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ISO/FDIS 13703-3:2023(E)

ISO/TC 67/SC 6~~/WG 5~~

Date: 2023-xx

Secretariat: AFNOR

Oil and gas industries including lower carbon energy — Piping systems on offshore platforms and onshore plants — Part 3: Fabrication

Industries pétrolières et gazières, 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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ISO copyright office

CP 401 • Ch. de Blandonnet 8

CH-1214 Vernier, Geneva

Phone: +41 22 749 01 11

Fax: +41 22 749 09 47

Email: copyright@iso.org

Website: ~~www.iso.org~~www.iso.org

Published in Switzerland

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ISO 20344, Personal protective equipment — Test methods for footwear

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Contents

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~~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~~www.iso.org/directives).

~~Attention is drawn~~ISO draws attention to the possibility that ~~some of~~ the ~~elements~~implementation of this document may ~~be~~involve the ~~subject~~use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights~~.~~ in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at www.iso.org/patents. 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 ~~on~~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 the following URL: www.iso.org/iso/foreword.html~~), 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.

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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~~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.

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Oil and gas industries including lower carbon energy — Piping systems on offshore 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.

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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.

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— 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 DNVGL-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.

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

<std>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 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 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 15156-2:2015~~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 15156-3:2015~~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*

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ISO 15156-2:2020, 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
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ISO 15156-3:2020, 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
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<std>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*</std>

<std>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*</std>

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

<std>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*</std>

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

<std>ISO 18265, *Metallic materials — Conversion of hardness values*</std>

<std>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*</std>

<std>ANSI Z49.1, *Safety in Welding, Cutting and Allied Processes*</std>

<std>API RP 686, *Machinery Installation and Installation Design*</std>

<std>ASME B31.3, *Process Piping*</std>

<unknown>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</unknown>

<unknown>ASME Boiler and Pressure Vessel Code, Section V:2019, Non Destructive Testing</unknown>

<unknown>ASME Boiler and Pressure Vessel Code, Section IX:2019, Welding and Brazing Qualifications</unknown>

<std>ASNT CP-189, *Standard for Qualification and Certification of Nondestructive Testing Personnel*</std>

<std>ASNT SNT-TC-1A, *Personnel Qualification and Certification in Nondestructive Testing*</std>

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

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

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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, *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*~~</std>~~

~~<std>ASTM E1815, *Standard Test Method for Classification of Film Systems for Industrial Radiography*</std>~~

~~<std>~~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*~~</std>~~

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

~~<std>AWS D10.10, *Recommended Practices for Local Heating of Welds in Piping and Tubing*</std>~~

~~<std>EN 10204, *Metallic products — Types of inspection documents*</std>~~

~~<std>PFI ES-3, *Fabricating Tolerances*</std>~~

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

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

PFI ES-3, *Fabricating Tolerances*

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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~~https://www.iso.org/obp

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

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

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

where all mass fractions are expressed in percent.

3.4
closure weld
final weld connecting piping systems, assemblies or sub-assemblies that have been successfully leak tested, but that itself is not subject to leak testing

Note 1 to entry: Closure welds include any welds made after leak or tightness testing, such as seal welds to threaded connections, or repair welds made in the event of a leak that are not subject to further leak test, if approved by owner.

Note 2 to entry: Closure welds are often also referred to as 'golden welds'.

3.5
computerized imaging technique
CIT
manual or encoded ultrasonic examination technique with capability for computer processed display or analysis and display of ultrasonic data to provide two or three dimensional surfaces

3.6
confined space
space that is substantially but not necessarily entirely enclosed, and where serious injury can occur from hazardous substances or conditions within the space or nearby (e.g. lack of oxygen)

Note 1 to entry: Confined space includes access into the internal bore of pipes to install, inspect and remove internal backing gas dams, and during cleaning, flushing, leak and tightness testing activities.

