

Dimensions, mass and permissible variations of hot rolled steel plates, sheets and strip

1. Scope

1.1 This Japanese Industrial Standard specifies the dimensions, mass and tolerances thereon of the hot rolled steel plate, sheet and strip as well as the appearance, shape and permissible variations thereof. However, this Standard is not applicable to the flat steel.

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 to the SI units and numerical values on January 1, 1991.

1.2 This Standard is applicable to the relevant product standards.

2. Expression of Size

The expression of size of the steel plate, sheet and strip shall be as follows:

- (1) The size of the steel plate and sheet shall be expressed by thickness, width and length in millimeters.
- (2) The size of the steel strip shall be expressed by thickness and width in millimeters.

3. Standard Dimensions

The standard dimensions shall be as follows:

- (1) The standard thicknesses of the steel plate, sheet and strip shall be as given in Table 1.

Table 1. Standard Thickness

Unit: mm										
1.2	1.4	1.6	1.8	2.0	2.3	2.5	(2.6)	2.8	(2.9)	3.2
3.6	4.0	4.5	5.0	5.6	6.0	6.3	7.0	8.0	9.0	10.0
11.0	12.0	12.7	13.0	14.0	15.0	16.0	(17.0)	18.0	19.0	20.0
22.0	25.0	25.4	28.0	(30.0)	32.0	36.0	38.0	40.0	45.0	50.0

Remarks 1. The standard thickness not in parentheses should preferably be used.

2. For the steel strip and cut lengths therefrom, the standard thicknesses of 12.7 mm or under shall be applied.

(2) The standard widths of the steel plate, sheet and strip shall be as given in Table 2.

Table 2. Standard Width Unit: mm

600	630	670	710	750	800	850	900	914
950	1 000	1 060	1 100	1 120	1 180	1 200	1 219	1 250
1 300	1 320	1 400	1 500	1 524	1 600	1 700	1 800	1 829
1 900	2 000	2 100	2 134	2 438	2 500	2 600	2 800	3 000
3 048								

Remarks 1. For the steel strip and cut lengths therefrom, the standard widths of 2000 mm or under shall be applied.

2. For the steel plate, excluding the cut lengths from the steel strip, the standard widths of 914 mm, 1219 mm and 1400 mm or over shall be applied.

(3) The standard lengths of the steel plate and sheet shall be as given in Table 3.

Table 3. Standard Length of Steel Plate and Sheet Unit: mm

1 829	2 438	3 048	6 000	6 096	7 000	8 000	9 000	9 144
10 000	12 000	12 192						

Remark: The lengths given in the above Table shall not be applied to the cut lengths from the steel strip.

4. Tolerances on Shape and Dimension

The tolerances on shape and dimension for the steel plate, sheet and strip shall be as follows: However, they shall not be applied to the irregular portions of both ends of the steel strip.

- (1) The tolerances on thickness for the steel plate, sheet and strip shall be as given in Table 4.

Table 4. Tolerance on Thickness

Unit: mm

Thickness \ Width	Width					
	Under 1600	1600 or over to and excl. 2000	2000 or over to and excl. 2500	2500 or over to and excl. 3150	3150 or over to and excl. 4000	4000 or over to and excl. 5000
Under 1.25	±0.16	—	—	—	—	—
1.25 or over to and excl. 1.60	±0.18	—	—	—	—	—
1.60 or over to and excl. 2.00	±0.19	±0.23	—	—	—	—
2.00 or over to and excl. 2.50	±0.20	±0.25	—	—	—	—
2.50 or over to and excl. 3.15	±0.22	±0.29	±0.29	—	—	—
3.15 or over to and excl. 4.00	±0.24	±0.34	±0.34	—	—	—
4.00 or over to and excl. 5.00	±0.45	±0.55	±0.55	±0.65	—	—
5.00 or over to and excl. 6.30	±0.50	±0.60	±0.60	±0.75	±0.75	—
6.30 or over to and excl. 10.0	±0.55	±0.65	±0.65	±0.80	±0.80	±0.9
10.0 or over to and excl. 16.0	±0.55	±0.65	±0.65	±0.80	±0.80	±1.0
16.0 or over to and excl. 25.0	±0.65	±0.75	±0.75	±0.95	±0.95	±1.1
25.0 or over to and excl. 40.0	±0.70	±0.80	±0.80	±1.0	±1.0	±1.2
40.0 or over to and excl. 63.0	±0.80	±0.95	±0.95	±1.1	±1.1	±1.3
63.0 or over to and excl. 100	±0.9	±1.1	±1.1	±1.3	±1.3	±1.5
100 or over to and excl. 160	±1.3	±1.5	±1.5	±1.7	±1.7	±1.9
160 or over to and excl. 200	±1.6	±1.8	±1.8	±1.9	±1.9	±2.1
200 or over to and excl. 250	±1.8	±1.9	±1.9	±2.0	±2.0	±2.2
250 or over to and excl. 300	±2.0	±2.1	±2.1	±2.2	±2.2	±2.5
300 or over to and incl. 350	±2.1	±2.3	±2.3	±2.4	±2.4	±2.8

