
**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.

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 27509 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*.

Introduction

This International Standard, which is based on NORSOK L-005^[36], has been developed to provide a standard for compact flanged connections (CFCs) that constitutes an alternative to conventional flanges as specified in ASME standards, European Standards and other International 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 comply with the fundamental requirements of this International Standard.

This International Standard has been developed for use in process piping systems, which are designed according to codes for pressure piping, e.g. ASME B31.3. See 4.7 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 International Standard.

The main body of this International Standard 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;
- requirements to designation and marking of finished products.

Normative annexes A and D cover the following topics:

- structural capacity equations for flange assemblies;
- bolt dimensions and masses.

Informative annexes B, C, E, F and G cover the following topics:

- how to apply the flanges to special geometries of valves and equipment nozzles;
- quality management;
- installation and assembly instructions, and guidelines on how to repair damage and irregularities on sealing surfaces;
- masses of all standard components;
- suitable dimensions of alternative metric bolting.

For the purposes of this International Standard, the following verbal forms apply:

- "shall" indicates a requirement strictly to be followed in order to conform to this International Standard and from which no deviation is permitted, unless accepted by all involved parties;
- "should" indicates that among several possibilities one is recommended as particularly suitable, without mentioning or excluding others, or that a certain course of action is preferred but not necessarily required;
- "may" indicates a course of action permissible within the limits of this International Standard;
- "can" is used for statements of possibility and capability, whether material, physical or casual.

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

1 Scope

This International Standard 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 in accordance with ASME B36.10M and ASME B36.19M.

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

This International standard is not applicable for external pressure.

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 2768-1, *General tolerances — Part 1: Tolerances for linear and angular dimensions without individual tolerance indications*

ISO 4288, *Geometric 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*

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, *Process Piping*

EN 1092-1, *Flanges and their joints — Circular flanges for pipes, valves, fittings and accessories, PN designated — Part 1: Steel flanges*

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

3 Terms, definitions, symbols and abbreviated terms

3.1 Terms and definitions

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

3.1.1

class

CL

ASME pressure class in accordance with ASME B16.5 and ASME B16.34

3.1.2

compact flanged connection

CFC

non-gasketed bolted static pipe connection including two flanges and where the bolt loads are transferred through metal to metal contact between the flange faces

3.1.3

gasket

barrier to prevent the passage of fluids, but which does transmit all loads between flanges

EXAMPLE As shown in EN 1591-1:2001, Figure 3.

3.1.4

purchaser

individual or organization that buys the pipe connection on behalf of the user and/or operator or for its own use

3.1.5

seal

component providing a barrier to prevent the passage of fluids, transmitting no significant loads between the flanges

3.1.6

supplier

individual or organization that takes the responsibility for the supply of the pipe connection and its conformance with this International Standard

3.2 Symbols

A outside diameter of neck

A_{\max} maximum outer diameter to accommodate standard tools

A_{\min} minimum neck outer diameter listed in Table 7 to Table 12

$Area_{015}$ cross-sectional area of the neck/pipe calculated from t_{015}

$Area_{eqv}$ cross-sectional area of a special flange neck geometry calculated from t_{eqv}

B bore diameter, where the bore should not exceed the maximum listed bore in this International Standard

B_{\max} maximum listed bore diameter