3.7
cryogenic service
service environments with a minimum design temperature lower than –104 °C

3.8
~~**Low-Alloy Steel**~~
~~**Steel**~~**low-alloy steel**
steel with significant alloy additions (e.g. Groups 4 to 6 according to ISO 15608, or P-No. 3 to P-No 5 and P-No. 15E according to ASME B31.3)

3.9
extrados
outer curved portion of a bend

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ISO/TR 15608, Welding — Guidelines for a metallic materials grouping system

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3.10
fabricator
organization responsible for the fabrication, welding, examination and testing of piping systems including any externally provided products or services

Note 1 to entry: For the purposes of this document, “fabricator” is considered interchangeable with “manufacturer”, “erector”, “employer” or “purchaser” where these terms are used in referenced documents.

3.11
fibre elongation
elongation during bending or forming calculated as 100 r/R expressed as percentage

Note 1 to entry: Fibre elongation can be determined by physical measurement or calculation.

3.12
heat input
energy introduced into the weld region during welding per unit run length

Note 1 to entry: The reference for the calculation of heat input is ASME Boiler and Pressure Vessel Code, Section IX:2019 for the specific welding process.

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3.13
high alloyed stainless steel
austenitic stainless steel typically having PREN ≥ 40 or [% Ni + 2 (% Mo)] > 30 where % Mo > 2, where all mass fractions are expressed as percent

EXAMPLE SS type 6Mo or SS type 565.

3.14
intrados
inner curved portion of a bend

3.15
leak testing
application of a pressure load greater than the design load to demonstrate the integrity of a piping assembly to safely withstand the design load

Note 1 to entry: Leak testing is also referred to as “hydrostatic leak testing” or “pneumatic leak testing”, or combination thereof, as defined in ASME B31.3.

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3.16
lot
totality of welds completed by all welders, and accepted by visual examination on any one day, unless otherwise defined in the engineering design

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3.17
low sulfur oil
heating oil with maximum sulfur content of 1 000 ppm

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3.18
nepheleometric turbidity units
NTU
measurement of water turbidity

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3.19
owner
person, partnership, organization or business ultimately responsible for design, construction, operation, and maintenance of a facility

[SOURCE: ASME B31.3]

3.20
pitting resistance equivalent number
number indicating the resistance of stainless steels to pitting corrosion and related to chemical composition

Note 1 to entry: PREN is calculated from one of the following formulas:

PREN = % Cr + 3,3 % Mo + 16 % N

PREN = % Cr + 3,3 % (Mo + 0,5 W) + 16 % N

where all mass fractions are expressed as percent.

Note 2 to entry: All PREN limits are absolute limits based upon the heat analysis. The calculated value shall not be rounded.

3.21
sour service
service environments that contain sufficient H_2S to cause cracking of materials

Note 1 to entry: For the purpose of the do document, the mechanisms that result in cracking are addressed in ISO 15156-2:~~2015~~ or ISO 15156-3:~~2015~~.

Note 2 to entry: For the purpose of this document, NACE MR0175-2 and NACE MR0175-3 are equivalent to ISO 15156-2:~~2015~~ and ISO 15156-3:~~2015~~, respectively.

3.22
stainless steel 300-series
SS 300-seriesaustenitic stainless steel with at least 16 % Cr (mass fraction) and 8 % Ni (mass fraction) possibly with other elements added to secure special properties

Note 1 to entry: Low carbon grades are typically used where welding is required.

EXAMPLE UNS S30400, UNS S30403, UNS S31600, UNS S31603.

3.23
stainless steel type 22Cr duplex
SS type 22Cr duplex
ferritic/austenitic stainless steel alloys with 30,0 < PREN < 40,0 and Cr ≥ 19 % (mass fraction)

EXAMPLE UNS S31803, UNS S32205.

3.24
stainless steel type 25Cr duplex
SS type 25Cr duplex
ferritic/austenitic stainless steel alloys with 40,0 ≤ PREN < 48,0

Note 1 to entry: This alloy is often referred to as “super duplex”.

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ISO 15156-2:2020, 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
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ISO 15156-3:2020, 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
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ISO 15156-2:2020, 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
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ISO 15156-3:2020, Petroleum and natural gas industries — ...
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