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Rolled steels for general structure

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Foreword

This translation has been made based on the original Japanese Industrial Standard 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 the draft being attached, based on the provision of Article 12 Clause 1 of the Industrial Standardization Law applicable to the case of revision by the provision of Article 14.

Consequently **JIS G 3101:2010** is replaced with this Standard.

However, **JIS G 3101:2010** may be applied in the **JIS** mark certification based on the relevant provisions of Article 19 Clause 1, etc. of the Industrial Standardization Law until August 19, 2016.

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

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

Rolled steels for general structure

Introduction

This Japanese Industrial Standard has been prepared based on the first editions of ISO 630-1 and ISO 630-2 published in 2011 with some modifications of the technical contents.

The portions given continuous sidelines or dotted underlines are the matters in which the contents of the corresponding International Standards have been modified. A list of modifications with the explanations is given in Annex JC.

1 Scope

This Standard specifies the hot rolled steels and hot extruded sections used for general structure such as bridges, ships, rolling stocks and other structures (hereafter referred to as “steel product”).

The quality requirements for hot extruded sections are given in Annex JB.

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

ISO 630-1 : 2011 *Structural steels — Part 1 : General technical delivery conditions for hot-rolled products*

ISO 630-2 : 2011 *Structural steels — Part 2 : Technical delivery conditions for structural steels for general purposes* (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

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 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 3191 *Dimensions, mass and permissible variations of hot rolled steel bars and bar in coil*

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

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

JIS G 3194 *Dimensions, mass and permissible variations of hot rolled flat steel*

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

JIS Z 2248 *Metallic materials — Bend test*

3 Classification, symbols and applicable dimensions

The steel products are classified into four grades, and their symbols and applicable dimensions are as given in Table 1.

Table 1 Symbol of grade and applicable dimensions

Symbol of grade	Shape of steel product	Applicable dimensions
SS330	Steel plates and sheets, steel strips in coil, flats and bars	—
SS400	Steel plates and sheets, steel strip in coil, sections, flats and bars	—
SS490		
SS540	Steel plates and sheets, steel strips in coil, sections and flats	≤ 40 mm in thickness ^{a)}
	Steel bars	≤ 40 mm in diameter, side or distance across flats
NOTE : Steel bars include bar-in coils. Note ^{a)} The thickness of sections shall be t or t_2 in Table 3 and t_2 in Table 4 of JIS G 3192 .		

4 Chemical composition

Steel products shall be tested in accordance with 8.1, and the heat analysis values shall be as given in Table 2.

Table 2 Chemical composition

Symbol of grade	Unit: %			
	C	Mn	P	S
SS330	—	—	≤ 0.050	≤ 0.050
SS400	≤ 0.30	≤ 1.60	≤ 0.040	≤ 0.040
SS490				
SS540				
Alloy elements other than those specified in this table may be added as necessary.				

5 Mechanical properties

The steel products shall be tested in accordance with **8.2**, and the yield point or proof stress, tensile strength, elongation and bendability shall be as given in Table 3. The mechanical properties of sections with a side under 40 mm and of flats with a width under 40 mm shall be in accordance with Annex JA.

The steel products shall satisfy the bendability without generating any cracks on the outer surface of the bend test piece.

NOTE : For the details of bend test, see **8.2.1**.

6 Shape, dimensions, mass and tolerances

The shape, dimensions, mass and tolerances of steel products shall be in accordance with **JIS G 3191**, **JIS G 3192**, **JIS G 3193** and **JIS G 3194**.

In this case, the tolerances on the width of cut-edged steel plate, sheet and steel strip in coil as well as the tolerances on length of steel plate or sheet shall be in accordance with tolerance A in Tables 7 and 8 of **JIS G 3193**, unless otherwise specified. The tolerance on thicknesses not specified in **JIS G 3193** may be agreed between the purchaser and the manufacturer.

