

JIS

JAPANESE INDUSTRIAL STANDARD

**Welded Light Gauge H Steels for
General Structures**

JIS G 3353—1990

Translated and Published

by

Japanese Standards Association

In the event of any doubt arising,
the original Standard in Japanese is to be final authority.

JAPANESE INDUSTRIAL STANDARD

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Welded Light Gauge H Steels for
General Structures

G 3353-1990

1. Scope

This Japanese Industrial Standard specifies the welded light gauge H steels which are formed continuously either by high frequency resistance welding or by the same method combined with high frequency induction welding, to be used for general structures for building, civil engineering, etc., hereafter referred to as the "light gauge H steels".

Remark: The units and numerical values given in { } in this Standard are based on the International System of Units (SI) and are appended for informative reference.

Further, the traditional units accompanied by numerical values in this Standard shall be converted on January 1, 1991 to the SI units and numerical values.

2. Classification and Symbol

The classes and symbols of the light gauge H steels shall be as given in Table 1.

Table 1. Classes and Symbols

Class	Division by sectional shape		
	Designation	Symbol	
Light gauge H steels	Light gauge H steel	SWH 41 ⁽¹⁾	SWH 400 ⁽²⁾
	Light gauge lip type H steel	SWH 41L ⁽¹⁾	SWH 400L ⁽²⁾

Notes ⁽¹⁾ Applicable till the end of 1990.

⁽²⁾ Applicable on and after January 1, 1991.

3. Chemical Composition

The chemical composition shall be determined by the ladle analysis and the determined values shall conform to Table 2.

Table 2. Chemical Composition

Symbol		Unit: %		
		C	P	S
SWH 41 ⁽¹⁾	SWH 400 ⁽²⁾	0.25 max.	0.050 max.	0.050 max.
SWH 41L ⁽¹⁾	SWH 400L ⁽²⁾			

Applicable Standards: See page 12.

4. Mechanical Properties

4.1 Tensile Strength, Yield Point and Elongation The light gauge H steels shall be subjected to the tensile test specified in 9.2 and the determined tensile strength, yield point and elongation shall comply with the requirements given in Table 3-1 or Table 3-2.

Table 3-1. Tensile Strength, Yield Point and Elongation
(Applicable till the end of 1990)

Symbol	Tensile strength kgf/mm ² {N/mm ² }	Yield point kgf/mm ² {N/mm ² }	Elongation		
			Thickness of strip mm	Test piece	%
SWH 41 (1)	41 to 55	25 min.	5 or under	No. 5	21 min.
SWH 41L (1)	{402 to 539}	{245} min.	Over 5	No. 1 A	17 min.

Table 3-2. Tensile Strength, Yield Point and Elongation
(Applicable on and after Jan. 1, 1991)

Symbol	Tensile strength N/mm ²	Yield point N/mm ²	Elongation		
			Thickness of strip mm	Test piece	%
SWH 400 (2)	400 to 540	245 min.	5 or under	No. 5	21 min.
SWH 400L (2)			Over 5	No. 1 A	17 min.

4.2 Tensile Strength of Weld The welded portions of the light gauge H steels shall be subjected to the tensile test specified in 9.3, and they shall fracture, as a rule, at the base metal of the web. When the breakage takes place at the weld, the value obtained by dividing the tensile load by an actual sectional area of the web shall be not less than 41 kgf/mm²{402 N/mm²} to be applicable till the end of 1990, and 400 N/mm² or over to be applicable on and after January 1, 1991.

5. Shape, Dimensions and Dimensional Tolerances

5.1 Standard Cross-sectional Dimension and Area The standard cross-sectional dimensions of the light gauge H steels shall be as specified in Attached Tables 1 and 2.

The radius of curvature of the light gauge lip type H steels shall, as a rule, be $1.5 t_2$ at center line of plate thickness (t_2).

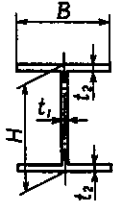
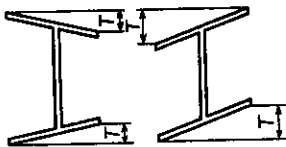
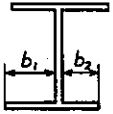
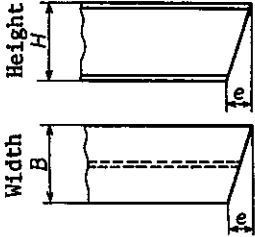
5.2 Standard Length The standard length of the light gauge H steels shall be as given in Table 4.

