JIS

JAPANESE
INDUSTRIAL
STANDARD

Translated and Published by
Japanese Standards Association

JIS G 3194 : 1998

Dimensions, mass and permissible variations of hot rolled flat steel

ICS 77.140.50

Descriptors : dimensions, weight (mass), tolerances (measurement), dimensional tolerances, mechanical tolerances, hot-working, rolling, materials by form, steels

Reference number : JIS G 3194 : 1998 (E)

Foreword

This translation has been made based on the original Japanese Industrial Standard revised by the Minister of International Trade and Industry through deliberations at Japanese Industrial Standards Committee in accordance with the Industrial Standardization Law. Consequently **JIS G 3194** : 1966 is replaced with **JIS G 3194** : 1998.

Date of Establishment: 1966-07-01

Date of Revision: 1998-11-20

Date of Public Notice in Official Gazette: 1998-11-20

Investigated by: Japanese Industrial Standards Committee
Divisional Council on Iron and Steel

JIS G 3194:1998, First English edition published in 1999-08

Translated and published by: Japanese Standards Association
4-1-24, Akasaka, Minato-ku, Tokyo, 107-8440 JAPAN

In the event of any doubts arising as to the contents, the original JIS is to be the final authority.

Dimensions, mass and permissible variations of hot rolled flat steel

1 Scope Scope shall be as follows.

a) This Standard specifies dimensions, mass and permissible variations as well as appearance, shape and allowable limit for hot rolled flat steel which is manufactured by hot rolling.

b) The scope and the select of the classification of the permissible variations specified in this Standard shall be specified in the respective product standard, or in accordance with agreement between the purchaser and the supplier.

Unless otherwise specified, class B in Table 1 shall be applied.

Remarks : The corresponding International Standards are as following.

ISO 1035-3 : 1980 *Hot-rolled steel bars—Part 3 : Dimensions of flat bars*

ISO 1035-4 : 1982 *Hot-rolled steel bars—Part 4 : Tolerances*

ISO 9034 : 1987 *Hot-rolled structural steel wide flats—Tolerances on dimensions and shape*

2 Normative references The following standard contain provisions which, through reference in this Standard, constitute provisions of this Standard. The most recent edition of the standard indicated below shall be applied.

JIS Z 8401 *Rules for rounding off of numerical values*

3 Definition The flat steel so called in this Standard shall be defined as the steel which had been hot rolled on four surfaces with rectangular cross-sections and is supplied by being cut into a prescribed length.

4 Expression of dimension The dimension of flat steel shall be expressed in mm for the thickness and width, and in m for the length.

5 Standard dimension Standard dimensions shall be as follows.

a) Flat steel shall be defined as steel of which width is 1 250 mm max. and thickness 100 mm max. The cross-sectional standard dimension of flat steel shall comply with the Attached Table 1.

b) The standard length of flat steel shall be 3.5 m, and be taken at intervals of 0.5 m for 4.0 m to 7.0 m and 1.0 m for more than 7.0 m.

6 Classification of permissible variations and the division Classification of permissible variations of flat steel shall comply with Table 1.

Table 1 Classification of permissible variations

Items		Classification of permissible variations				Reference
Thickness	t	A	B	C	—	**7 a)**
Width	w	A	B	—	—	**7 b)**
Length	l	A	B	C	D	**7 c)**
Corner drop	c	—	B	—	—	**7 d)**
Angular distortion		A	B	C	—	**7 e)**
Flatness: perpendicular direction of rolling		—	B	—	—	**7 f) 1)**
Flatness: longitudinal direction of rolling		A	B	—	—	**7 f) 2)**
Twist		—	—	—	—	**7 g)**

7 Shape and permissible variations of dimensions The shape and permissible variations of dimensions are shown as follows.

a) The permissible variations of thickness for flat steel shall comply with Table 2.