Table 3 Mechanical properties

Symbol of grade	Yield point or proof strength N/mm ²				Tensile strength N/mm ²	Elongation			Bendability		
	Thickness ^{a)} mm					Thickness ^{a)} mm	Test piece	%	Bending angle	Inner radius	Test piece ^{c)}
	≤16	>16 ≤40	>40 ≤100	>100							
SS330	≥205	≥195	≥175	≥165	330 to 430	≤5 in thickness of steel plates and sheets, steel strip in coil and flats	No. 5	≥26	180°	0.5 × thickness	No. 1
						> 5 ≤ 16 in thickness of steel plates and sheets, steel strip in coil and flats	No. 1A	≥21			
						> 16 ≤ 50 in thickness of steel plates and sheets, steel strip in coil and flats	No. 1A	≥26			
						>40 in thickness of steel plates and sheets, and flats	No. 4	≥28 ^{b)}			
						≤25 in diameter, side or distance across flats of steel bars	No. 2	≥25	180°	0.5 × diameter, side or distance across flats	No. 2
						>25 in diameter, side or distance across flats of steel bars	No. 14A	≥28			
SS400	≥245	≥235	≥215	≥205	400 to 510	≤5 in thickness of steel plates and sheets, steel strip in coils, flats and sections	No. 5	≥21	180°	1.5 × thickness	No. 1
						> 5 ≤ 16 in thickness of steel plates and sheets, steel strip in coil, flats and sections	No. 1A	≥17			
						> 16 ≤ 50 in thickness of steel plates and sheets, steel strip in coil, flats and sections	No. 1A	≥21			
						>40 in thickness of steel plates and sheets, flats and sections	No. 4	≥23 ^{b)}			
						≤25 in diameter, side or distance across flats of steel bars	No. 2	≥20	180°	1.5 × diameter, side or distance across flats	No. 2
						>25 in diameter, side or distance across flats of steel bars	No. 14A	≥22			

Table 3 (concluded)

Symbol of grade	Yield point or proof strength N/mm ²				Tensile strength N/mm ²	Elongation			Bendability		
	Thickness ^{a)} mm					Thickness ^{a)} mm	Test piece	%	Bending angle	Inner radius	Test piece ^{c)}
	≤16	>16 ≤40	>40 ≤100	>100							
SS490	≥285	≥275	≥255	≥245	490 to 610	≤5 in thickness of steel plates and sheets, steel strip in coils, flats and sections	No. 5	≥19	180°	2.0 × thickness	No. 1
						>5 ≤ 16 in thickness of steel plates and sheets, steel strip in coil, flats and sections	No. 1A	≥15			
						>16 ≤ 50 in thickness of steel plates and sheets, steel strip in coil, flats and sections	No. 1A	≥19			
						>40 in thickness of steel plates and sheets, flats and sections	No. 4	≥21 ^{b)}			
						≤25 in diameter, side or distance across flats of steel bars	No. 2	≥18	180°	2.0 × diameter, side or distance across flats	No. 2
						>25 in diameter, side or distance across flats of steel bars	No. 14A	≥20			
SS540	≥400	≥390	—	—	≥540	≤5 in thickness of steel plates and sheets, steel strip in coils, flats and sections	No. 5	≥16	180°	2.0 × thickness	No. 1
						>5 ≤ 16 in thickness of steel plates and sheets, steel strip in coil, flats and sections	No. 1A	≥13			
						>16 ≤ 40 in thickness of steel plates and sheets, steel strip in coil, flats and sections	No. 1A	≥17			
						≤25 in diameter, side or distance across flats of steel bars	No. 2	≥13	180°	2.0 × diameter, side or distance across flats	No. 2
						>25 ≤ 40 in diameter, side or distance across flats of steel bars	No. 14A	≥16			

NOTE : 1 N/mm² = 1 MPaNotes^{a)} For sections, the thickness of steel products shall be that of the location of test pieces. The thickness of steel products shall be that of diameter for round bars, that of side for square bars, and that of distance across flats for hexagon bars.^{b)} For the elongation of No. 4 test piece of steel plate of thickness over 90 mm, subtract 1 from the elongation values of this table for each increment of 25.0 mm or its fraction in thickness. However, the subtraction shall not exceed 3.^{c)} For bend test of steel products of thickness 5 mm or under, No. 3 test piece may be used.