Table 4. Standard Length

Unit: m					
7.0	8.0	9.0	10.0	11.0	12.0

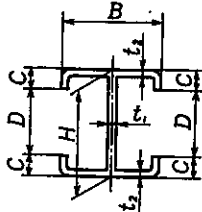
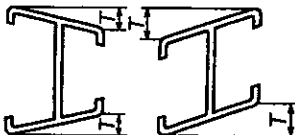
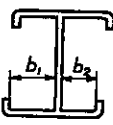
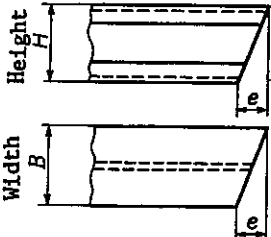
5.3 Tolerances on Shape and Dimensions The tolerances on shape and dimensions of the light gauge H steels shall be as specified in Tables 5 and 6.

Table 5. Tolerances on Shape and Dimensions of Light Gauge H Steels

Item		Tolerances	Application
Height (H)		± 1.5 mm	
Width (B)		± 1.5 mm	
Thickness of flat-plate parts (t_1, t_2)	2.3 mm	± 0.25 mm	
	3.2 mm	± 0.30 mm	
	4.5 mm	± 0.45 mm	
	6.0 mm, 9.0 mm, 12.0 mm	± 0.60 mm	
Length		+ Not specified 0	
Bend	300 mm or under in height	At most 0.20 % of length	
	Over 300 mm in height	At most 0.10 % of length	
Squareness (T)	300 mm or under in height	At most 1.0 % of width (B) Minimum value of tolerance 1.5 mm	
	Over 300 mm in height	At most 1.2 % of width (B)	
Eccentricity of center (S)		± 2.0 mm	$S = \frac{b_1 - b_2}{2}$ 
Squareness of section (e)		At most 1.6 % of height (H) or width (B) Minimum value of tolerance 3.0 mm	

Remark: The measurement of cross-sectional dimensions shall be made at an arbitrary point in the light gauge H steel except its both ends.

Table 6. Tolerances on Shape and Dimensions
of Light Gauge Lip Type H Steels

Item		Tolerances	Application
Height (H)		± 1.5 mm	
Width (B)		± 1.5 mm	
Length of lip (C)		± 1.5 mm	
Thickness of flat-plate parts (t_1, t_2)	2.3 mm	± 0.25 mm	
	2.6 mm	± 0.28 mm	
	3.2 mm	± 0.30 mm	
	4.0 mm	± 0.45 mm	
	4.5 mm	± 0.45 mm	
	6.0 mm, 9.0 mm, 12.0 mm	± 0.60 mm	
Length		+ Not specified 0	
Bend angle of lip		$\pm 1.5^\circ$	
Bend	300 mm or under in height	At most 1.2 % of width	
	Over 300 mm in height	At most 0.10 % of length	
Squareness (T)	300 mm or under in height	At most 1.0 % of width (B) Minimum value of tolerance 1.5 mm	
	Over 300 mm in height	At most 1.2 % of width (B)	
Eccentricity of center (S)		± 2.0 mm	$S = \frac{b_1 - b_2}{2}$ 
Squareness of section (e)		At most 1.6 % of height (H) or width (B) Minimum value of tolerance 3.0 mm	

- Remarks 1. The measurement of cross-sectional dimensions shall be made at an arbitrary point in the light gauge H steel except its both ends.
2. Special requirements, if any, for the tolerances on gap (D) between lips shall be as agreed upon by the parties concerned with delivery.

6. Appearance

The light gauge H steels shall be free from defects injurious to serviceability.

7. Method of Manufacture

The method of manufacture shall be as follows:

- (1) The light gauge H steels shall be manufactured from the strip either by the continuous high frequency-resistance welding, or by this method combined with the high frequency induction welding.
- (2) The light gauge H steels shall be as-manufactured and not subjected to any heat treatment.
- (3) The light gauge H steels shall, as a rule, be treated with a suitable rust preventive coating.