Table 2 Permissible variations of thickness

Unit : mm

Class	Thickness						
	Less than 6	6 or over up to and incl. 12	12 or over up to and incl. 15	15 or over up to and incl. 20	20 or over up to and incl. 25	25 or over up to and incl. 40	40 or over up to and incl. 100
Class A	± 0.5	± 0.5	± 0.5	± 0.6	± 1.0	± 1.0	± 1.5
Class B	± 0.3	± 0.4	± 0.5	± 0.6	± 0.8	± 1.0	± 1.2
Class C	+ 0.3 − 0.3	+ 0.5 − 0.3	+ 1.1 − 0.3	+ 1.1 − 0.3	+ 1.1 − 0.3	+ 1.4 − 0.3	+ 2.1 − 0.3

Remarks : The location of thickness measurement shall be at an arbitrary inside point apart from longitudinal edge of flat steel.

b) The permissible variations of width for flat steel shall comply with Table 3.

Table 3 Permissible variations of width

Unit : mm

Class	Width	
	Less than 50	50 or more
Class A	± 0.8	± 2.0 %, max. ± 10.0
Class B	± 0.8	± 1.6 %, max. ± 3.5

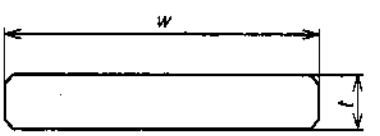

Fig. 1 Application to width

c) The permissible variations of length for flat steel shall comply with Table 4.

Table 4 Permissible variations of length

Unit : mm

Class	Class A	Class B	Class C	Class D
Tolerance	$+200$ 0	$+100$ 0	$+50$ 0	$+25$ 0

Remarks : Tolerance on the negative side shall be treated in accordance with agreement between the purchaser and the supplier.

d) The permissible variations of corner drop c) for flat steel shall comply with Table 5.

Table 5 Permissible variations of corner drop

Class	Class B
Tolerance	15 % or under of thickness. The maximum value shall be 4 mm.

Remarks : These variations shall be applied 9 mm or over in thickness. Exceeding the application range shall be in accordance with agreement between the purchaser and the supplier.

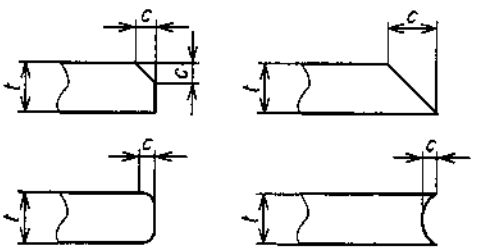

Fig. 2 Application to corner drop

e) The permissible variations of angular distortion for flat steel shall comply with Table 6.

Table 6 Permissible variations of angular distortion

Class	Permissible variations
Class A	Within 0.4 % in total length shall be permitted. Within 4 mm per meter of optional length shall be provided.
Class B	Within 0.3 % in total length shall be permitted. Within 4 mm per meter of optional length shall be provided.
Class C	Within 0.25 % in total length shall be permitted. Within 2.5 mm per meter of optional length shall be provided.

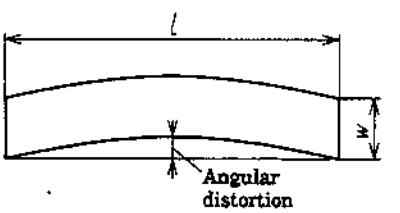

Fig. 3 Application to angular distortion

f) The variations on flatness for flat steel.

1) The variations on flatness for flat steel perpendicular to the direction of rolling shall comply with Table 7.

Table 7 The variations on flatness perpendicular to the direction of rolling

Class	Class B
Tolerance	Not more than 0.3 % of width

Remarks : These variations shall be applied for the flat steel of 150 mm or over in width and under 50 mm in thickness. However, the tolerances except these value shall be treated in accordance with agreement between the purchaser and the supplier.

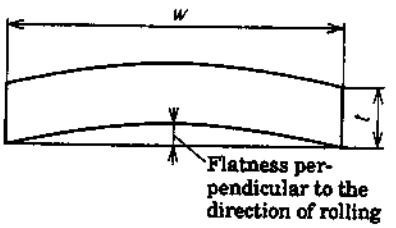

Fig.4 Application to flatness perpendicular to the direction of rolling

2) The variations on flatness for flat steel in the longitudinal direction of rolling shall comply with Table 8.

