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Petroleum and natural gas industries — Factory bends, fittings and flanges for pipeline transportation systems —

Part 2: **Fittings**

Industries du pétrole et du gaz naturel — Coudes d'usine, raccords et brides pour systèmes de transport par conduites —

Partie 2: Raccords

Reference number
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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).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

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 2, *Pipeline transportation systems*.

This second edition cancels and replaces the first edition (ISO 15590-2:2003), which has been technically revised. The main changes compared to the previous edition are as follows:

a) changed title*;*

b) updated the list of applicable international standards with the latest applicable editions;

c) added the possibility to execute NDE following the ISO, EN and ASTM standards;

d) updated the assembly categories in only two types (sour service and non-sour service);

e) removed references to extruded headers (they are not accessories but special products);

f) modified the references to the final preparation, now in line with MSS SP-75 (Figure 1) and body conical according to the ASME B16.9 criteria (Figure 3);

g) greater clarity on the sampling criteria (paragraph 9.2);

h) reviewed the chemical analysis to align with the ISO 3183 requirements (additional notes concerning *P*cm);

i) updated applicable standards relating to HIC and SSC;

j) modified paragraph relating to hydrotest;

k) applicability lighter than caliber (applicable only to tees);

l) added the range of qualifications of the “design proof test” in Clause B.5.

A list of all parts in the ISO 15590 series can be found on the ISO website.

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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.

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Introduction

Further or differing requirements might be needed for individual applications. This document is not intended to inhibit a manufacturer from offering, or the purchaser from accepting, alternative equipment or engineering solutions for the individual application. This can be particularly applicable where there is innovative or developing technology. Where an alternative is offered, the manufacturer should identify any variations from this document and provide details.

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Petroleum and natural gas industries — Factory bends, fittings and flanges for pipeline transportation systems —

Part 2: Fittings

1 Scope

This document specifies the technical delivery conditions for unalloyed or low-alloy steel seamless and welded pipeline fittings for use in pipeline transportation systems for the petroleum and natural gas industries as defined in ISO 13623.

This document is applicable to welding-end fittings such as elbows, caps, tees, single or multiple extruded headers, reducers, and transition sections made from seamless and welded pipe of unalloyed or low-alloy steels.

This document specifies two classes of fitting one related to material used in non-sour service and one for material to be use in sour service environment as shown in Table 1.

Table 1 — Fitting class and service

Fitting class	Service
Class B	NON-SOUR SERVICE
Class S	SOUR SERVICE

This document is not applicable to the selection of the fitting class.

This document is not applicable to the materials for, or the attachment of, factory-welded extensions.

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 148-1, *Metallic materials — Charpy pendulum impact test — Part 1: Test method*

ISO 377, *Steel and steel products — Location and preparation of samples and test pieces for mechanical testing*

ISO 6892-1, *Metallic materials — Tensile testing — Part 1: Method of test at room temperature*

ISO 6892-2, *Metallic materials — Tensile testing — Part 2: Method of test at elevated temperature*

ISO 2566-1, *Steel — Conversion of elongation values — Part 1: Carbon and low alloy steels*

ISO 3183, *Petroleum and natural gas industries — Steel pipe for pipeline transportation systems*

ISO 3834-2, *Quality requirements for fusion welding of metallic materials — Part 2: Comprehensive quality requirements*

ISO 4885, *Ferrous materials — Heat treatments — Vocabulary*

ISO 6507-1, *Metallic materials — Vickers hardness test — Part 1: Test method*

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ISO 7438, *Metallic materials — Bend test*

ISO/TS 7705:2017, *Guidelines for specifying Charpy V-notch impact prescriptions in steel specifications*

ISO 9606-1, *Qualification testing of welders — Fusion welding — Part 1: Steels*

ISO 9712, *Non-destructive testing — Qualification and certification of NDT personnel*

ISO 10474, *Steel and steel products — Inspection documents*

ISO 10893-4, *Non-destructive testing of steel tubes — Part 4: Liquid penetrant inspection of seamless and welded steel tubes for the detection of surface imperfections*

ISO 10893-5, *Non-destructive testing of steel tubes — Part 5: Magnetic particle inspection of seamless and welded ferromagnetic steel tubes for the detection of surface imperfections*

ISO 10893-6, *Non-destructive testing of steel tubes — Part 6: Radiographic testing of the weld seam of welded steel tubes for the detection of imperfections*

ISO 10893-8, *Non-destructive testing of steel tubes — Part 8: Automated ultrasonic testing of seamless and welded steel tubes for the detection of laminar imperfections*

ISO 13623, *Petroleum and natural gas industries — Pipeline transportation systems*

ISO 15614-1, *Specification and qualification of welding procedures for metallic materials — Welding procedure test — Part 1: Arc and gas welding of steels and arc welding of nickel and nickel alloys*

EN 10204, *Metallic components: Types of inspection documents*

ASTM E112, *Standard test methods for determining average grain size*

ASTM E213, *Standard Practice for Ultrasonic Testing of Metal Pipe and Tubing*

ASTM A388, *Standard Practice for Ultrasonic Examination of Steel Forgings*

ASTM A578, *Standard Specification for Straight-Beam Ultrasonic Examination of Rolled Steel Plates for Special Applications*

ASTM E165, *Standard Practice for Liquid Penetrant Testing for General Industry*

ASTM E709, *Standard Guide for Magnetic Particle Testing*

ASME BPVC Section V *Nondestructive Examination*

ASME BPVC Section VIII *Rules for Construction of Pressure Vessels Division 1*

ASME B16.9, *Factory-made wrought butt welding fittings*

ASME B31.8, *Gas transmission and distribution piping systems*

ASME B31.4*Pipeline Transportation Systems for Liquids and NDTSlurries*

ASME BPVC Section IX *Welding, Brazing, and Fusing Qualifications*

MSS SP-75, *Specification for high test wrought butt welding fittings*

NACE TM0177-2016-SG, *Laboratory Testing of Metals for Resistance to Sulfide Stress Cracking and Stress Corrosion Cracking in H2S Environments*

NACE TM0284-2016-SG, *Evaluation of Pipeline and Pressure Vessel Steels for Resistance to Hydrogen-Induced Cracking*Terms and definitions

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3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 4885 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1
by agreement
agreed between manufacturer and purchaser

3.2
extrados
outer curved section of the elbow

[SOURCE: ISO 15590-1:2018; 3.8, modified]

3.3
heat
batch of steel prepared in one steel-making process

[SOURCE: ISO 15590-1:2018; 3.9, modified]

3.4
intrados
inner curved section of the elbow

[SOURCE: ISO 15590-1:2018; 3.15, modified]

3.5
manufacturing procedure specification
MPS
document that specifies the process control parameters and the acceptance criteria to apply for all manufacturing, inspection and testing activities performed during fitting manufacture

3.6
tangent
straight section at the ends of the fitting

[SOURCE: ISO 15590-1:2018; 3.25, modified]

3.7
test unit
fitting or test piece of the same type (tee, elbow, reducer or cap), starting material wall thickness, *heat* (3.3), manufacturing procedure specification, and heat treatment condition

4 Symbols and abbreviated terms

4.1 Symbols

A_o	original cross-sectional area of the parallel length of a tensile test specimen
D	outside diameter
D_1	outside diameter at the point under consideration, measured perpendicular to the longitudinal axis

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