



SLOVENSKI STANDARD
oSIST prEN ISO 13703-2:2022
01-januar-2022

Petrokemična industrija ter industrija za predelavo nafte in zemeljskega plina - Cevni sistemi na plavajočih proizvodnih objektih in v kopenskih obratih - 2. del: Materiali (ISO/DIS 13703-2:2021)

Petroleum, petrochemical and natural gas industries - Piping systems on offshore production platforms and onshore plants - Part 2: Materials (ISO/DIS 13703-2:2021)

Erdöl- und Erdgasindustrie - Rohrleitungssysteme auf Offshore-Förderplattformen und Onshore-Anlagen - Teil 2: Rohrleitungswerkstoff (ISO/DIS 13703-2:2021)

Industries du pétrole et du gaz naturel - Conception et installation des systèmes de tuyauterie sur les plates-formes de production en mer et les installations à terre - Partie 2: Matériaux (ISO/DIS 13703-2:2021)

Ta slovenski standard je istoveten z: prEN ISO 13703-2

ICS:

75.180.10	Oprema za raziskovanje, vrtanje in odkopavanje	Exploratory, drilling and extraction equipment
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Petroleum, petrochemical and natural gas industries — Piping systems on offshore platforms and onshore plants —

Part 2: Materials

ICS: 75.180.10

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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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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 and natural gas industries*, Subcommittee SC 6, *Processing equipment and systems*.

This edition cancels and replaces part of ISO 13703:2000, which has been technically revised and split in three parts.

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 provide a set of common supplementary requirements for the most frequently used materials in upstream oil and gas piping systems designed according to ISO 13703-1. Requirements are defined in material datasheets and element datasheets, which can be used for the specification and procurement of materials for piping systems. Common fabrication, welding, inspection, examination and testing requirements of piping systems are covered by ISO 13703-3.

This document makes normative reference to ASME B31.3 as the base code for process piping. It is recognized that alternative codes for process piping exist that provide similar functionality. Such alternative codes can specify alternative requirements that are in conflict with this document. Local, national or regional regulations can also affect the specification of piping materials.

This document is not intended to limit the use of alternative materials, which are not included in this document. Alternative material grades and product standards can be used freely within the limits of the piping design code.

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Petroleum, petrochemical and natural gas industries — Piping systems on offshore platforms and onshore plants — Part 2: Materials

1 Scope

This document specifies minimum requirements for materials exposed to sour environments as defined in ISO 15156 (all parts). It does not provide guidelines for material selection. The selection of suitable materials for a specific service including any necessary additional material requirements remains the responsibility of the end user. Requirements related to sulphide stress cracking in corrosive petroleum refining environments included in ISO 17945 are not covered in this document.

NOTE For the purposes of this document, NACE MR0175 is equivalent to ISO 15156 (all parts), and NACE MR0103 is equivalent to ISO 17945.

The materials covered in this document are intended to be used in piping systems designed according to ASME B31.3 category D, and normal and high pressure fluid service as supplemented by ISO 13703-1.

This document is applicable to offshore production facilities and onshore production, processing and gas liquefaction plants. Common requirements related to manufacture of piping and valve parts are included in Annex A and Annex B providing material datasheets and element datasheets, respectively. These material and element datasheets can be applied for applications other than piping systems, e.g. pressure vessels and pumps based upon assessment of the end user and conformance with the selected design code for the relevant equipment.

This document does not cover requirements related to:

- non-metallic piping systems according to ASME B31.3 chapter VII or ISO 14692 (all parts);
- marine piping systems, e.g. ballasting piping system, covered by classification rules;
- subsea production systems;
- downhole equipment;
- transportation pipeline systems, including flowlines, designed in accordance with a recognized pipeline design code.

Annex C contains guidance on how to comply with the European Directive 2014/68/EU on pressure equipment.