Table 8 Variations on flatness in the longitudinal direction of rolling

Class	Permissible variations
Class A	Within 0.7 % of total length with a maximum of 20 mm shall be permitted. Within 7 mm per meter of optional length shall be provided.
Class B	Within 0.3 % of total length with a maximum of 10 mm shall be permitted. Within 3 mm per meter of optional length shall be provided.

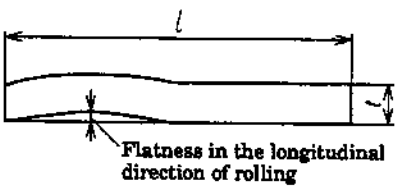

Fig. 5 Application to flatness in the longitudinal direction of rolling

g) If twist tolerance for flat steel are required by the purchaser, this shall be in accordance with the agreement, which include the method of measurement, between the purchaser and the supplier.

8 Mass The masses shall be as follows.

a) The mass of flat steel shall comply as a rule with the calculated mass and shall be expressed in kg.

b) The calculating method for the mass of flat steel shall comply with Table 9, however, the dimension in this case shall use the expressed dimension.

c) The cross-sectional area and unit mass for the standard cross-sectional dimension of flat steel which is found with **b)** shall comply with Appendix Table 1.

Table 9 The calculating method for the mass

Sequence of calculation	Calculating method	Number of result figures
Basic mass kg/cm²/m	0.785 (Mass of 1 m in length and 1 cm² in cross section)	
Cross section cm²	Width (mm) × thickness (mm) × $\frac{1}{100}$	Round off in numerical value to 4 places of significant figures.
Unit mass kg/m	Basic mass (kg/cm²/m) × cross section (cm²)	Round off in numerical value to 3 places of significant figures.
Mass per piece kg	Unit mass (kg/m) × Length (m)	Round off numerical value to 3 places of significant figures. Provided that round off those exceeding 1 000 kg in the integer of kg.
Total mass kg	Weight per piece (kg) × Number of piece of the same dimension	Round off in the integer of kg.

Remarks : The rounding method for numerical value shall comply with **JIS Z 8401**.

9 Variations on mass The variations on mass of flat steel shall, when being designated by purchaser, comply with Table 10. Provided that calculating method for the tolerance shall be shown in percentage of dividing the difference between the calculated weight and actually measured mass by the calculated mass.

Table 10 Variations on mass

Thickness	Variations	Application
Less than 10 mm	±5 %	To apply to one lot (1 ton min.) of the same dimension. Provided that when the number of pieces corresponding to 1 ton does not reach 10 pieces, this shall be applicable to one lot of 10 pieces or more.
10 mm and over	±4 %	

10 Appearance Appearances are as follows:

a) The flat steel shall be free from injurious defects in the use.

b) In case of injurious defects existing on the surface of flat steel, the manufacturer may remove or mend the defects with a grinder or welding. Provided that the conditions in this case shall comply with following respective items:

1) Repair by grinder

1.1) The thickness of flat steel after being repaired shall be within the range of tolerance on thickness.

1.2) The repaired portion of flat steel shall be cleanly finished and smoothed on the boundary with the surface as it is rolled.

2) Mending by welding

2.1) The injurious defect of flat steel shall be thoroughly removed prior to welding by a suitable method such as chipping or grinding. The depth of removed portion shall be not more than 20 % of the expressed thickness of flat steel, and the total mended area on single side surface shall be not more than 2 % of the single side area in the flat steel.

2.2) The mending by welding shall be carried out by a optimum method in response to the type of the flat steel.

2.3) The welded place in the flat steel shall be free from undercut or overlap on the edge. The reinforcement of weld shall be at least not less than 1.5 mm from the rolled surface, shall be removed by a method such as chipping or grinding and shall be cleanly finished to the same height as the rolled surface.

2.4) The flat steel which was heat-treated (included annealing) shall be heat-treated again after being weld-mended.