- Remarks 1. Either plus side or minus side of the thickness tolerances given in the above Table may be limited on request. The total tolerances in this case shall be equal to those given in Table 4.
2. Thickness shall be measured at any point on the steel strip not less than 25 mm from a side edge for the mill edge strip 50 mm or over in width and cut lengths therefrom, and on the center line for those less than 50 mm in width. For the cut edge steel strip 30 mm or over in width and cut lengths therefrom, measurement shall be made at any point not less than 15 mm from a side edge, and on the center line for those less than 30 mm in width.

Thickness shall be measured at any point inward the scheduled cutting line concerning width for the as-rolled steel plate (with untrimmed edge), and at any point not less than 15 mm from the aforementioned line for the cut edge plate.

- (2) The tolerances on width of the steel plate, sheet and strip shall be as given in Table 5.

Table 5. Tolerance on Width

Unit: mm

Width	Thickness	Tolerance						
		Mill edge		Cut edge				
		Steel plate as rolled (with untrimmed edge)	Steel strip and cut lengths therefrom	A Normal cut edge		B Resheared or fine cut edge		C Slitted edge
+	-			+	-			
Under 160	Under 3.15	-	±2	5	0	2.0	0	±0.3
	3.15 or over to and excl. 6.00			5		3.0		±0.5
	6.00 or over to and excl. 20.0			10		4.0		-
	20.0 or over			10		-		-
160 or over to and excl. 250	Under 3.15	-	±2	5	0	2.0	0	±0.4
	3.15 or over to and excl. 6.00			5		3.0		±0.5
	6.00 or over to and excl. 20.0			10		4.0		-
	20.0 or over			15		-		-
250 or over to and excl. 400	Under 3.15	0 + Not specified	±5	5	0	2.0	0	±0.5
	3.15 or over to and excl. 6.00			5		3.0		±0.5
	6.00 or over to and excl. 20.0			10		4.0		-
	20.0 or over			15		-		-
400 or over to and excl. 630	Under 3.15	0 + Not specified	+20 0	10	0	3.0	0	±0.5
	3.15 or over to and excl. 6.00			10		3.0		±0.5
	6.00 or over to and excl. 20.0			10		5.0		-
	20.0 or over			15		-		-
630 or over to and excl. 1000	Under 3.15	0 + Not specified	+25 0	10	0	4.0	0	-
	3.15 or over to and excl. 6.00			10		4.0		-
	6.00 or over to and excl. 20.0			10		6.0		-
	20.0 or over			15		-		-
1000 or over to and excl. 1250	Under 3.15	0 + Not specified	+30 0	10	0	4.0	0	-
	3.15 or over to and excl. 6.00			10		4.0		-
	6.00 or over to and excl. 20.0			15		6.0		-
	20.0 or over			15		-		-
1250 or over to and excl. 1600	Under 3.15	0 + Not specified	+35 0	10	0	4.0	0	-
	3.15 or over to and excl. 6.00			10		4.0		-
	6.00 or over to and excl. 20.0			15		6.0		-
	20.0 or over			15		-		-
1600 or over	Under 3.15	0 + Not specified	+40 0	10	0	4.0	0	-
	3.15 or over to and excl. 6.00			10		4.0		-
	6.00 or over to and excl. 20.0			1.2 %		6.0		-
	20.0 or over			1.2 %		-		-

Remark: For the mill edge steel strip less than 400 mm in width and cut lengths therefrom, the width tolerance on minus side may be limited to zero. In this case, the tolerances on plus side shall be twice the values given in Table 5.

(3) The tolerances on length for the steel plate and sheet shall be as given in Table 6.

Table 6. Tolerance on Length of Steel Plate and Sheet

Unit: mm

Length	Thickness	Tolerance	
		A Normal cutting	B Reshearing or fine cutting
Under 6300	Under 6.00	+25 0	+ 5 0
	6.00 or over	+25 0	+10 0
6300 or over	Under 6.00	+ 0.5% 0	+10 0
	6.00 or over	+ 0.5% 0	+15 0

Remark: Tolerance B does not apply to that of 20 mm or over in width.

(4) The maximum value of camber for the steel plate, sheet and strip shall be as given in Tables 7 and 8.

