International Standard

ISO 18735

First edition
2026-03

Ships and marine technology — High-manganese austenitic steel — Specification for high-manganese austenitic steel castings for cryogenic temperature

Navires et technologie maritime — Acier austénitique à haute teneur en manganèse — Spécification pour les pièces moulées en acier austénitique à haute teneur en manganèse pour température cryogénique

Reference number
ISO 18735:2026(en)

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

Page

Foreword ..... **iv**
Introduction ..... **v**
1 Scope **1**
2 Normative references **1**
3 Terms and definitions **2**
4 Abbreviated terms **3**
5 Health, safety and quality requirements **4**
5.1 Health and safety requirements 4
5.2 Quality requirements 4
6 Material designation **4**
7 Manufacture **5**
7.1 Steel making practice 5
7.2 Moulding 5
8 Chemical composition **5**
9 Heat treatment **6**
9.1 Temperature uniformity survey (TUS) for heat treatment furnace 6
9.2 Heat treatment 7
10 Mechanical properties **7**
10.1 Preparation of test specimens 7
10.2 Extent of testing 8
10.3 Mechanical properties 8
10.3.1 General 8
10.3.2 Tensile testing 8
10.3.3 Impact testing 9
10.3.4 Bend testing 9
10.4 Retesting 9
11 Inspection **10**
11.1 General requirements 10
11.2 Visual inspection 10
11.3 Liquid penetrant inspection 10
11.4 Radiographic inspection 10
11.5 Ultrasonic inspection 11
11.6 Hydrostatic testing 11
12 Repairs **12**
13 Dimension inspection **13**
14 Traceability, handling and packing **13**
15 Documentation **13**
Bibliography **15**

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).

ISO draws attention to the possibility that the implementation of this document may involve the 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.

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 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.

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 castings for material suppliers, ship owners, ship yards, manufacturers and shipping companies with regard to producing, purchasing and using such materials.

Ships and marine technology — High-manganese austenitic steel — Specification for high-manganese austenitic steel castings for cryogenic temperature

1 Scope

This document specifies minimum requirements for high-manganese austenitic steel castings for valves, flanges and other pressure-containing components used at cryogenic temperature.

This document can be applicable to all pressure retaining components and any non-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 4990, *Steel castings — General technical delivery requirements*

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

ISO 5208, *Industrial valves — Pressure testing of metallic valves*

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

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 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 V, *Non-Destructive Testing*

ASME Boiler and Pressure Vessel Code, Section VIII, *Rules for Construction of Pressure Vessels Division 1*

ASTM A991/991M, *Standard Test Method for Conducting Temperature Uniformity Surveys of Furnaces Used to Heat Treat Steel Products*

ANSI/MSS SP-55, *Quality Standard for Steel Castings for Valves, Flanges, and Fittings and Other Components - visual method for evaluation of surface irregularities*