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Chromium-molybdenum alloy steel plates
for boilers and pressure vessels

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Foreword

This Japanese Industrial Standard has been revised by the Minister of Economy, Trade and Industry based on the provision of Article 14, paragraph (1) of the Industrial Standardization Act applied mutatis mutandis pursuant to the provision of Article 16 of the said Act in response to a proposal for revision of Japanese Industrial Standard with a draft being attached, submitted by The Japan Iron and Steel Federation (JISF), an accredited standards development organization. This edition replaces the previous edition (**JIS G 4109** : 2019), which has been technically revised.

However, **JIS G 4109** : 2019 may be applied in the **JIS** mark certification based on the relevant provisions of Article 30, paragraph (1), etc. of the Industrial Standardization Act until 21 April 2025.

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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, 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 Standards and **JIS** are IDT (identical), MOD (modified), and NEQ (not equivalent) according to **ISO/IEC Guide 21-1**.

2 Normative references

Part or all of the provisions of the following standards, 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 0201 *Glossary of terms used in iron and steel (Heat treatment)*

JIS G 0202 *Glossary of terms used in iron and steel (Testing)*

JIS G 0203 *Glossary of terms used in iron and steel (Products and quality)*

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 Terms and definitions

For the purpose of this Standard, the following terms and definitions, and those given in JIS G 0201, JIS G 0202 and JIS G 0203 apply.

3.1

coarse grained killed steel

killed steel of austenitic grain size index 5 or less

4 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 six 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 classified 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, SCMV2, SCMV3	1	6 or over up to and incl. 200
	2	
SCMV4, SCMV5, SCMV6	1	6 or over up to and incl. 300
	2	

5 Manufacturing method and heat treatment

5.1 Manufacturing method

Steel plates shall be manufactured from killed steel. Steel plates of SCMV1 shall be manufactured from coarse grained killed steel.

5.2 Heat treatment and symbol for heat treatment

5.2.1 Heat treatment

5.2.1.1 Heat treatment of steel plates

The heat treatment of steel plates shall be as given in Table 2. The temperature for annealing, or normalizing and tempering shall be as given in Table 3.

Table 2 Heat treatment of steel plates ^{a)}

Symbol of grade	Strength class	Heat treatment of steel plates
SCMV1, SCMV2, SCMV3	1	Annealing or normalizing and tempering ^{b)}
SCMV4, SCMV5, SCMV6	2	Normalizing and tempering ^{b)}
Note ^{a)} When the purchaser performs other heat treatment than annealing or normalizing and tempering on the steel plates, the steel plates shall be either supplied as rolled upon agreement between the manufacturer and the purchaser, or given the agreed heat treatment. If no heat treatment is specified by the purchaser, SCMV1, SCMV2 and SCMV3 shall be supplied as rolled, and SCMV4, SCMV5 and SCMV6 shall be stress relieved. Note ^{b)} The manufacturer may, in normalizing, perform accelerated cooling by liquid quenching, air blasting or other suitable methods with the purchaser's approval in order to obtain the specified mechanical properties.		

Table 3 Temperatures for annealing, normalizing and tempering

Unit: °C

Symbol of grade	Annealing temperature or normalizing temperature	Tempering temperature
SCMV1, SCMV2, SCMV3	875 to 1 000	620 min.
SCMV4, SCMV5		650 min.
SCMV6 ^{a)}		700 min.
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.		

5.2.1.2 Heat treatment of test piece

Where the test is performed on heat treated test pieces, the specified heat treatment shall be given on the sample taken from a steel plate, and then the required number of test pieces shall be taken from the heat treated sample.

5.2.1.3 Specification of heat treatment

Specification of heat treatment shall be as follows.

- The purchaser shall specify the type and symbol of heat treatment to be performed on steel plates by the manufacturer and, if necessary, the conditions and number of cycles of the heat treatment to be performed on test pieces.
- When the purchaser intends to perform heat treatment on the steel plates according to Note ^{a)} to Table 2, the purchaser shall make this explicit to the manufacturer,