7 Appearance

The appearance of steel products shall be in accordance with clause 9 of JIS G 3191, clause 9 of JIS G 3192, clause 7 of JIS G 3193, and clause 10 of JIS G 3194.

8 Tests

8.1 Chemical analysis

The chemical analysis shall be as follows.

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

8.2 Mechanical tests

8.2.1 General

General requirements for mechanical tests shall be in accordance with clauses 7 and 9 of **JIS G 0404.** The sampling method shall be in accordance with Class A in 7.6 of **JIS G 0404.**

The bend test may be omitted ¹⁾, but if specified by the purchaser, the test shall be performed.

Note ¹⁾ It means that although the test may be omitted according to the judgement of the manufacturer, the steel products shall satisfy the specified bendability.

8.2.2 Number of tensile and bend test pieces

The number of tensile and bend test pieces shall be as follows.

- a) **Steel plates, sheets and flats** Take one test piece for each test from one lot of steel plate, sheet or flat which belongs to the same heat, and of which the maximum thickness is within two times the minimum thickness. When the mass of one lot exceeds 50 t, take two test pieces from each lot. When the mass of a steel sheet exceeds 50 t in this case, take one test piece from each steel sheet.
- b) **Steel strip in coil or cut length** Take one test piece for each test from one lot of steel strip in coil or cut length which belongs to the same heat and of the same thickness. When the mass of one lot exceeds 50 t, take two test pieces from each lot.
- c) **Sections** Take one test piece for each test from one lot of section which belongs to the same heat rolled to the same sectional profile, and of which the maximum thickness is within two times the minimum thickness. When the mass of one lot exceeds 50 t, take two test pieces from each lot.
- d) **Steel bars** Take one test piece for each test from one lot of steel bar which belongs to the same heat rolled to the same sectional profile, and of which the maximum diameter (side or distance across flats) is within two times the minimum diameter

(side or distance across flats). When the mass of one lot exceeds 50 t, take two test pieces from each lot.

- e) **Heat treated steel products** The number of test pieces of heat treated steel product shall be in accordance with a), b), c) and d), by the same heat and the same conditions of heat treatment.

8.2.3 The location of tensile and bend test pieces

The location of tensile and bend test pieces shall be in accordance with **JIS G 0416**. The centre of test pieces across the width of steel plate or sheet, steel strip in coil and flat shall be at 1/4 from the edge of the width or as near to that location as possible.

8.2.4 Test pieces

Tensile test and bend test pieces shall be as follows.

- a) Tensile test pieces shall be one of No.1A, 2, 4, 5, 14A and 14B specified in **JIS Z 2241**.
- b) Bend test pieces shall be one of No.1, 2 and 3 specified in **JIS Z 2248**.

8.2.5 Test methods

The tensile test and the bend test shall be as follows.

- a) The tensile test shall be in accordance with **JIS Z 2241**.
- b) The bend test shall be in accordance with **JIS Z 2248**.

9 Inspection

The inspection shall be as follows.

- a) General requirements for inspection shall be in accordance with **JIS G 0404**.
- b) The chemical composition shall conform to the requirements of clause 4.
- c) The mechanical properties shall conform to the requirements of clause 5.
- d) The shape, dimensions and mass shall conform to the requirements of clause 6.
- e) The appearance shall conform to the requirements of clause 7.

10 Reinspection

The steel products having failed in the tensile test and the bend test may be subjected to the retest according to 9.8 of **JIS G 0404** for further acceptance judgement.

11 Marking

The steel products which have passed the inspection shall be marked on each piece or each bundle with the following items by suitable means. By agreement between the purchaser and the manufacturer, part of the items may be omitted to such extent that the product can be still identified.

- a) Symbol of grade

NOTE : In some cases, additional mark specified by the order or the agreement between the purchaser and the manufacturer is to be suffixed to the symbol of grade for identification.