Table 7. Camber for Steel Plate and Sheet

Unit: mm

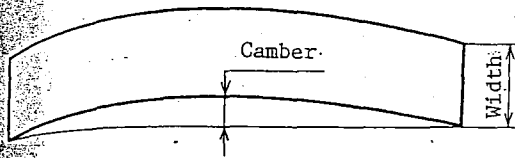
Length	Width	250 or over	630 or over	1000 or
		to and excl. 630	to and excl. 1000	over
Under 2500		5	4	3
2500 or over to and excl. 4000		8	6	5
4000 or over to and excl. 6300		12	10	8
6300 or over to and excl. 10000		20	16	12
10000 or over		20 in any 10000 length	16 in any 10000 length	12 in any 10000 length

- Remarks 1. For the tolerances on camber of the steel plate and sheet under 250 mm in width, Table 8 shall be applied.
2. This Table shall not be applied to the steel plate and sheet as rolled (with untrimmed edge).
3. For determination of camber of the steel plate and sheet, it shall be in accordance with Fig. 1.

Fig. 1. Application of Camber of Steel Plate and Sheet

Unit: mm

(For steel plate under 10000 mm in length)



(For steel plate 10000 mm or over in length)

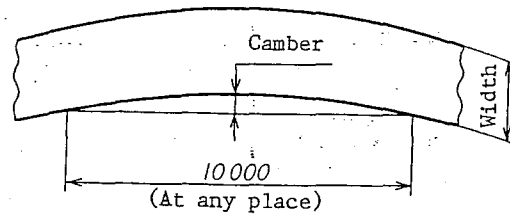


Table 8. Camber of Steel Strip

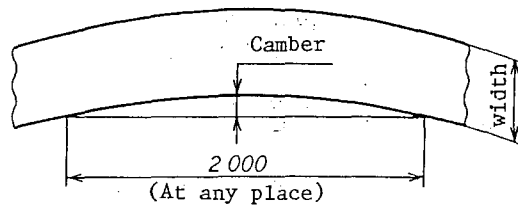
Unit: mm

Width	Maximum value
Under 250	8 in any 2000 length
250 or over	5 in any 2000 length

Remark: The application of camber of the steel strip shall be in accordance with Fig. 2.

Fig. 2. Application of Camber of Steel Strip

Unit: mm



- (5) The maximum deviation of flatness of the steel plate and sheet shall be as given in Table 9.

Table 9. Flatness of Steel Plate and Sheet

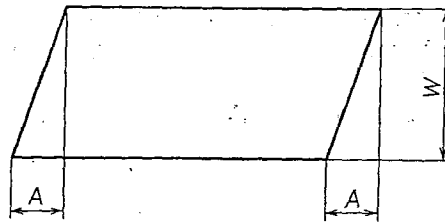
Unit: mm

Thickness	Width				
	Under 1250	1250 or over to and excl. 1600	1600 or over to and excl. 2000	2000 or over to and excl. 3000	3000 or over
Under 1.60	18	20	—	—	—
1.60 or over to and excl. 3.15	16	18	20	—	—
3.15 or over to and excl. 4.00	16		—	—	—
4.00 or over to and excl. 6.00	14		—	24	25
6.00 or over to and excl. 10.0	13		—	21	22
10.0 or over to and excl. 25.0	12		—	16	17
25.0 or over to and excl. 40.0	9		—	13	14
40.0 or over to and excl. 63.0	8		—	11	11
63.0 or over to and excl. 200	7		—	10	10
200 or over up to and incl. 350	20				

- Remarks
- This Table shall not be applied to the stretcher levelled steel plate and sheet for delivery.
 - The values given in the above Table shall be applied to any 2000 mm length. For the steel plate and sheet less than 2000 mm in length, the values shall be applied to the full length.
For the steel plate and sheet over 2000 mm in wave pitch, the values given in the above Table shall be applied to any pitch of the wave. For those over 4000 mm in wave pitch, however, the above values shall be applied to any 4000 mm length.
 - The deviation from the flatness shall be determined as the difference between the maximum deviation of convex side uppermost from the flat surface and the thickness of the steel plate and sheet themselves.
 - Unless otherwise specified, one and half time the maximum deviation from flatness shall be applied to the steel plate and sheet of the specified minimum tensile strength of 58 kgf/mm² {569 N/mm²} till the end of 1990, to those of 570 N/mm² on and after January 1, 1991, to those of the specified minimum yield point of 44 kgf/mm² {431 N/mm²} till the end of 1990, to those of 430 N/mm² on and after January 1, 1991, and to the steel plate and sheet of equivalent tensile test characteristics achieved and adjusted by chemical composition, hardness and treatment of quench and temper.
 - This Table shall not be applied to the as-rolled steel plate and sheet (with untrimmed edge).
 - Measurement of flatness, as a rule, shall be made on a flat surface plate.

