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**Superior atmospheric corrosion resisting
rolled steels**

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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 3125:2015**), which has been technically revised.

However, **JIS G 3125: 2015** 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 March 2022.

This **JIS** document is protected by the Copyright Act.

Attention is drawn to the possibility that some parts of this Standard may conflict with patent rights, published patent application or utility model rights. The relevant Minister and the Japanese Industrial Standards Committee are not responsible for identifying any of such patent rights, published patent application or utility model rights.

Superior atmospheric corrosion resisting rolled steels

Introduction

This Japanese Industrial Standard has been prepared based on ISO 5952:2019, Edition 5, with some modifications of the technical contents.

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

1 Scope

This Standard specifies requirements for the rolled steels having high atmospheric corrosion resistance (hereafter referred to as rolled steels) to be used for vehicles, buildings, steel towers and other structures.

NOTE 1 The term “atmospheric corrosion resistance” means the property to withstand the corrosion in the atmosphere.

NOTE 2 The International Standard corresponding to this Standard and the symbol of degree of correspondence are as follows.

ISO 5952 : 2019 *Steel sheet, hot-rolled, of structural quality with improved atmospheric corrosion resistance (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

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

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

JIS G 0416 *Steel and steel products — Location and preparation of samples and test pieces for mechanical testing*

JIS G 3141 *Cold-reduced carbon steel sheet and strip*

JIS G 3192 *Dimensions, mass and permissible variations of hot rolled steel sec-*

tions

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 terms and definitions given in **JIS G 0202** and **JIS G 0203** apply.

4 Symbols of grade and applicable thicknesses

The rolled steels are classified into two grades, and their symbols and applicable thicknesses shall be as given in Table 1.

Table 1 Symbols of grade and applicable thicknesses

Unit: mm

| Symbol of grade | Division | Applicable thickness |
|-----------------|---|---------------------------------|
| SPA-H | Hot-rolled steel sheet, strip and section | 16 or under |
| SPA-C | Cold-rolled steel sheet and strip | 0.6 or over up to and incl. 2.3 |

5 Chemical composition

When tested in accordance with 10.1, the rolled steel shall satisfy the heat analysis values given in Table 2.

Table 2 Chemical composition

Unit: %

| Symbol of grade | C | Si | Mn ^{a)} | P | S | Cu | Cr | Ni |
|-----------------|------|---------|------------------|----------|-------|---------|---------|------|
| SPA-H | 0.12 | 0.20 to | 0.60 | 0.070 to | 0.035 | 0.25 to | 0.30 to | 0.65 |
| SPA-C | max. | 0.75 | max. | 0.150 | max. | 0.55 | 1.25 | max. |

Alloy elements not specified in this Table may be added as necessary.

Note ^{a)} The upper limit of Mn may be 1.0 % by agreement between the purchaser and the manufacturer.

6 Mechanical properties

6.1 Yield point or proof stress, tensile strength and elongation

When tested in accordance with 10.2, the yield point or proof stress, tensile strength and elongation of the rolled steel shall satisfy Table 3.

Table 3 Yield point or proof stress, tensile strength and elongation

| Symbol of grade | Division | Yield point or proof stress N/mm ² | Tensile strength N/mm ² | Elongation % | Tensile test piece |
|-----------------|--|--|---------------------------------------|-----------------|--------------------|
| | | | | | |
| SPA-H | Steel sheet and strip 6.0 mm or under in thickness | 355 min. | 490 min. ^{a)} | 22 min. | No. 5 |
| | Steel sheet and strip over 6.0 mm in thickness | 355 min. | 490 min. | 15 min. | No. 1A |
| | Steel section | | | | |
| SPA-C | — | 315 min. | 450 min. | 26 min. | No. 5 |

NOTE : 1 N/mm² = 1 MPa
 Note ^{a)} For SPA-H steel sheet and strip of under 3 mm in thickness, the tensile strength of 510 N/mm² or over is applicable by agreement between the purchaser and the manufacturer.

6.2 Bendability

When bent by the method specified in 10.2 according to the conditions given in Table 4, the test piece shall be free from cracks on the outer surface.

NOTE For details of the bend test, see 10.2.3.