- b) Heat number or inspection number
- c) Dimensions The marking of dimensions shall be in accordance with clause 4 of JIS G 3191, clause 4 of JIS G 3192, clause 3 of JIS G 3193, and clause 4 of JIS G 3194.
- d) Quantity or mass of each bundle (for steel plate, sheet and steel strip in coil)
- e) Manufacturer's name or its identifying brand

12 Report

The manufacturer shall submit the inspection document to the purchaser. The report shall be in accordance with clause 13 of **JIS G 0404**. Unless otherwise specified in the order, the type of the inspection document to be submitted shall be the standard designation 3.1 in Table 1 of **JIS G 0415**.

When any alloy elements other than those in Table 2 are added, the content rate of the element included shall be addressed in the report.

Annex JA (normative)

Mechanical properties of sections with side under 40 mm
and of flats with width under 40 mm

JA.1 Mechanical properties

Sections with a side under 40 mm and flats with a width under 40 mm shall be tested in accordance with 8.2, and the yield point or proof stress, tensile strength, elongation and bendability shall be as given in Table JA.1.

Table JA.1 Mechanical properties of sections with side under 40 mm and of flats with width under 40 mm

Symbol of grade	Yield point or proof strength N/mm ²		Tensile strength N/mm ²	Thickness ^{a)} mm	Tensile test piece	Elongation %	Bendability		
	Thickness ^{a)} mm						Bending angle	Inner radius	Test piece ^{b)}
	≤16	>16 ≤40							
SS330	≥205	≥195	330 to 430	≥ 3 ≤ 5	No. 5	≥26	180°	0.5 × thickness	No. 1
					No. 14B	≥26			
				> 5 ≤ 16	No. 5	≥33			
					No. 14B	≥30			
				> 16 ≤ 40	No. 5	≥41			
					No. 14B	≥30			
SS400	≥245	≥235	400 to 510	≥ 3 ≤ 5	No. 5	≥21	180°	1.5 × thickness	No. 1
					No. 14B	≥21			
				> 5 ≤ 16	No. 5	≥27			
					No. 14B	≥24			
				> 16 ≤ 40	No. 5	≥33			
					No. 14B	≥24			
SS490	≥285	≥275	490 to 610	≥ 3 ≤ 5	No. 5	≥19	180°	2.0 × thickness	No. 1
					No. 14B	≥19			
				> 5 ≤ 16	No. 5	≥24			
					No. 14B	≥22			
				> 16 ≤ 40	No. 5	≥30			
					No. 14B	≥22			
SS540	≥400	≥390	≥540	≥ 3 ≤ 5	No. 5	≥16	180°	2.0 × thickness	No. 1
					No. 14B	≥16			
				> 5 ≤ 16	No. 5	≥21			
					No. 14B	≥19			
				> 16 ≤ 40	No. 5	≥27			
					No. 14B	≥20			

NOTE : 1 N/mm² = 1 MPa
Notes a) For sections, the thickness of steel products shall be that at the location of test pieces.
b) For bend test of steel products of 5 mm or under in thickness, No. 3 test piece may be used.

Annex JB (normative)

Quality requirements for hot extruded sections

JB.1 Application

This Annex specifies the quality of specially-shaped hot extruded sections to be used for construction components, coupling components for sheet piling, steel pipe sheet piles and the like.

Hot extruded sections shall be applied by agreement between the purchaser and the manufacturer.

JB.2 Classification, symbols and applicable dimensions

Hot extruded sections are classified into two classes, and their symbols and applicable dimensions shall be as given in Table JB.1.

Table JB.1 Symbol of grade and applicable dimensions for hot extruded sections

Symbol of grade	Applicable dimensions
SS400	≥5 mm in thickness
SS490	≤250 mm in side or height

JB.3 Manufacturing method

The sections shall be manufactured by hot extrusion²⁾. Hot extruded sections shall be formed so that the forging ratio³⁾ is at least 4.

Notes²⁾ Hot extrusion means a forming method by which heated billets are extruded through the dice.

³⁾ The forging ratio here means a ratio of the cross-section area of a cast slab or a bloom to that after hot extrusion.

JB.4 Chemical composition

Hot extruded sections shall be tested in accordance with 8.1, and the heat analysis values shall be as given in Table 2.