8. Method of Calculation for Cross-sectional Area and Mass

- (1) The mass shall, as a rule, be on the basis of the calculated mass and as given in Table 7.

In this case, the dimensions given in the table shall be used.

- (2) The cross-sectional areas and unit mass of the light gauge H steels corresponding to the standard cross-sectional dimensions obtained in (1) are as given in Attached Tables 1 and 2.

Table 7. Calculating Method of Cross-sectional Area and Mass

Calculating sequence	Procedure	Number of digits to be obtained
Basic mass kg/cm ² · m	0.785 (mass per cm ² in corss-sectional area for 1 m length)	—
Cross-sectional area cm ²	Multiply a value obtained from following formula by 1/100: For light gauge H steel, $t_1 (H - 2 t_2) + 2 B t_2$ For light gauge lip type H steel $t_1 (H - 2 t_2) + (2 B + 4 C - 6.574 t_2) t_2$	Round off to a numerical value of 4 significant digits.
Unit mass kg/m	Basic mass (kg/cm ² · m) × cross-sectional area (cm ²)	Round off to a numerical value of 3 significant digits.
Mass per piece kg	Unit mass (kg/m) × length (m)	Round off to a numerical value of 3 significant digits.
Total mass kg	Total number of pieces of same dimensions × mass per piece (kg)	Round off to an integer of kg.

- Remarks 1. The symbols used in the calculation of cross-sectional area denote the cross-sectional dimensions of the light gauge H steel, and the corresponding parts of the section are shown in Attached Tables 1 and 2.
2. The methods of rounding off of numerical values shall be as specified in JIS Z 8401.

9. Tests

9.1 Analysis Test

9.1.1 Analysis Tests in General and Sampling Method of Analysis Specimens
The analysis tests in general and the method of sampling analysis specimens shall be as specified in 3. of JIS G 0303.

9.1.2 Method of Analysis The analysis shall be in accordance with the appropriate Standards in the following:

JIS G 1211 JIS G 1214 JIS G 1215 JIS G 1252 JIS G 1253
JIS G 1256 JIS G 1257 JIS G 1258

9.2 Tension Test The tension test shall be as follows:

- (1) The test piece shall be No. 5 or No. 1 A test piece specified in JIS Z 2201 to be cut off, as a rule, in the rolling direction, from the strip used in manufacture of the light gauge H steels.
- (2) The number of test pieces to be taken shall be one from a lot of the strips of the same heat and same thickness. However, two pieces shall be taken from a lot weighing over 50 t.
- (3) The sampling of the test pieces from the light gauge H steels shall be subject to agreement between the parties concerned with delivery.

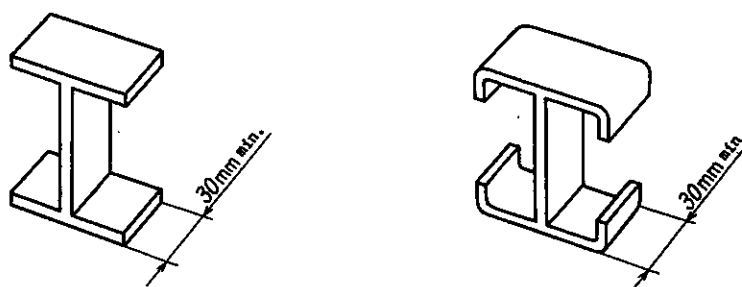
- (4) The test methods shall be as specified in JIS Z 2241.

9.3 Tension Test for Welded Portion The tension test for welded portions shall follow the method described in the following (1) and (2).

- (1) **Test Piece** The test piece shall be as shown in Fig. 1. The number of test piece to be taken shall be one from a lot of 2500 m of light gauge H steel of the same sectional dimension.