Table 4 Bendability

| Symbol of grade | Division | Bendability | | | Test piece |
|-----------------|--|-------------|-------------------------------|--|------------------------|
| | | Bend angle | Inside radius | Internal spacing of bend ^{a)} (number of pads) | |
| SPA-H | Steel sheet and strip 6.0 mm or under in thickness | 180° | 0.5 × thickness ^{b)} | Not applicable | No. 1 |
| | Steel sheet and strip over 6.0 mm in thickness | 180° | 1.5 × thickness | Not applicable | |
| | Steel section | | | | |
| SPA-C | — | 180° | Not applicable | 1 | According to 10.2.3.2. |

Note ^{a)} Internal spacing to which the test piece is bent, expressed as the number of sheets of nominal thickness used for the bending.
 Note ^{b)} For SPA-H steel sheet and strip of 6.0 mm or under in thickness, the inside radius of 1.0 times the thickness is applicable by agreement between the purchaser and the manufacturer.

7 Shape, dimensions and mass

7.1 Expression of dimensions

The expression of dimensions shall be as follows.

- a) The dimensions of hot-rolled steel section shall be expressed in accordance with Clause 4 of **JIS G 3192**.
- b) The dimensions of hot-rolled steel sheet and strip shall be expressed in accordance with Clause 3 of **JIS G 3193**.
- c) The dimensions of cold-rolled steel sheet and strip shall be expressed in accordance with Clause 6 of **JIS G 3141**.

7.2 Shape, dimensions and mass of SPA-H

The shape, dimensions, mass and tolerances shall be as follows.

- a) The shape, dimensions, mass and tolerances of rolled steel shall be in accordance with **JIS G 3192** or **JIS G 3193**.
- b) For the length and the cut-edge width of steel sheet, Tolerance A in Clause 5 of **JIS G 3193** shall apply unless otherwise specified.
- c) Squareness of steel sheet shall be in accordance with either of the following. In case of dispute, the method 1) shall be applied.
 - 1) **Method using perpendicular line** The squareness of the steel sheet shall be expressed by the ratio (A/W) as shown in Figure 1, wherein A is the distance between a perpendicular line from an edge drawn at a corner point and the corner point of the opposite edge and W is the length of the perpendicular. This ratio shall not exceed 1.0 %.

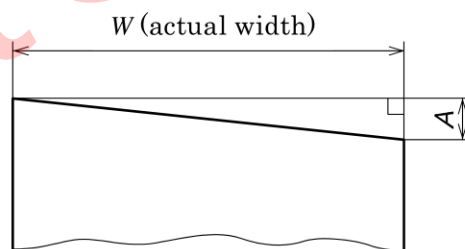


Figure 1 Squareness of steel sheet (method using perpendicular line)

- 2) **Method using diagonal lines** The absolute value of the difference between the lengths of two diagonals (X_1 and X_2 shown in Figure 2) divided by 2 ($|X_1 - X_2| / 2$) shall not exceed 0.7 % of the actual width W of the steel sheet.

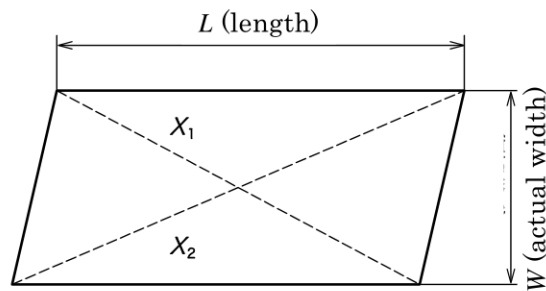


Figure 2 Squareness of steel sheet (method using diagonal lines)

7.3 Shape, dimensions and mass of SPA-C

The standard thickness, dimensional tolerances, shape and mass shall be as follows.

- The standard thickness, dimensional tolerances, shape and mass of steel sheet and strip shall be in accordance with **JIS G 3141**.
- For the tolerances on thickness, width and length of steel sheet, and the tolerances on thickness and width of steel strip, Tolerance A in Clause 8 of **JIS G 3141** shall apply unless otherwise specified.
- For the flatness of steel sheet and strip, Flatness A in 9.1 of **JIS G 3141** shall apply unless otherwise specified.

8 Appearance

The appearance shall be as follows.

- The appearance of hot-rolled steel section shall be in accordance with Clause 9 of **JIS G 3192**.
- The appearance of hot-rolled steel sheet and strip shall be in accordance with Clause 7 of **JIS G 3193**.
- The appearance of cold-rolled steel sheet and strip shall be in accordance with Clause 12 of **JIS G 3141**.

9 Descaling and oiling

9.1 Descaling

SPA-H sheets and strips shall be descaled if so requested by the purchaser, using either acid pickling or shot blasting.

9.2 Oiling

The oiling shall be as follows unless otherwise specified.

- SPA-H and SPA-C steel sheets and strips which have been descaled by acid pickling or shot blasting shall be oiled.
- As-rolled SPA-H steel sheets, strips and sections shall not be oiled.

