum and natural gas industries — Compact flanged connections with IX seal ring

1 Scope

This document specifies detailed manufacturing requirements for circular steel and nickel alloy compact flanged connections and associated seal rings, for designated pressures and temperatures in class designations CL 150 (PN 20) to CL 1500 (PN 260) for nominal sizes from DN 15 (NPS ½) to DN 1200 (NPS 48), and for CL 2500 (PN 420) for nominal sizes from DN 15 (NPS ½) to DN 600 (NPS 24).

NOTE NPS is expressed in accordance with ASME B36.10M and ASME B36.19M.

This document is applicable to welding neck flanges, blind flanges, paddle spacers and spacer blinds (paddle blanks), valve/equipment integral flanges, orifice spacers, reducing threaded flanges and rigid interfaces for use in process piping for the petroleum, petrochemical and natural gas industries.

This document is applicable within a temperature range from –196 °C to +250 °C.

This document is not applicable for external pressure.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 2768-1, *General tolerances — Part 1: Tolerances for linear and angular dimensions without individual tolerance indications*

ISO 4287, *Geometrical Product Specifications (GPS) — Surface texture: Profile method — Terms, definitions and surface texture parameters*

ISO 4288, *Geometrical Product Specifications (GPS) — Surface texture: Profile method — Rules and procedures for the assessment of surface texture*

ISO 5167-1, *Measurement of fluid flow by means of pressure differential devices inserted in circular cross-section conduits running full — Part 1: General principles and requirements*

ISO 5167-2:2003, *Measurement of fluid flow by means of pressure differential devices inserted in circular cross-section conduits running full — Part 2: Orifice plates*

ISO 14313, *Petroleum and natural gas industries — Pipeline transportation systems — Pipeline valves*

ISO 80000-1:2009, *Quantities and units — Part 1: General*

EN 1591-4, *Flanges and their joints — Part 4: Qualification of personnel competency in the assembly of the bolted connections of critical service pressurized systems*

EN 1779, *Non-destructive testing — Leak testing — Criteria for method and technique selection*

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

ASME B16.34, *Valves — Flanged, Threaded and Welding End*

ASME B1.20.1, *Pipe Threads, General Purpose (Inch)*

ASME B31.3:2018, *Process Piping*

ASTM B568, *Standard Test Method for Measurement of Coating Thickness by X-Ray Spectrometry*

ASTM B571, *Standard Practice for Qualitative Adhesion Testing of Metallic Coatings*

ASME VIII *Div. 2: Boiler and Pressure Vessel Code — Alternative Rules*