International Standard

ISO 18760

Ships and marine technology — High-manganese austenitic steel — Longitudinally welded high-manganese austenitic steel pipes for cryogenic temperature

Navires et technologie maritime — Acier austénitique à haute teneur en manganèse — Tuyaux soudés longitudinallement en acier austénitique à haute teneur en manganèse pour température cryogénique

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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 TC 8, *Ships and marine technology*, Subcommittee SC 4, *Outfitting and deck machinery*.

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

The aim of this document is to provide a set of common requirements for metallic materials used in cryogenic applications, in alignment with the IGC Code[1] and IGF Code[2] adopted by the International Maritime Organization (IMO).

The newly developed, high-manganese austenitic steel is expected to possess mechanical properties including Charpy impact energy values comparable to those materials for cryogenic service listed in both the IGC Code and IGF Code. Consequently, high-manganese steel is intended to satisfy the strength requirements of the structure of cargo tanks, fuel tanks and piping systems.

In addition, upon agreement with a purchaser, this document can be applied to piping systems for liquefied hydrogen.

This document provides a standard specification of high-manganese austenitic steel forgings for material suppliers, ship owners, ship yards, manufacturers and shipping companies with regard to producing, purchasing and using such materials.

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Ships and marine technology — High-manganese austenitic steel — Longitudinally welded high-manganese austenitic steel pipes for cryogenic temperature

1 Scope

This document specifies the delivery conditions for longitudinally welded pipes of circular cross-section, made of high-manganese austenitic steel, intended for cryogenic temperature applications under pressure.

This document is applicable to all pressure-retaining components and any non-pressure-retaining components, such as members of pipe supports, which are welded directly to a pressure-retaining component.

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

ISO 2566-2, *Steel — Conversion of elongation values — Part 2: Austenitic steels*

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

ISO 4136, *Destructive tests on welds in metallic materials — Transverse tensile test*

ISO 5173, *Destructive tests on welds in metallic materials — Bend tests*

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

ISO 10893-2, *Non-destructive testing of steel tubes — Part 2: Automated eddy current testing of seamless and welded (except submerged arc-welded) steel tubes for the detection of imperfections*

ISO 9606 (all parts), *Qualification testing of welders — Fusion welding — Part 1: Steels*

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

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 10474, *Steel and steel products — Inspection documents*

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*

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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*

ASME B31.3, *Process Piping*

ASME Boiler and Pressure Vessel Code, Section IX, *Welding, Brazing and Fusing Qualifications*

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

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

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

3.2
manufacturer
erector
organization responsible for the fabrication, welding, examination and testing of piping systems including any externally provided products or services

3.3
heat input
energy introduced into the weld region during welding per unit run length

3.4
leak testing
hydrostatic leak test
pneumatic leak test
application of a pressure load, greater than the design load, to demonstrate the integrity of a pressure system to safely withstand the design load

Note 1 to entry: ASME B31.3 uses the terms *hydrostatic leak test*, *pneumatic leak test*, or a combination of both methods, such as a hydro-pneumatic test.

3.5
lot
pipe of the same steel grade, the same cast, the same manufacturing process (using the same type of filler wires), the same nominal dimensions and, if applicable, subject to the same finishing treatment in a continuous furnace or heat treated in the same furnace charge

3.6
owner
person, partnership, organization or business ultimately responsible for design, construction, operation, and maintenance of a facility

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