10 Tests

10.1 Chemical analysis

The chemical analysis shall be as follows.

- a) General requirements for chemical analysis and sampling method for heat analysis shall be in accordance with Clause 8 of **JIS G 0404**.
- b) The analytical method shall be in accordance with **JIS G 0320**.

10.2 Mechanical tests

10.2.1 General

General requirements for mechanical tests shall be in accordance with clauses 7 and 9 of **JIS G 0404**. The sampling of test pieces shall be in accordance with Class A specified in 7.6 of **JIS G 0404**, and the number and location of test pieces shall be as follows.

a) Number of tensile test pieces and bend test pieces

- 1) **Hot-rolled steel sheet** Take one tensile and one bend test piece from each lot of steel sheets of the same heat with the maximum thickness not more than two times the minimum thickness. If the lot exceeds 50 t in mass, take two tensile and two bend test pieces.
- 2) **Hot-rolled steel strip and cut lengths therefrom** Take one tensile and one bend test piece from each lot of steel strip/cut lengths of the same heat and of the same thickness. If the lot exceeds 50 t in mass, take two tensile and two bend test pieces.
- 3) **Hot-rolled steel section** Take one tensile and one bend test piece from each lot of steel sections of the same heat and the same cross-section with the maximum thickness not more than two times the minimum thickness. If the lot exceeds 50 t in mass, take two tensile and two bend test pieces.
- 4) **Cold-rolled steel sheet and strip** Take one tensile and one bend test piece from each lot of steel sheets/strips of the same heat, the same thickness, the same rolling condition and the same heat treatment condition. If the lot exceeds 50 t in mass, take two tensile and two bend test pieces.

- b) **Location of tensile and bend test pieces**, in accordance with Annex A of **JIS G 0416**.

10.2.2 Tensile test piece and test method

The tensile test shall be as follows.

- a) The tensile test piece shall be in accordance with No. 1A or No. 5 specified in **JIS Z 2241**.
- b) The tensile test method shall be in accordance with **JIS Z 2241**.
- c) For a steel shape from which the test pieces of specified dimensions cannot be taken, the test method and elongation requirement shall be as agreed between the purchaser and the manufacturer.

10.2.3 Bend test piece and test method

10.2.3.1 Bend test piece and test method for SPA-H

The bend test piece shall be in accordance with No. 1 specified in **JIS Z 2248**. The bend test method shall be in accordance with **JIS Z 2248**. The bend angle, inside radius and the internal spacing of bend shall be as given in Table 4.

10.2.3.2 Bend test piece and test method for SPA-C

The bend test piece shall be 15 mm to 50 mm in width, and have an appropriate length which is about twice the width. The test piece shall be bent according to Table 4 manually with a vise through 180° along the length direction of the test piece as shown in Figure 3. If bending with a vise is not possible, other suitable means of bending may be used.

10.2.3.3 Execution of test

The bend test is optional ¹⁾ and shall be performed only when specified by the purchaser.

Note ¹⁾ The test may be omitted at the discretion of the manufacturer, but even in this case the products are required to satisfy the specified bendability.

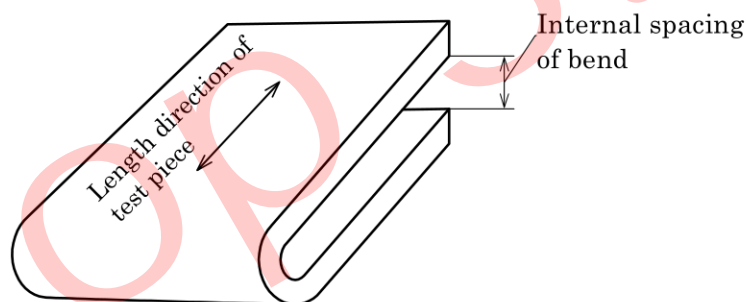


Figure 3 Direction of bend test

11 Inspection and reinspection

11.1 Inspection

The inspection shall be as follows.

- The chemical composition shall conform to the requirements of Clause 5.
- The mechanical properties shall conform to the requirements of Clause 6.
- The shape, dimensions and mass shall conform to the requirements of Clause 7.
- The appearance shall conform to the requirements of Clause 8.

11.2 Reinspection

The rolled steels having failed in the mechanical tests may be subjected to the retest according to 9.8 of **JIS G 0404** for further acceptance judgement.

12 Marking

Each rolled steel or each bundle of rolled steels having passed the inspection shall be marked with the following information by a suitable means. Part of the following particulars may be omitted by agreement between the purchaser and the manufacturer as far as the product can be identified.