JB.5 Mechanical properties

JB.5.1 The location of tensile and bend test pieces

The location of tensile and bend test pieces of hot extruded sections shall be as agreed between the purchaser and the manufacturer. The No.4 tensile test piece shall be taken at 1/4 of the width.

JB.5.2 Tensile test and bend test properties

Hot extruded sections shall be tested in accordance with 8.2, and the yield point or proof stress, tensile strength, elongation, and bendability shall be as given in Table 3 and Table JA.1. When the shape of hot extruded section is not appropriate to take No. 1A test piece, No. 5 test piece may be taken. In this case, the specifications in Table 3 shall be replaced as follows: replace $\geq 17\%$ by $\geq 27\%$, $\geq 21\%$ by $\geq 33\%$ for SS400; replace $\geq 15\%$ by $\geq 24\%$, $\geq 19\%$ by $\geq 30\%$ for SS490.

JB.6 Shape, dimensions and tolerances

The shape of hot extruded sections shall be as specified by the purchaser. When a specific shape cannot be formed, the purchaser shall specify changes of shape by agreement between the purchaser and the manufacturer.

NOTE : Hot extruded sections are used mainly as components specified in designing documents, based on technical standards such as standard specifications for building operations and common specifications for port construction work.

The tolerances on shape and dimensions of hot extruded sections shall be as given in Table JB.2.

Table JB.2 Tolerances on shape and dimensions

Unit: mm

Division		Tolerance
Side, height and thickness	< 50	± 1.5
	$\geq 50 < 100$	± 2.0
	$\geq 100 < 200$	± 3.0
	≥ 200	± 4.0
Length	≤ 7 m	+40 0
	>7 m	For the plus side tolerance, add 5 mm to the plus side tolerance for each increment of 1 m or its fraction in length. The minus side tolerance shall be 0 mm.
Squareness of cross-section	≤ 100 mm in maximum side length	≤ 1.6
	>100 mm in maximum side length	≤ 3.0
Bendability		$\leq 0.5\%$ of length ^{a)}
<p>The tolerances may be moved to the minus side in the same range as the total tolerance range specified in Table JB.2 upon agreement between the purchaser and the manufacturer. When the tolerance is moved to the plus side, the lower limits shall not be above zero, and, when it is moved to the minus side, the upper limits shall not be below zero.</p> <p>Note ^{a)} Applicable to vertical and horizontal bending.</p>		

JB.7 Appearance

The appearance of hot extruded sections shall be in accordance with clause **9** of **JIS G 3192**.

JB.8 Inspection

The inspection of hot extruded sections shall be in accordance with clause **9**.

JB.9 Reinspection

The reinspection of hot extruded sections shall be in accordance with clause **10**.

JB.10 Marking

The marking of hot extruded sections shall be in accordance with clause **11**.

JB.11 Report

The report of hot extruded sections shall be in accordance with clause **12**

Annex JC (informative)

Comparison table between JIS and corresponding International Standards

(I) Requirements in JIS		(II) International Standard number	(III) Requirements in International Standard		(IV) Classification and details of technical deviation between JIS and the International Standard by clause		(V) Justification for the technical deviation and future measures
No. and title of clause	Content		No. of clause	Content	Classification by clause	Detail of technical deviation	
1 Scope		ISO 630-2	1		Identical		
2 Normative references							
3 Classification, symbols and applicable dimensions	SS330 SS400 SS490 SS540	ISO 630-2	4	SS330, SS400, SS490 and SS540 of JIS correspond to Quality A of SG205, SG250, SG285 and SG345 of ISO , respectively.	Alteration	Steel grade represents tensile strength in JIS while it represents yield point in ISO .	
4 Chemical composition	P and S are specified. C and Mn are also specified for SS540. Alloy elements can be added as necessary. The content of alloy elements added needs to be reported.	ISO 630-2	6.3	Si is specified in addition to P and S. Alloy elements can be added. Elements specified shall be reported regardless of addition.	Alteration	More elements are specified in ISO .	Most specifications in JIS have been covered in ISO .
5 Mechanical properties	Yield point or proof stress, tensile strength, elongation and bendability	ISO 630-2	6.4.1	Yield strength (yield point or proof stress), tensile strength and elongation are specified.	Alteration	Technically, the same contents are specified.	

