INTERNATIONAL STANDARD

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Oil and gas industries including lower carbon energy — Piping systems on offshore production platforms and onshore plants —

Part 3: Fabrication

Industries du pétrole et du gaz, y compris les énergies à faible émission de carbone — Conception et installation des systèmes de tuyauterie sur les plates-formes de production en mer et les installations à terre —

Partie 3: Fabrication

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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 document 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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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, *Oil and gas industries including lower carbon energy*, Subcommittee SC 6, *Process equipment, piping, systems, and related safety*, 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 first edition of ISO 13703-3, together with ISO 13703-1 and ISO 13703-2, cancels and replaces ISO 13703:2000. It also incorporates the Technical Corrigendum ISO 13703:2000/Cor.1:2002.

The main changes compared to the previous edition are as follows:

— deletion of the installation and quality control requirements of Clause 10;

— deletion of previous Annex C as requirements are addressed in ASME B31.3.

A list of all parts in the ISO 13703 series can be found on the ISO website.

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

The aim of this document is to establish common requirements for the fabrication, welding, inspection, examination and testing of new, metallic process piping systems designed in accordance with the requirements of ISO 13703-1, and using bulk piping materials in accordance with ISO 13703-2.

This document makes normative reference to ASME B31.3 as the base code for process piping. Alternative codes to ASME B31.3 exist for the fabrication, welding, inspection, examination and testing of process piping systems along with the potential need to comply with local or national regulatory/ jurisdictional requirements. The user of this document is expected to assess the implications arising from local or national regulatory/jurisdictional requirements in implementing the requirements herein, including the need to specify additional requirements to those stated. ASME B31.3, Appendix N provides guidance on its use internationally, and specifically its use within the European Union for which additional requirements to those specified in ASME B31.3 will be necessary to meet the requirements of Directive 2014/68/EU on the harmonization of the laws of the Member States relating to the making available on the market of pressure equipment (PED).

This document is not intended to inhibit a user from accepting alternative fabrication, welding, examination or testing solutions for the individual application. This can be particularly appropriate where there is innovative or developing technology. Where an alternative to the requirements in this document is offered, the user is expected to review the implications in meeting the performance requirements within this document.

Oil and gas industries including lower carbon energy — Piping systems on offshore production platforms and onshore plants —

Part 3: Fabrication

1 Scope

This document specifies requirements for the fabrication, installation, welding, inspection, examination and testing of new, metallic piping systems , within temperature range limits for the materials meeting the requirements of ASME B31.3, on fixed and floating offshore production facilities and onshore production, processing and gas liquefaction plants. For piping systems above pressure class 2500, the requirements of chapter IX of ASME B31.3 shall be complied with, in addition to the requirements stated in this standard.

This document is applicable to all pressure retaining components and any non-pressure retaining component, such as a member of a pipe support, welded directly to a pressure retaining component.

This document is not applicable to the following:

— marine-related piping systems, e.g. ballasting piping systems, systems covered by classification societies;

— metallic tubing used for subsea umbilical systems;

NOTE 1 Reference can be made to ISO 13628-5 or API Spec 17E for welding and examination of these components.

— piping systems with corrosion resistant cladding (either integrally clad or mechanically lined) or weld overlay, including buttering and associated dissimilar welds;

NOTE 2 Reference can be made to DNV-RP-B204 for welding and examination of these systems.

— refractory alloys [with exception of CP titanium Grade 1 (UNS R50250) or Grade 2 (UNS R50400)];

— non-metallic piping assemblies;

— transportation pipeline systems, including flow-lines, designed in accordance with a recognized pipeline design code.

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

ISO 8249, *Welding — Determination of Ferrite Number (FN) in austenitic and duplex ferritic-austenitic Cr-Ni stainless steel weld metals*

ISO 9015-1, *Destructive tests on welds in metallic materials — Hardness testing — Part 1: Hardness test on arc welded joints*

ISO 9606 (all parts), *Qualification testing of welders — Fusion welding*

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

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

ISO 11666:2018, *Non-destructive testing of welds — Ultrasonic testing — Acceptance levels*

ISO 11699-1, *Non-destructive testing — Industrial radiographic film — Part 1: Classification of film systems for industrial radiography*

ISO 14175, *Welding consumables — Gases and gas mixtures for fusion welding and allied processes*

