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Chromium-molybdenum alloy steel plates for boilers and pressure vessels

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In the event of any doubts arising as to the contents,
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Foreword

This Japanese Industrial Standard has been revised by the Minister of Economy, Trade and Industry through deliberations at the Japanese Industrial Standards Committee as the result of proposal for revision of Japanese Industrial Standard submitted by The Japan Iron and Steel Federation (JISF) with a draft being attached, based on the provision of Article 12, paragraph (1) of the Industrial Standardization Act applied mutatis mutandis pursuant to the provision of Article 16 of the said Act. This edition replaces the previous edition (**JIS G 4109:2013**), which has been technically revised.

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NOTE Based on Article 9 of the Supplementary Provisions to the Unfair Competition Prevention Act etc., any submission of proposal, or employment of procedures such as deliberation by the Japanese Industrial Standards Committee under the previous Industrial Standardization Act shall be deemed to have been conducted pursuant to the provision of Article 12, paragraph (1) of the revised Industrial Standardization Act.

Chromium-molybdenum alloy steel plates for boilers and pressure vessels

Introduction

This Japanese Industrial Standard has been prepared based on **ISO 9328-1:2018**, Edition 4, and **ISO 9328-2:2018**, Edition 4 in line with common practice in transaction, with some modifications of the technical contents.

The vertical lines on both sides and dotted underlines indicate changes from the corresponding International Standards. A list of modifications with the explanations is given in Annex JA.

1 Scope

This Standard specifies requirements for hot-rolled chromium-molybdenum alloy steel plates for boilers and pressure vessels used in service at room temperature and elevated temperatures (hereafter referred to as steel plates).

NOTE The International Standards corresponding to this Standard and the symbol of degree of correspondence are as follows.

ISO 9328-1:2018 *Steel flat products for pressure purposes—Technical delivery conditions—Part 1: General requirements*

ISO 9328-2:2018 *Steel flat products for pressure purposes—Technical delivery conditions—Part 2: Non-alloy and alloy steels with specified elevated temperature properties* (Overall evaluation: MOD)

In addition, symbols which denote the degree of correspondence in the contents between the relevant International Standard and **JIS** are IDT (identical), MOD (modified), and NEQ (not equivalent) according to **ISO/IEC Guide 21-1**.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this Standard. The most recent editions of the standards (including amendments) indicated below shall be applied.

JIS G 0320 *Standard test method for heat analysis of steel products*

JIS G 0321 *Product analysis and its tolerance for wrought steel*

JIS G 0404 *Steel and steel products—General technical delivery requirements*

JIS G 0415 *Steel and steel products—Inspection documents*

JIS G 0551 *Steels—Micrographic determination of the apparent grain size*

JIS G 3193 *Dimensions, shape, mass and permissible variations of hot rolled steel plates, sheets and strips*

JIS Z 2241 *Metallic materials—Tensile testing—Method of test at room temperature*

JIS Z 2248 *Metallic materials—Bend test*

3 Symbol of grade, strength class and applicable thickness

The symbol of grade, strength class and applicable thickness of steel plates shall be as follows.

- a) Steel plates shall be classified into 6 grades, and their symbols of grade, strength classes and applicable thicknesses shall be as given in Table 1.
- b) Steel plates are classified according to the symbol of grade and further subclassified into two classes according to mechanical properties. Steel plates with low tensile strength shall be classified as Strength class 1 and those with high tensile strength as Strength class 2, which are represented by symbol “-1” or “-2”, respectively, suffixed to the symbol of grade.

Table 1 Symbol of grade, strength class and applicable thickness

Symbol of grade	Strength class	Applicable thickness mm
SCMV1	1	6 or over up to and incl. 200
	2	
SCMV2	1	
	2	
SCMV3	1	6 or over up to and incl. 300
	2	
SCMV4	1	
	2	
SCMV5	1	
	2	
SCMV6	1	
	2	

4 Manufacturing method and heat treatment

4.1 Manufacturing method

Steel plates shall be manufactured from killed steel.

4.2 Heat treatment and symbol for heat treatment

4.2.1 Heat treatment

4.2.1.1 Heat treatment of steel plates

The heat treatment of steel plates shall be as follows.

- a) Steel plates of Strength class 1 shall be annealed, or normalized and tempered. Steel plates of Strength class 2 shall be normalized and tempered.
- b) The temperature for annealing, or normalizing and tempering shall be as given in Table 2.

- c) When steel plates are normalized and tempered, in normalizing, accelerated cooling to obtain the specified mechanical properties may be performed by liquid quenching, air blasting or other suitable methods with a purchaser's approval.
- d) When the purchaser performs an alternative heat treatment to the annealing, or normalizing and tempering specified in a), upon agreement between the manufacturer and the purchaser, the steel plates shall be either as rolled or subjected to the heat treatment agreed. If not specified by the purchaser, SCMV1, SCMV2 and SCMV3 shall be as rolled, and SCMV4, SCMV5 and SCMV6 shall be stress relieved after rolling.

4.2.1.2 Heat treatment of test piece

The heat treatment shall be performed on the sample taken from a steel plate, and from the heat treated sample, the test piece shall be taken. Heat treatment shall be in accordance with 4.2.1.3.

4.2.1.3 Specifications of heat treatment

Specifications of heat treatment shall be as follows.

- a) The purchaser shall specify in the order sheet the type of heat treatment for steel plates to be performed by the manufacturer, the symbol for heat treatment in 4.2.2, and where necessary, the heat treatment conditions and the frequency of heat treatment operations on test pieces.
- b) When the heat treatment of steel plates is performed by the purchaser in accordance with 4.2.1.1 d), the purchaser shall clearly state to that effect in the order sheet and shall specify the conditions of heat treatment performed by the manufacturer on the test piece.

Table 2 Temperatures for annealing, normalizing and tempering

Unit: °C

Symbol of grade	Annealing temperature or normalizing temperature	Tempering temperature
SCMV1	875 to 1 000	620 or over
SCMV2		
SCMV3		
SCMV4		650 or over
SCMV5		
SCMV6 ^{a)}		700 or over
Note ^{a)} For steel plates of SCMV6 for which the maximum carbon content is specified to be 0.10 % by the purchaser, the temperature for annealing and normalizing may be 875 °C or under.		

4.2.2 Symbol for heat treatment

The symbol for heat treatment of steel plates and test pieces shall be as follows. The symbol for heat treatment shall be suffixed to the symbol of grade given in Table 1. When the same heat treatment is performed multiple times, the frequency of heat treatment operations shall be indicated before the symbol for heat treatment.