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

ISO 3452, *Non-destructive testing — Penetrant testing*

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ISO 3878, *Hardmetals — Vickers hardness test*

ISO 4499-2, *Hardmetals — Metallographic determination of microstructure — Part 2: Measurement of WC grain size*

ISO 4499-4, *Hardmetals - Metallographic determination of microstructure — Part 4: Characterisation of porosity, carbon defects and eta-phase content*

ISO 4624, *Paints and varnishes — Pull-off test for adhesion*

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

ISO 9606, *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 10684, *Fasteners — Hot dip galvanized coatings*

ISO 10893-11, *Non-destructive testing of steel tubes — Part 11: Automated ultrasonic testing of the weld seam of welded steel tubes for the detection of longitudinal and/or transverse imperfections*

ISO 11970, *Specification and qualification of welding procedures for production welding of steel castings*

ISO 13703-1, *Petroleum and natural gas industries — Piping systems on offshore production platforms and onshore plants — Part 1: Design*

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

ISO 15156 (all parts), *Petroleum and natural gas industries — Materials for use in H₂S-containing environments in oil and gas production*

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

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 15614-7, *Specification and qualification of welding procedures for metallic materials — Welding procedure test — Part 7: Overlay welding*

ISO 17637, *Non-destructive testing of welds — Visual testing of fusion-welded joints*

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

ISO 17782, *Petroleum, petrochemical and natural gas industries — Scheme for conformity assessment of manufacturers of special materials*

ISO 27509, *Petroleum and natural gas industries — Compact flanged connections with IX seal ring*

ISO 28079, *Hardmetals — Palmqvist toughness test*

ANSI/MSS SP-55, *Quality standard for steel castings for valves, flanges, fittings, and other piping components - visual method for evaluation of surface irregularities*

API Spec 5L, *Specification for line pipe*

API Std 6ACRA, *Age-hardened Nickel-based alloys for oil and gas drilling and production equipment*

ASME B16.34, *Valves – Flanged, threaded and welding end*

ASME B31.3, *Process piping*

ASME Boiler and pressure vessel code (BPVC), Section V: *Nondestructive examination*

ASME Boiler and pressure vessel code (BPVC), Section VIII, Division 1: *Rules for construction of pressure vessels*

ASME Boiler and pressure vessel code (BPVC), Section VIII, Division 2: *Alternative rules*

ASME Boiler and pressure vessel code (BPVC), Section VIII, Division 3: *Alternative rules for high pressure vessels*

ASME Boiler and pressure vessel code (BPVC), Section IX: *Welding and brazing qualifications*

ASNT SNT-TC-1A, *Qualification of nondestructive testing personnel*

ASTM A29, *Standard specification for general requirements for steel bars and alloy, hot-wrought*

ASTM A105, *Standard specification for Carbon steel forgings for piping applications*

ASTM A106, *Standard specification for seamless carbon steel pipe for high-temperature service*

ASTM A182, *Standard specification for forged or rolled alloy and stainless Steel pipe flanges, forged fittings, and valves and parts for high-temperature service*

ASTM A193, *Standard specification for alloy-steel and stainless steel bolting for high temperature or high pressure service and other special purpose applications*

ASTM A194, *Standard specification for Carbon steel, alloy steel, and stainless steel nuts for bolts for high pressure or high temperature service, or both*

ASTM A216, *Standard specification for steel castings, Carbon, suitable for fusion welding, for high-temperature service*

ASTM A234, *Standard specification for piping fittings of wrought Carbon steel and alloy steel for moderate and high temperature service*

ASTM A240, *Standard specification for Chromium and Chromium-Nickel stainless steel plate, sheet, and strip for pressure vessels and for general applications*

ASTM A269, *Standard specification for seamless and welded austenitic stainless steel tubing for general service*

ASTM A276, *Standard specification for stainless steel bars and shapes*

ASTM A312, *Standard specification for seamless, welded, and heavily cold worked austenitic stainless steel pipes*