Attached Table 1 Dimension of standard cross section, cross section and unit mass for the flat steel

Dimension of standard cross section mm		Cross section	Unit mass	Dimension of standard cross section mm		Cross section	Unit mass	Dimension of standard cross section mm		Cross section	Unit mass	Dimension of standard cross section mm		Cross section	Unit mass
Thickness	Width	cm^2	kg/m	Thickness	Width	cm^2	kg/m	Thickness	Width	cm^2	kg/m	Thickness	Width	cm^2	kg/m
4.5	25	1.125	0.88	8	300	24.00	18.8	16	50	8.000	6.28	22	200	44.00	34.5
4.5	32	1.440	1.13	8	350	28.00	22.0	16	65	10.40	8.16	22	230	50.60	39.7
4.5	38	1.710	1.34	8	400	32.00	25.1	16	75	12.00	9.42	22	250	55.00	43.2
4.5	44	1.980	1.55	9	25	2.250	1.77	16	90	14.40	11.3	22	280	61.60	48.4
4.5	50	2.250	1.77	9	32	2.880	2.26	16	100	16.00	12.6	22	300	66.00	51.8
4.5	65	2.925	2.30	9	38	3.420	2.68	16	125	20.00	15.7	22	350	77.00	60.4
4.5	75	3.375	2.65	9	44	3.960	3.11	16	150	24.00	18.8	22	400	88.00	69.1
4.5	90	4.050	3.18	9	50	4.500	3.53	16	180	28.80	22.6	22	450	99.00	77.7
4.5	100	4.500	3.53	9	65	5.850	4.59	16	200	32.00	25.1	22	500	110.0	86.4
4.5	125	5.625	4.42	9	75	6.750	5.30	16	230	36.80	28.9	25	50	12.50	9.81
4.5	150	6.750	5.30	9	90	8.100	6.36	16	250	40.00	31.4	25	65	16.25	12.8
6	25	1.500	1.18	9	100	9.000	7.06	16	280	44.80	35.2	25	75	18.75	14.7
6	32	1.920	1.51	9	125	11.25	8.83	16	300	48.00	37.7	25	90	22.50	17.7
6	38	2.280	1.79	9	150	13.50	10.6	16	350	56.00	44.0	25	100	25.00	19.6
6	44	2.640	2.07	9	180	16.20	12.7	16	400	64.00	50.2	25	125	31.25	24.5
6	50	3.000	2.36	9	200	18.00	14.1	16	450	72.00	56.5	25	150	37.50	29.4
6	65	3.900	3.06	9	230	20.70	16.2	16	500	80.00	62.8	25	180	45.00	35.3
6	75	4.500	3.53	9	250	22.50	17.7	19	38	7.220	5.67	25	200	50.00	39.2
6	90	5.400	4.24	9	280	25.20	19.8	19	44	8.360	6.56	25	230	57.5	45.1
6	100	6.000	4.71	9	300	27.00	21.2	19	50	9.500	7.46	25	250	62.50	49.1
6	125	7.500	5.89	9	350	31.50	24.7	19	65	12.35	9.69	25	280	70.00	55.0
6	150	9.000	6.36	9	400	36.00	28.3	19	75	14.25	11.2	25	300	75.00	58.9
6	180	10.80	8.48	12	25	3.000	2.36	19	90	17.10	13.4	25	350	87.50	68.7
6	200	12.00	9.42	12	32	3.840	3.01	19	100	19.00	14.9	25	400	100.0	78.5
6	230	13.80	10.8	12	38	4.560	3.38	19	125	23.75	18.6	25	450	112.5	88.3
6	250	15.00	11.8	12	44	5.280	4.14	19	150	28.50	22.4	25	500	125.0	98.1
6	280	16.80	13.2	12	50	6.000	4.71	19	180	34.20	26.8	28	75	21.00	16.5
6	300	18.00	14.1	12	65	7.800	6.12	19	200	38.00	29.8	28	90	25.20	19.8
8	25	2.000	1.57	12	75	9.000	7.06	19	230	43.70	34.3	28	100	28.00	22.0
8	32	2.560	2.01	12	90	10.80	8.48	19	250	47.50	37.3	28	125	35.00	27.5
8	38	3.040	2.39	12	100	12.00	9.42	19	280	53.20	41.8	28	150	42.00	33.0
8	44	3.520	2.76	12	125	15.00	11.8	19	300	57.00	44.7	28	180	50.40	39.6
8	50	4.000	3.14	12	150	18.00	14.1	19	350	66.50	52.2	28	200	56.00	44.0
8	65	5.200	4.08	12	180	21.60	17.0	19	400	76.00	59.7	28	230	64.40	50.6
8	75	6.000	4.71	12	200	24.00	18.8	19	450	85.50	67.1	28	250	70.00	55.0
8	90	7.200	5.65	12	230	27.60	21.7	19	500	95.00	74.6	28	280	78.40	61.5
8	100	8.000	6.28	12	250	30.00	23.6	22	50	11.00	8.64	28	300	84.00	65.9
8	125	10.00	7.85	12	280	33.60	26.4	22	65	14.30	11.2	28	350	98.00	76.9
8	150	12.00	9.42	12	300	36.00	28.3	22	75	16.50	13.0	28	400	112.0	87.9
8	180	14.40	11.3	12	350	42.00	33.0	22	90	19.80	15.5	28	450	126.0	98.9
8	200	16.00	12.6	12	400	48.00	37.7	22	100	22.00	17.3	28	500	140.0	110
8	230	18.40	14.4	16	32	5.120	4.02	22	125	27.50	21.6	32	75	24.00	18.8
8	250	20.00	15.7	16	38	6.080	4.77	22	150	33.00	25.9	32	90	28.80	22.6
8	280	22.40	17.6	16	44	7.040	5.53	22	180	39.60	31.1	32	100	32.00	25.1