Fig. 1. Tension Test Piece for Welded Portion

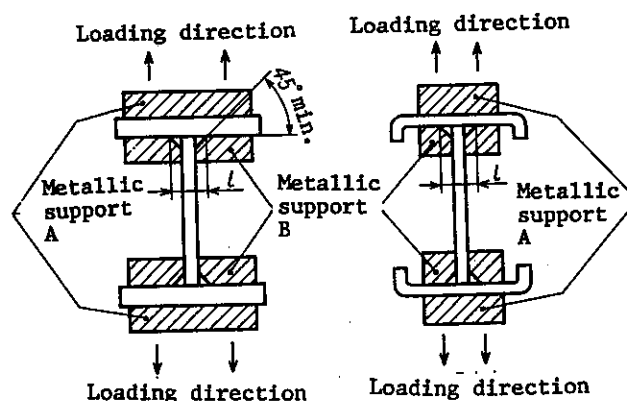
Light Gauge H Steel Light Gauge Lip Type H Steel



- (2) **Test Method** The test shall be carried out as follows; apply a tension to a test piece using metallic support shown in Fig. 2 and the breakage takes place at webs or at weld.

In this case, the angle formed by the chamfered part of the metallic support B and the flange shall be 45° or over, the fulcrum distance (l) shall be at least 1.5 times the thickness of flange (t_2), and the metallic support B shall be so attached as not to contact the convex fillet part.

Fig. 2. Method of Tension Test for Welded Portion



10. Inspection

10.1 Inspection The inspection shall be as follows:

- (1) The general requirements for inspection shall be as specified in JIS G 0303.
- (2) The chemical composition shall conform to 3.
- (3) The mechanical properties shall conform to 4.
- (4) The shape, dimensions and mass shall conform to 5.
- (5) The appearance shall conform to 6.

10.2 Reinspection The light gauge H steels having failed in the tests of mechanical properties are eligible for a retest as specified in 4.4 of JIS G 0303 for final acceptance.

11. Marking

The light gauge H steels which have passed the inspection shall be clearly marked on each piece or on each bundle with the following detail by a suitable means.

- (1) Class symbol ⁽³⁾
- (2) Dimensions ⁽⁴⁾
- (3) Manufacturer's name or its abbreviation

Notes ⁽³⁾ The class symbols shall be indicated as follows:

Light gauge H steel: SWH 41
Light gauge lip type H steel: SWH 41 L

⁽⁴⁾ The dimensions shall be indicated as follows:

Light gauge H steel: Height (mm) × width (mm) × web thickness (mm) × flange thickness (mm) × length (m)

Example: 150 × 150 × 3.2 × 4.5 × 9.0

Light gauge lip type H steel: Height (mm) × width (mm) × lip length (mm) × web thickness (mm) × flange thickness (mm) × length (m)

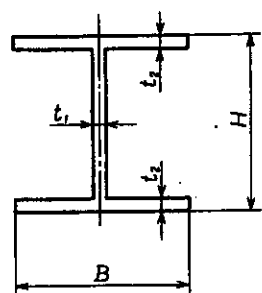
Example: 150 × 150 × 25 × 3.2 × 3.2 × 11.0

12. Report

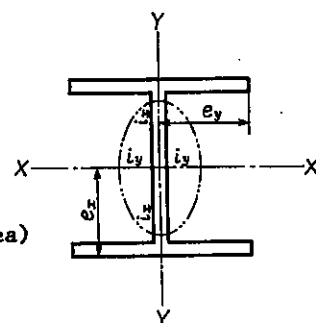
At the request of the purchaser, the manufacturer shall submit the test result report to the purchaser.

Remark: For the light gauge H steels, the geometrical moment of inertia, radius of gyration of area and modulus of section are given in Attached Tables 1 and 2.

Attached Table 1. Standard Cross-sectional Dimensions, Cross-sectional Areas, and Unit Masses of Light Gauge H Steels



Geometrical moment of inertia $I = ai^2$
 Radius of gyration of area $i = \sqrt{\frac{I}{a}}$
 Modulus of section $Z = \frac{I}{e}$
 (a = Cross-sectional area)