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- ASTM A320, *Standard specification for alloy-steel and stainless steel bolting for low-temperature service*
- ASTM A333, *Standard specification for seamless and welded steel pipe for low-temperature service and other applications with required notch toughness*
- ASTM A350, *Standard specification for Carbon and low-alloy steel forgings, requiring notch toughness testing for piping components*
- ASTM A351, *Standard specification for castings, austenitic, for pressure-containing parts*
- ASTM A352, *Standard specification for steel castings, ferritic and martensitic, for pressure-containing parts, suitable for low-temperature service*
- ASTM A358, *Standard specification for electric-fusion-welded austenitic Chromium-Nickel stainless steel pipe for high-temperature service and general applications*
- ASTM A363, *Standard specification for Zinc-coated (galvanized) steel overhead ground wire strand*
- ASTM A370, *Standard test methods and definitions for mechanical testing of steel products*
- ASTM A388, *Standard practice for ultrasonic examination of steel forgings*
- ASTM A403, *Standard specification for wrought austenitic stainless steel piping fittings*
- ASTM A420, *Standard specification for piping fittings of wrought Carbon steel and alloy steel for low-temperature service*
- ASTM A450, *Standard specification for general requirements for Carbon and low alloy steel tubes*
- ASTM A453, *Standard specification for high-temperature bolting, with expansion coefficients comparable to austenitic stainless steels*
- ASTM A479, *Standard specification for stainless steel bars and shapes for use in boilers and other pressure vessels*
- ASTM A484, *Standard specification for general requirements for stainless steel bars, billets, and forgings*
- ASTM A488, *Standard practice for steel castings, welding, qualifications of procedures and personnel*
- ASTM A494, *Standard specification for castings, Nickel and Nickel alloy*
- ASTM A508, *Standard specification for quenched and tempered vacuum-treated Carbon and alloy steel forgings for pressure vessels*
- ASTM A516, *Standard specification for pressure vessel plates, Carbon steel, for moderate- and lower-temperature service*
- ASTM A564, *Standard specification for hot-rolled and cold-finished age-hardening stainless steel bars and shapes*
- ASTM A578, *Standard specification for straight-beam ultrasonic examination of rolled steel plates for special applications*
- ASTM A671, *Standard specification for electric-fusion-welded steel pipe for atmospheric and lower temperatures*

- ASTM A672, *Standard specification for electric-fusion-welded steel pipe for high-pressure service at moderate temperatures*
- ASTM A694, *Standard specification for Carbon and alloy steel forgings for pipe flanges, fittings, valves, and parts for high-pressure transmission service*
- ASTM A696, *Standard specification for steel bars, Carbon, hot-wrought or cold-finished, special quality, for pressure piping components*
- ASTM A703, *standard specification for steel castings, creep-strength enhanced ferritic alloy, for pressure-containing parts, suitable for high temperature service*
- ASTM A705, *Standard specification for age-hardening stainless steel forgings*
- ASTM A781, *Standard specification for castings, steel and alloy, common requirements, for general industrial use*
- ASTM A788, *Standard specification for steel forgings, general requirements*
- ASTM A789, *Standard specification for seamless and welded ferritic/austenitic stainless steel tubing for general service*
- ASTM A790, *Standard specification for seamless and welded ferritic/austenitic stainless steel pipe*
- ASTM A815, *Standard specification for wrought ferritic, ferritic/austenitic, and martensitic stainless steel piping fittings*
- ASTM A860, *Standard specification for wrought high-strength ferritic steel butt-welding fittings*
- ASTM A928, *Standard specification for ferritic/austenitic (duplex) stainless steel pipe electric fusion welded with addition of filler metal*
- ASTM A957, *Standard specification for investment castings, steel and alloy, common requirements, for general industrial use*
- ASTM A960, *Standard specification for common requirements for wrought steel piping fittings*
- ASTM A961, *Standard specification for common requirements for steel flanges, forged fittings, valves, and parts for piping applications*
- ASTM A962, *Standard specification for common requirements for bolting intended for use at any temperature from cryogenic to the creep range*
- ASTM A966, *Standard practice for magnetic particle examination of steel forgings using alternating current*
- ASTM A985, *Standard specification for steel investment castings general requirements, for pressure-containing parts*
- ASTM A988, *Standard specification for hot isostatically-pressed stainless steel flanges, fittings, valves, and parts for high temperature service*
- ASTM A995, *Standard specification for castings, austenitic-ferritic (duplex) stainless steel, for pressure-containing parts*
- ASTM A1058, *Standard Test Methods for Mechanical Testing of Steel Products — Metric*

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ASTM A1080, *Standard practice for hot isostatic pressing of steel, stainless steel, and related alloy castings*

ASTM A1082, *Standard specification for high strength precipitation hardening and duplex stainless steel bolting for special purpose applications*

ASTM B148, *Standard specification for Aluminum-Bronze sand castings*

ASTM B151, *Standard specification for Copper-Nickel-Zinc alloy (Nickel Silver) and Copper-Nickel rod and bar*

ASTM B171, *Standard specification for Copper-alloy plate and sheet for pressure vessels, condensers, and heat exchangers*

ASTM B265, *Standard specification for Titanium and Titanium alloy strip, sheet, and plate*

ASTM B338, *Standard specification for seamless and welded Titanium and Titanium alloy tubes for condensers and heat exchangers*

ASTM B348, *Standard specification for Titanium and Titanium alloy bars and billets*