- a) Symbol of grade
- b) Heat number or inspection number
- c) Dimensions (see 7.1)
- d) Name of manufacturer or identifying brand
- e) Quantity or mass (steel sheet and strip)

13 Product requirements to be confirmed at the time of ordering

To adequately specify the requirements in this Standard, the purchaser and the manufacturer should confirm the following particulars at the time of order.

- a) Product form, i.e. sheet, strip or section
- b) Symbol of grade (Table 1)
- c) Edge type (mill edge or cut edge)
- d) Dimensions (Clause 7)
- e) For SPA-H steel sheet or strip, whether descaling is required, and the method used for descaling if it is (9.1)
- f) Quantity or mass
- g) Maximum mass of steel strip

14 Report

The manufacturer shall submit the inspection certificate when previously required by the purchaser. The report shall conform to the requirements of Clause 13 in **JIS G 0404**. Unless otherwise specified, the type of the inspection document to be submitted shall be in accordance with 5.1 of **JIS G 0415**.

If any alloy element(s) other than given in Table 2 has been added, the content(s) of the added element(s) shall be reported in the inspection document.

Annex JA (informative)

Comparison table between JIS and corresponding International Standard

| JIS G 3125 | | ISO 5952 : 2019, (MOD) | | |
|------------------------|---|-----------------------------|--|--|
| a) No. of clause (JIS) | b) No. of clause (corresponding International Standard) | c) Classification by clause | d) Detail and justification of technical deviation | e) Future measures for the technical deviation |
| 1 | 1 | Addition | Add steel sections to the ISO scope that only covers steel sheets and strips. | Structural difference between JIS and ISO . No proposal will be made to ISO . |
| 3 | 3 | Alteration | Cite JIS terminology standards for definitions of terms used in this Standard. | To provide definitions for terms used in JIS . No proposal will be made to ISO . |
| 4 | 1 | Alteration | Specify hot-rolled and cold-rolled steels for one of the steel grades specified in ISO . | Structural difference between JIS and ISO . No proposal will be made to ISO . |
| 5 | 5.2 | Deletion | Delete part of the chemical composition requirements given in ISO . | Same as above. |
| 6 | 5.4 | Addition | Add yield point or proof stress, tensile strength and elongation requirements for steel sections and cold-rolled steel sheets, as well as the bend test. | Same as above. |
| 7 | 5.10 | Addition | Add citation of JISs for shape, dimensions, masss and tolerances. | Same as above. |
| 8 | 10 | Alteration | Cite JISs for appearance requirements. | Same as above. |
| 10 | 5.3 | Addition | Add specific chemical analysis requirements and method. Add the bend test and specific mechanical tests requirements. | Same as above. |
| | 6 7 | Addition | Add the bend test. | Same as above. |
| 11 | 11 | Deletion | Delete the description regarding the inspection observed by the purchaser. | The inspection is left to the manufacturer's responsibility. No change is made at this time. |

| a) No. of clause (JIS) | b) No. of clause (corresponding International Standard) | c) Classification by clause | d) Detail and justification of technical deviation | e) Future measures for the technical deviation |
|--|---|-----------------------------|--|--|
| 12 | 13 | Deletion | Delete “a reference to this document, i.e. ISO 5952 : 2019” and “the order number” from the marking items. | In JIS , the standard number is obvious from the class symbols. The order number is left to the individual contracts. |
| 13 | 14 | Alteration | Delete part of the particulars to be confirmed. | Structural difference between JIS and ISO . No proposal will be made to ISO . |
| 14 | — | Addition | Add the test report requirements. | Same as above. |
| — | 5.1 | Deletion | Delete the steelmaking requirements. | Same as above. |
| — | 12 | Deletion | Delete the coil size requirements. | Coil size is left to the individual contracts. No proposal will be made to ISO . |
| <p>NOTE 1 Symbols in sub-columns of classification by clause in the above table indicate as follows.</p> <ul style="list-style-type: none"> — Deletion : Delete the specification item(s) or content(s) of International Standard(s). — Addition : Adds the specification item(s) or content(s) which are not included in International Standard. — Alteration : Alter the specification content(s) or structure of International Standard(s). <p>NOTE 2 Symbol of overall degree of correspondence between JIS and International Standard(s) in the above table indicates as follows:</p> <ul style="list-style-type: none"> — MOD : Modifies International Standards. | | | | |

Botop Steel

Errata for **JIS** (English edition) can be downloaded in PDF format at Webdesk (purchase information page) of our website (<https://www.jsa.or.jp/>).

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