- (6) The out-of-square of cut length from cut edged steel strip shall be expressed in $\frac{A}{W}$ as shown in Fig. 3 and shall not exceed 1.0 %.

Fig. 3. Out-of-square of Cut Lengths from Strip



Remark: A is the measured value, and W is the nominal width.

5. Mass

5.1 Mass of Steel Plate and Sheet The mass of the steel plate and sheet shall be as follows:

- (1) The mass of the steel plate and sheet shall generally be the theoretical mass expressed in kilogrammes.
- (2) The method for calculation of mass of the steel plate and sheet shall be in accordance with Table 10 based on their nominal dimensions. For the steel plate and sheet which are specified to limit either plus side or minus side of their thickness tolerances given in Table 4 in accordance with 4. (1), the mean value of the maximum and minimum thicknesses in each range of tolerance shall be used instead of the nominal thicknesses.

Table 10. Method for Calculation of Mass of Steel Plate and Sheet

Step of calculation		Calculation method	Number of figures in calculated result
Basic mass $\text{kg/mm} \cdot \text{m}^2$		7.85 (mass per mm thickness per m^2 area)	-
Unit mass kg/m^2		Basic mass ($\text{kg/mm} \cdot \text{m}^2$) \times thickness of plate or sheet (mm)	Round off to 4 significant figures
Area of steel plate or sheet m^2 .		Width (m) \times Length (m)	Round off to 4 significant figures
Mass of single plate or sheet kg		Unit mass (kg/m^2) \times area (m^2)	Round off to 3 significant figures. For those exceeding 1000 kg, integer, round off to in kg.
Either bundled or packed	Total mass kg	Mass of single plate or sheet (kg) \times number of plates or sheets of the same size	Round off to integer in kg.
Bundled or packed	Mass of single bundle kg	Mass of single plate or sheet (kg) \times number of plates or sheets per bundle of the same size	Round off to integer in kg.
	Total mass kg	Sum of mass of each bundle	Integer in kg

Remarks 1. Rounding off the numerical values shall be in accordance with JIS Z 8401.

2. When the steel plates or sheets are bundled (or packed) the total mass may be calculated as follows:

$$\text{Mass of single sheet (kg)} \times \text{number of plates or sheets of the same size}$$

5.2 Mass of Steel Strip The mass of the steel strip shall be as follows:

- (1) The mass of the steel strip shall generally be the actual mass expressed in kilogrammes.
- (2) For the mass of the steel strip, the maximum mass of each coil shall generally be specified by agreement, where not less than 75 % of the total number of steel strip shall be not less than 70 % of the specified mass and the rest may include shorter steel strip of 30 % to 70 % excluding in specified mass.

6. Appearance

The appearance of the steel plates, sheets and strip shall be as follows:

- (1) The steel plate, sheet and strip shall be free from defects that are detrimental to practical use. For the steel strip, however, some irregular portions may be included therein, since generally the steel strip is afforded no opportunity to inspect readily and to remove such defective parts.
- (2) For the steel strip and cut lengths therefrom, the provision concerning harmful surface defects shall generally be applied to one side of the surfaces. The term "one side of the surfaces" means the outside surface for the steel strip and the upper side surface for the cut lengths therefrom.
- (3) In the case where there is any harmful defect on the surface of the steel plate and sheet, the manufacturer may remove or repair the defect by grinding or welding. In this case, the operation shall be as follows:
 - (3.1) Conditioning with Grinder
 - (a) The thickness of the steel plate and sheet after conditioning shall fall within the tolerances on thickness.
 - (b) The conditioned parts of the steel plate and sheet shall be finished neatly, and the boundary between the repaired portions on the as-rolled surface shall be smoothly finished.
 - (3.2) Repair by Welding
 - (a) The harmful defects of the steel plate and sheet shall be removed thoroughly by suitable means such as chipping or grinding prior to welding. The depth of the removed part shall be not more than 20 % of the nominal thickness, and the total conditioned area on the one side surface shall not exceed 2 % of the area of one side of the steel plate and sheet.
 - (b) The repair by welding shall be carried out by suitable means for the kind of steel product.

- (c) The welded part of the steel plate and sheet shall be free from undercuts or overlaps around the fringe of welds. The reinforcement of weld shall be at least 1.5 mm or over height from the rolled surface and this shall be removed by chipping, grinding, etc. and neatly finished as high as the rolled surface.
- (d) The heat-treated steel plate and sheet themselves shall be heat treated once again after the repair by welding.