ASTM B363, *Standard specification for seamless and welded unalloyed Titanium and Titanium alloy welding fittings*

ASTM B366, *Standard specification for factory-made wrought Nickel and Nickel alloy fittings*

ASTM B367, *Standard specification for Titanium and Titanium alloy castings*

ASTM B381, *Standard specification for Titanium and Titanium alloy forgings*

ASTM B443, *Standard specification for Nickel-Chromium-Molybdenum-Columbium alloy and Nickel-Chromium-Molybdenum-Silicon alloy plate, sheet, and strip*

ASTM B444, *Standard specification for Nickel-Chromium-Molybdenum-Columbium alloys (UNS N06625 and UNS N06852) and Nickel-Chromium-Molybdenum-Silicon alloy (UNS N06219) pipe and tube*

ASTM B446, *Standard specification for Nickel-Chromium-Molybdenum-Columbium Alloy (UNS N06625), Nickel-Chromium-Molybdenum-Silicon alloy (UNS N06219), and Nickel-Chromium-Molybdenum-Tungsten alloy (UNS N06650) rod and bar*

ASTM B499, *Standard test method for measurement of coating thicknesses by the magnetic method: nonmagnetic coatings on magnetic basis metals*

ASTM B564, *Standard specification for Nickel alloy forgings*

ASTM B571, *Standard practice for qualitative adhesion testing of metallic coatings*

ASTM B578, *Standard test method for microhardness of electroplated coatings*

ASTM B602, *Standard test method for attribute sampling of metallic and inorganic coatings*

ASTM B637, *Standard specification for precipitation-hardening and cold worked Nickel alloy bars, forgings, and forging stock for moderate or high temperature service*

ASTM B705, *Standard specification for Nickel-alloy (UNS N06625, N06219 and N08825) welded pipe*

ASTM B733, *Standard specification for autocatalytic (electroless) Nickel-Phosphorus coatings on metal*

ASTM B834, *Standard specification for pressure consolidated powder metallurgy Iron-Nickel-Chromium-Molybdenum (UNS N08367), Nickel-Chromium-Molybdenum-Columbium (Nb) (UNS N06625), Nickel-Chromium-Iron alloys (UNS N06600 and N06690), and Nickel-Chromium-Iron-Columbium-Molybdenum (UNS N07718) alloy pipe flanges, fittings, valves, and parts*

ASTM B861, *Standard specification for Titanium and Titanium alloy seamless pipe*

ASTM B862, *Standard specification for Titanium and Titanium alloy welded pipe*

ASTM C633, *Standard test method for adhesion or cohesion strength of thermal spray coatings*

ASTM E8, *Standard test methods for tension testing of metallic materials*

ASTM E94, *Standard guide for radiographic examination using industrial radiographic film*

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

ASTM E165, *Standard practice for liquid penetrant testing for general industry*

ASTM E186, *Standard reference radiographs for heavy-walled (2 to 412 in. (50.8 to 114 mm)) steel castings*

ASTM E213, *Standard practice for ultrasonic testing of metal pipe and tubing*

ASTM E280, *Standard reference radiographs for heavy-walled (412 to 12 in. (114 to 305 mm)) steel castings*

ASTM E446, *Standard reference radiographs for steel castings up to 2 in. (50.8 mm) in thickness*

ASTM F467, *Standard specification for nonferrous nuts for general use*

ASTM F468, *Standard specification for nonferrous bolts, hex cap screws, socket head cap screws, and studs for general use*

ASTM F788, *Standard specification for surface discontinuities of bolts, screws, studs, and rivets, inch and metric series*

ASTM F812, *Standard specification for surface discontinuities of nuts, inch and metric series*

ASTM F2329, *Standard specification for Zinc coating, hot-dip, requirements for application to Carbon and alloy steel bolts, screws, washers, nuts, and special threaded fasteners*

ASTM G48, *Standard test methods for pitting and crevice corrosion resistance of stainless steels and related alloys by use of ferric chloride solution*

EEMUA 234, *90/10 Copper nickel alloy piping for offshore applications*

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

MSS SP-93, *Quality standard for steel castings and forgings for valves, flanges, fittings, and other piping components — Liquid penetrant examination method*

MSS SP-147, *Quality standard for steel castings used in standard class steel valves — sampling method for evaluating casting quality*

NACE TM0284, *Evaluation of pipeline and pressure vessel steels for resistance to hydrogen-induced cracking*