ISO 14344, *Welding consumables — Procurement of filler materials and fluxes*

ISO 14731, *Welding coordination — Tasks and responsibilities*

ISO 14732, *Welding personnel — Qualification testing of welding operators and weld setters for mechanized and automatic welding of metallic materials*

ISO 15156-2, *Petroleum and natural gas industries — Materials for use in H2S containing environments in oil and gas production — Part 2: Cracking-resistant carbon and low alloy steels, and the use of cast irons*

ISO 15156-3, *Petroleum and natural gas industries — Materials for use in H2S containing environments in oil and gas production — Part 3: Cracking-resistant CRAs (corrosion-resistant alloys) and other alloys*

ISO 15609-1, *Specification and qualification of welding procedures for metallic materials — Welding procedure specification — Part 1: Arc welding*

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*

ISO 15614-5, *Specification and qualification of welding procedures for metallic materials — Welding procedure test — Part 5: Arc welding of titanium, zirconium and their alloys*

ISO 15614-6, *Specification and qualification of welding procedures for metallic materials — Welding procedure test — Part 6: Arc and gas welding of copper and its alloys*

ISO/IEC 17025, *General requirements for the competence of testing and calibration laboratories*

ISO 17636-2, *Non-destructive testing of welds — Radiographic testing — Part 2: X- and gamma-ray techniques with digital detectors*

ISO 17781:2017, *Petroleum, petrochemical and natural gas industries — Test methods for quality control of microstructure of ferritic/austenitic (duplex) stainless steels*

ISO 18265, *Metallic materials — Conversion of hardness values*

ISO 22825, *Non-destructive testing of welds — Ultrasonic testing — Testing of welds in austenitic steels and nickel-based alloys*

ANSI Z49.1, *Safety in Welding, Cutting and Allied Processes*

API RP 686, *Machinery Installation and Installation Design*

ASME B31.3, *Process Piping*

ASME Boiler and Pressure Vessel Code, Section II, Materials, Part C:2019, Specifications for welding rods, electrodes, and filler metals

ASME Boiler and Pressure Vessel Code, Section V:2019, Non Destructive Testing

ASME Boiler and Pressure Vessel Code, Section IX:2019, Welding and Brazing Qualifications

ASNT CP-189, *Standard for Qualification and Certification of Nondestructive Testing Personnel*

ASNT SNT-TC-1A, *Personnel Qualification and Certification in Nondestructive Testing*

ASTM A380/A380M, *Standard Practice for Cleaning, Descaling, and Passivation of Stainless Steel Parts, Equipment, and Systems*

ASTM E140, *Standard Hardness Conversion Tables for Metals Relationship Among Brinell Hardness, Vickers Hardness, Rockwell Hardness, Superficial Hardness, Knoop Hardness, Scleroscope Hardness, and Leeb Hardness*

ASTM E1815, *Standard Test Method for Classification of Film Systems for Industrial Radiography*

ASTM G48, *Standard Test Methods for Pitting and Crevice Corrosion Resistance of Stainless Steels and Related Alloys by Use of Ferric Chloride Solution*

AWS A4.2M, *Standard Procedures for Calibrating Magnetic Instruments to Measure the Delta Ferrite Content of Austenitic and Duplex Ferritic-Austenitic Stainless Steel*

AWS D10.10/D10.10M, *Recommended Practices for Local Heating of Welds in Piping and Tubing*

EN 10204, *Metallic products — Types of inspection documents*

PFI ES-3, *Fabricating Tolerances*

3 Terms and definitions

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

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

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

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

3.1
alkaline service
service environments containing alkaline compounds such as amines, caustic, carbonates

3.2
bolted connection
connections with bolts, to allow assembly and disassembly, that uses flanges or clamps as connectors.

3.3
carbon equivalent
C_E
numerical value for a steel's composition that represents the contribution of the relevant elements to the hydrogen cracking susceptibility of steel

Note 1 to entry: The carbon equivalent is based on:

$$C_E = \%C + \left(\frac{\%\,Mn}{6}\right) + \left(\frac{\%\,Cr + \%\,Mo + \%\,V}{5}\right) + \left(\frac{\%\,Ni + \%\,Cu}{15}\right)$$

where all mass fractions are expressed in percent.