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(I) Requirements in JIS		(II) International Standard number	(III) Requirements in International Standard		(IV) Classification and details of technical deviation between JIS and the International Standard by clause		(V) Justification for the technical deviation and future measures
No. and title of clause	Content		No. of clause	Content	Classification by clause	Detail of technical deviation	
6 Shape, dimensions, mass and tolerances	JIS G 3191 , JIS G 3192 , JIS G 3193 , JIS G 3194 are cited.	ISO 630-1	6.7	Specified by citing ISO . Alternatively, other relevant standards like JIS may be used.	Addition	Corresponding JIS is addressed in Annex A.	
7 Appearance	For appearance, JIS G 3191 , JIS G 3192 , JIS G 3193 , JIS G 3194 are cited.	ISO 630-1	6.5	As specified in ISO 7788 , etc.	Alteration	JIS does not accept the local insufficiency in plate thickness caused by removal of surface flaws, although ISO does.	Difference in commercial practices.
8 Tests	Tests						
8.1 Chemical analysis	Clause 8 of JIS G 0404 is cited. For chemical analysis, each relevant JIS is cited.	ISO 630-1	9.1	The analysis addressed in ISO/TS 9769 .	Alteration	For analysis, relevant JIS is cited.	
8.2 Mechanical tests	Clause 9 of JIS G 0404 is cited. Two test pieces shall be taken when the mass exceeds 50 t. For the location of test pieces, JIS G 0416 is cited.	ISO 630-2	8.2	The basic test unit is 40 t or part thereof.	Alteration	JIS and ISO use slightly different test units, but use the same location of test pieces.	The requirements have become similar between JIS and ISO , because of proposal from Japan.
9 Inspection	For general requirements and reinspection, JIS G 0404 is cited.	ISO 630-1	7.1	Retest ISO 404 is cited.	Identical		
10 Reinspection	As specified in JIS G 0404 .	ISO 630-1	7.3	As specified in ISO 404 .	Identical	JIS G 0404 conforms to ISO 404 .	

(I) Requirements in JIS		(II) International Standard number	(III) Requirements in International Standard		(IV) Classification and details of technical deviation between JIS and the International Standard by clause		(V) Justification for the technical deviation and future measures
No. and title of clause	Content		No. of clause	Content	Classification by clause	Detail of technical deviation	
11 Marking	a) Symbol of grade b) Heat number or inspection number c) Dimensions d) Quantity or mass of each bundle e) Manufacturer's name or its identifying brand	ISO 630-1	10	Inspection document ISO 10474 is cited.	Alteration	More specifications are made in JIS than those in ISO .	Proposal will be made based on JIS .
12 Report	JIS G 0404 and JIS G 0415 are cited.	ISO 630-1	7.2		Identical		
Annex JA (normative)	Mechanical properties of sections with side under 40 mm and of flats with width under 40 mm				Addition		The specification required for JIS .
Annex JB (normative)	Quality requirements for hot extruded sections				Addition		The specification required for JIS .

Overall degree of correspondence between JIS and International Standards (ISO 6301-1 : 2011, ISO 630-2 : 2011): MOD
NOTE 1 Symbols in sub-columns of classification by clause in the above table indicate as follows: <ul style="list-style-type: none"> — Identical : Identical in technical contents. — Addition : Adds the specification item(s) or content(s) which are not included in International Standard. — Alteration : Alters the specification content(s) which are included in International Standard.
NOTE 2 Symbol in column of overall degree of correspondence between JIS and International Standards in the above table indicates as follows: <ul style="list-style-type: none"> — MOD : Modifies International Standards.

Errata for JIS (English edition) are printed in *Standardization and Quality Control*, published monthly by the Japanese Standards Association, and also provided to subscribers of JIS (English edition) in *Monthly Information*.

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