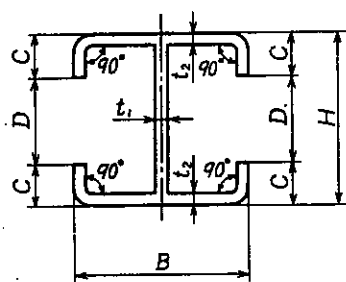


Height mm	Width mm	Thickness mm		Cross-sectional area cm ²	Unit mass kg/m	For reference					
						Geometrical moment of inertia cm ⁴		Radius of gyration of area cm		Modulus of section cm ³	
		Web	Flange			I_x	I_y	i_x	i_y	Z_x	Z_y
100	60	2.3	4.5	7.493	5.88	138	16.2	4.29	1.47	27.5	5.40
		3.2	4.5	8.312	6.52	143	16.2	4.15	1.50	28.7	5.41
100	100	2.3	4.5	11.09	8.71	220	75.0	4.45	2.60	44.0	15.0
		3.2	4.5	11.91	9.35	225	75.0	4.35	2.51	45.1	15.0
125	60	2.3	4.5	8.068	6.33	226	16.2	5.29	1.42	36.0	5.40
		3.2	4.5	9.112	7.15	238	16.2	5.11	1.33	38.0	5.41
125	100	2.3	4.5	11.67	9.16	357	75.0	5.53	2.54	57.1	15.0
		3.2	4.5	12.71	9.98	368	75.0	5.38	2.43	59.0	15.0
125	125	2.3	4.5	13.92	10.9	438	146	5.61	3.24	70.2	23.4
		3.2	4.5	14.96	11.7	450	147	5.50	3.13	72.0	23.4
150	75	2.3	4.5	9.993	7.84	411	31.6	6.41	1.78	54.8	8.44
		3.2	4.5	11.26	8.84	432	31.7	6.19	1.68	57.6	8.45
		3.2	6.0	13.42	10.5	537	42.2	6.33	1.77	71.6	11.3
150	100	2.3	4.5	12.24	9.61	530	75.0	6.58	2.48	70.7	15.0
		3.2	4.5	13.51	10.6	551	75.0	6.39	2.36	73.5	15.0
		3.2	6.0	16.42	12.9	693	100	6.50	2.47	92.3	20.0
150	150	2.3	4.5	16.74	13.1	768	253	6.77	3.89	102	33.7
		3.2	4.5	18.01	14.1	789	253	6.62	3.75	105	33.8
		3.2	6.0	22.42	17.6	1 000	338	6.69	3.88	134	45.0
175	90	2.3	4.5	11.92	9.36	676	54.7	7.53	2.14	77.3	12.2
		3.2	4.5	13.41	10.5	711	54.7	7.28	2.02	81.2	12.2
200	100	2.3	4.5	13.39	10.5	994	75.0	8.61	2.37	99.4	15.0
		3.2	4.5	15.11	11.9	1 050	75.1	8.32	2.23	105	15.0
		3.2	6.0	18.02	14.1	1 310	100	8.52	2.36	131	20.0
		4.5	6.0	20.46	16.1	1 380	100	8.21	2.21	138	20.0
200	125	3.2	6.0	21.02	16.5	1 590	195	8.70	3.05	159	31.3
200	150	2.3	4.5	17.89	14.05	1 420	253	8.92	3.76	142	33.7
		3.2	4.5	19.61	15.4	1 480	253	8.68	3.59	148	33.8
		3.2	6.0	24.02	18.9	1 870	338	8.83	3.75	187	45.0
		4.5	6.0	26.46	20.8	1 940	338	8.57	3.57	194	45.0

Attached Table 1 (Continued)

Height mm	Width mm	Thickness mm		Cross- sectional area cm ²	Unit mass kg/m	For reference					
						Geometrical moment of inertia cm ⁴		Radius of gyration of area cm		Modulus of section cm ³	
		Web	Flange			I_x	I_y	i_x	i_y	Z_x	Z_y
250	125	3.2	4.5	18.96	14.9	2 070	147	10.4	2.78	166	23.5
		4.5	6.0	25.71	20.2	2 740	195	10.3	2.76	219	31.3
		4.5	9.0	32.94	25.9	3 740	293	10.7	2.98	299	46.9
250	150	3.2	4.5	21.21	16.7	2 410	253	10.7	3.45	193	33.8
		4.5	6.0	28.71	22.5	3 190	338	10.5	3.43	255	45.0
		4.5	9.0	37.44	29.4	4 390	506	10.8	3.68	351	67.5
300	150	3.2	4.5	22.81	17.9	3 600	253	12.6	3.33	240	33.8
		4.5	6.0	30.96	24.3	4 790	338	12.4	3.30	319	45.0
		4.5	9.0	39.69	31.2	6 560	506	12.9	3.57	437	67.5
350	175	4.5	6.0	36.21	28.4	7 660	536	14.6	3.85	438	61.3
		4.5	9.0	46.44	36.5	10 500	804	15.1	4.16	602	91.9
400	200	4.5	6.0	41.46	32.5	11 500	800	16.7	4.39	575	80.0
		4.5	9.0	53.19	41.8	15 900	1 200	17.3	4.75	793	120
		6.0	9.0	58.92	46.3	16 500	1 200	16.8	4.51	827	120
		6.0	12.0	70.56	55.4	20 700	1 600	17.1	4.76	1 040	160
450	200	4.5	9.0	55.44	43.5	20 500	1 200	19.2	4.65	912	120
		6.0	12.0	73.56	57.7	26 900	1 600	19.1	4.66	1 200	160
450	250	6.0	12.0	85.56	67.2	32 600	3 130	19.5	6.04	1 450	250