Attached Table 1 (concluded)

Dimension of standard cross section mm		Cross section	Unit mass	Dimension of standard cross section mm		Cross section	Unit mass	Dimension of standard cross section mm		Cross section	Unit mass	Dimension of standard cross section mm		Cross section	Unit mass
Thick-ness	Width	cm²	kg/m	Thick-ness	Width	cm²	kg/m	Thick-ness	Width	cm²	kg/m	Thick-ness	Width	cm²	kg/m
32	125	40.00	31.4	36	150	54.00	42.4	40	125	50.00	39.2	45	100	45.00	35.3
32	150	48.00	37.7	36	180	64.80	50.9	40	150	60.00	47.1	45	125	56.25	44.2
32	230	73.60	57.8	36	200	72.00	56.5	40	180	72.00	56.5	45	150	67.50	53.0
32	250	80.00	62.8	36	230	82.80	65.0	40	200	80.00	62.8	45	180	81.00	63.6
32	280	89.60	70.3	36	250	90.00	70.6	40	230	92.00	72.2	45	250	112.5	88.3
32	300	96.00	75.4	36	280	100.8	79.1	40	250	100.0	78.5	45	280	126.0	98.9
32	350	112.0	87.9	36	300	108.0	84.8	40	280	112.0	87.9	45	300	135.0	106
32	400	128.0	100	36	350	126.0	98.9	40	300	120.0	94.2	45	350	157.5	124
32	450	144.0	113	36	400	144.0	113	40	350	140.0	110	45	400	180.0	141
32	500	160.0	126	36	450	162.0	127	40	400	160.0	126	45	450	202.5	159
36	75	27.00	21.2	36	500	180.0	141	40	450	180.0	141	45	500	225.0	177
36	90	32.4	25.4	40	75	30.00	23.6	40	500	200.0	157				
36	100	36.00	28.3	40	90	36.00	28.3	45	75	33.75	26.5				
36	125	45.00	35.3	40	100	40.00	31.4	45	90	40.5	31.8				

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

Errata will be provided upon request, please contact:

Standardization Promotion Department, Japanese Standards Association
4-1-24, Akasaka, Minato-ku, Tokyo, 107-8440 JAPAN
TEL. 03-3583-8002 FAX. 03-3583-0462