Attached Table 2. Standard Cross-sectional Dimensions, Cross-sectional Areas, and Unit Masses of Light Gauge Lip Type H Steels

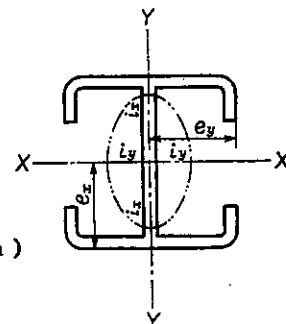


Geometrical moment of inertia $I = ai^2$

Radius of gyration of area $i = \sqrt{\frac{I}{a}}$

Modulus of section $Z = \frac{I}{e}$

(a = Cross-sectional area)



Height mm	Width mm	Length of lip mm	Thickness mm		Cross- sectional area cm ²	Unit mass kg/m	For reference					
							Geometrical moment of inertia cm ⁴		Radius of gyration of area cm		Modulus of section cm ³	
			Web	Flange			I_x	I_y	i_x	i_y	Z_x	Z_y
60	60	10	2.3	2.3	4.606	3.62	30.4	14.1	2.57	1.75	10.1	4.72
75	90	15	2.3	2.3	6.794	5.35	71.2	50.4	3.24	2.70	19.0	11.2
			2.3	3.2	8.585	6.74	92.8	67.4	3.29	2.80	24.7	15.0
			2.3	4.0	10.09	7.92	111	81.2	3.32	2.84	29.6	18.0
			3.2	3.2	9.202	7.22	95.3	67.4	3.22	2.76	25.4	15.0
90	90	22.5	2.3	2.3	7.825	6.14	112	63.7	3.78	2.85	24.9	14.2
			2.3	3.2	9.890	7.76	146	85.4	3.84	2.94	32.4	19.0
			2.3	4.0	11.63	9.13	174	103	3.87	2.98	38.7	22.9
			3.2	3.2	10.64	8.35	150	85.5	3.76	2.84	33.4	19.0
100	100	20	2.3	2.3	8.286	6.50	151	77.2	4.27	3.05	30.3	15.4
			2.3	3.2	10.44	8.20	198	104	4.35	3.16	39.6	20.8
			2.3	4.0	12.26	9.62	237	126	4.40	3.21	47.4	25.2
			3.2	3.2	11.28	8.90	204	103	4.24	2.99	40.8	20.7
150	100	20	2.3	3.2	11.59	9.10	489	104	6.50	3.00	65.2	20.8
			2.3	4.0	13.41	10.5	583	126	6.59	3.07	77.7	25.2
			3.2	3.2	12.88	10.1	511	104	6.30	2.84	68.1	20.8
200	200	40	4.5	6.0	39.69	31.2	2 910	1 480	8.56	6.10	291	148
250	250	45	4.5	6.0	49.14	38.6	5 770	2 810	10.8	7.57	461	225
300	300	50	4.5	6.0	58.59	46.0	10 100	4 780	13.1	9.03	671	318
		60	6.0	9.0	87.19	68.4	14 600	7 480	12.9	9.26	972	499
450	300	50	4.5	6.0	65.34	51.3	24 500	4 780	19.4	8.55	1 090	318
		60	6.0	9.0	96.19	75.5	36 000	7 480	19.3	8.82	1 600	499

Applicable Standards:

- JIS G 0303-General Rules for Inspection of Steel
- JIS G 1211-Methods for Determination of Carbon in Iron and Steel
- JIS G 1214-Methods for Determination of Phosphorus in Iron and Steel
- JIS G 1215-Methods for Determination of Sulfur in Iron and Steel
- JIS G 1252-Emission-Spectroscopic Analysis for Carbon Steel and Low Alloy Steel
- JIS G 1253-Method for Photoelectric Emission Spectrochemical Analysis of Iron and Steel
- JIS G 1256-Method for X-Ray Fluorescence Spectrometric Analysis of Iron and Steel
- JIS G 1257-Methods for Atomic Absorption Spectrochemical Analysis of Iron and Steel
- JIS G 1258-Methods for Inductively Coupled Plasma Emission Spectrochemical Analysis of Steel
- JIS Z 2201-Test Pieces for Tensile Test for Metallic Materials
- JIS Z 2241-Method of Tensile Test for Metallic Materials
- JIS Z 8401-Rules for Rounding off of Numerical Values

Standards

2.2 Machinery equipment related

No.	Standard Title & Applicable Standard No.	Title corresponding to the Applicable Standard No.	Note
2.2-1	Japanese Industrial Standard (JIS)		
(1)	B0202 (1982)	Parallel pipe threads	
(2)	B0203 (1982)	Taper pipe threads	
(3)	B0205 (1982)	Metric coarse screw threads	
(4)	B0207 (1982)	Metric fine screw threads	
(5)	B0216 (1987)	Metric trapezoidal screw threads	
(6)	B1101 (1996)	Slotted head screws	
(7)	B1111 (1996)	Cross recessed head screws	
(8)	B1177 (1997)	Hexagon socket set screws	
(9)	B1176 (1988)	Hexagon socket head cap screws	
(10)	B1180 (1994)	Hexagon head bolts and hexagon head screws	
(11)	B1181 (1993)	Hexagon nuts and hexagon thin nuts	
(12)	B1251 (1995)	Spring lock washers	
(13)	B1256 (1978)	Plain washers	
(14)	B1351 (1987)	Split pins	
(15)	B1352 (1988)	Taper pins	
(16)	B1354 (1988)	Parallel pins	
(17)	B2804 (1978)	Retaining rings - C type	
(18)	B2808 (1995)	Spring pins	
(19)	B1301 (1996)	Keys and their corresponding keyways	
(20)	B1601 (1996)	Straight-sided splines for cylindrical shafts with internal centering	
(21)	B1602 (1961)	Involute serrations	
(22)	B1575 (1994)	Grease nipples	
(23)	B0121 (1988)	Gear notation - symbols for geometrical data	
(24)	B1701 (1973)	Involute gear tooth profile and dimensions	
(25)	B1702 (1976)	Accuracy for spur and helical gears	

Standards

2.2 Machinery equipment related

No.	Standard Title & Applicable Standard No.	Title corresponding to the Applicable Standard No.	Note
2.2-1	Japanese Industrial Standard (JIS)		
(26)	B1703 (1976)	Backlash for spur and helical gear	
(27)	B1704 (1978)	Accuracy for bevel gears	
(28)	B1705 (1973)	Backlashes for bevel gears	
(29)	B1723 (1977)	Dimensions of cylindrical worm gears	
(30)	B1741 (1977)	Tooth contact marking of gears	
(31)	B1801 (1995)	Transmission roller chains and bush chains	
(32)	B1802 (1989)	Sprocket tooth form for transmission roller chains	
(33)	B1854 (1987)	Grooved pulleys for classical V-belts	
(34)	B1855 (1991)	Grooved pulleys for narrow V-belts	
(35)	B1856 (1993)	Synchronous belt drives - Pulleys	
(36)	K6323 (1995)	Classical V belts for power transmission	
(37)	K6368 (1977)	Narrow V belts for power transmission	
(38)	K6372 (1995)	Synchronous belts for general power transmission	
(39)	B2706 (1995)	Coned disc springs	
(40)	B2401 (1991)	O-rings	
(41)	B2402 (1996)	Rotary shaft lip type seals	
(42)	B2403 (1995)	V packings	
(43)	B2405 (1993)	Mechanical seals - General requirements	
(44)	B2406 (1991)	O-rings housing - Design criteria	
(45)	B2407 (1995)	Back-up rings for O-rings	
(46)	B0401 (1986)	System of limits and fits	