UNOFFICIAL TRANSLATION

In the event of any doubt or misunderstanding arising from this translation, the standard in Thai will be held to be authoritative

Notification of Ministry of Industry
No.2194 B.E. 2539 (1996)
Issued under the Industrial Product Standards Act
B.E. 2511 (1968)

Subject : Amendment to Thai Industrial Standard for Hot rolled structural steel sections (Amendment No. 1)

Whereas it is deemed appropriate to modify the Thai Industrial Standard for Hot rolled structural steel sections (TIS 1227-2537)

By virtue of Section 15 of the Industrial Product Standards Act B.E. 2511 (1968), the minister of Industry hereby issues a notification amending the Thai Industrial Standard for Hot rolled structural steel sections (TIS 1227-2537) which is attached to the notification of Ministry of Industry No. 2009, B.E. 2537 (1994) dated 25 October B.E. 2537 (1994) as follows :

1. The number of the standard is amended from “TIS 1227-2537” to “TIS 1227-2539”.

2. Clause 3.2 is withdrawn and replaced with the following clause.

" 3.2 Structural steel is classified according to the mechanical and chemical properties into 7 grades, i.e. SM 400, SM 490, SM 520, SM 570, SS 400, SS 490 and SS 540 as given in Table 11 and 12.

Note Grade SM 400 SM 490 SM 520 and SM 570 are suitable for welding."

3. Table 9 is withdrawn and replaced with the following table.

"Table 9 Tolerances on size, thickness, length, squareness, bend, eccentricity, concavity of web and squareness of cut end for H-section steel
(clauses 4.1 and 4.2)

unit : mm

Structural steel			Tolerance		Note
H	Less than 380		± 2.0		
	380 to less than 580		± 3.0		
	580 and over		± 4.0		
B	Less than 95		± 2.0		
	95 to less than 190		± 2.5		
	190 and over		± 3.0		
Thickness (t1, t2)	t_1	Less than 16	± 0.7		
		16 to less than 25	± 1.0		
		25 to less than 40	± 1.5		
	t_2	Less than 16	± 1.0		
		16 to less than 25	± 1.5		
		25 to less than 40	± 1.7		
Length	Not over 7		± 40 0		
	Over 7		Upper limit: 40 mm, plus 5 mm for every 1 m in excess of the 7 m length Lower limit: Nil		
Squareness (T)	H not over 300		B not over 150	Not over 1.5 mm	
			B over 150	1.0 % of B, max	
	H over 300		B not over 125	Not over 1.5 mm	
			B over 125	1.2 of B, max	
Bend	H not over 300		0.15% of length, max.		
	H over 300		0.10% of length, max.		
Eccentricity (S)	H not over 300 and B not over 200		± 2.5		
	H not over 300 and B over 200		± 3.5		
Concavity of web (W)	H	Less than 400	2.0		
		400 to less than 600	2.5		
		600 and over	3.0		
Squareness of cut end (e)	H not over 187.5		Not over 3.0 mm		
	B over 187.5		Not over 3.0 mm		
	H not over 187.5		1.6 % of H, max.		
	B over 187.5		1.6 % of B, max.		

4. Table 11 is withdrawn and replaced with the following table.

"Table 11 Grades and chemical composition on ladle analysis
(clauses 3.2 and 5.1)

Grade	Chemical composition, % by weight				
	Carbon max.	Silicon max.	Manganese	Phosphorus max.	Sulfur max.
SM 400	0.20	0.35	0.60 to 1.40	0.035	0.035
SM 490	0.18	0.55	1.60, max	0.035	0.035
SM 520	0.20	0.55	1.60, max	0.035	0.035
SM 570	0.18	0.55	1.60, max	0.035	0.035
SS 400	-	-	-	0.050	0.050
SS 490	-	-	-	0.050	0.050
SS 540	0.30	-	1.60, max	0.040	0.040

Note 1 For product analysis, the limits given in Table 11 may be exceeded by the following:
Carbon: 0.03
Silicon: 0.05
Manganese: 0.05
Phosphorus: 0.01
Sulfur: 0.01
2 - refer to not specified

5. The clause 6.2.3 is added
"6.2.3 Bending (applicable only to grade SS400 SS490 and SS540)
After the test of clause 9.4, there shall be no cracks or splits on the outside surface of the bend portion of the test piece.

6. Table 12 is withdrawn and replaced with the following table.

Table 12
Grades, yield strength, tensile strength and elongation and impact resistance
(clauses 3.2, 6.2.1 and 6.2.2)

Grade	Yield strength min. MPa		Tensile strength	Elongation, min %			Impact resistance min
	Thickness not over 16 mm	Thickness over 16 mm	MPa	Thickness not over 5 mm	Thickness 5 to 16 mm	Thickness over 16 mm	J
SM 400	245	235	400 to 510	23	18	22	27
SM 490	325	315	490 to 610	22	17	21	27
SM 520	365	355	520 to 640	19	15	19	27
SM 570	460	450	570 to 720	19	19	26	47
SS 400	245	235	400 to 510	21	17	21	-
SS 490	285	275	490 to 610	19	15	19	-
SS 540	400	390	540 min	16	13	17	-

Note - refer to not specified

7. Clause 7.1 is withdrawn and replaced with the following clause.

" 7.1 Each section of structural steel shall bear at least number, letter or mark representing clearly and legibly the following information.
(1) Grade
(2) Size, thickness and length
(3) Cast number or other equally informative mark
(4) Name of manufacturer or factory or registered trade mark
Marking as of clauses 7.1(1) and (4) shall be embossed
In case foreign language is used, the meaning shall correspond to that in Thai specified above."

8. Clause 8.2.1.1 is withdrawn and replaced with the following clause.

"8.2.1.1 Three sections shall be taken at random from products of the same lot or batch."

9. Clause 8.2.2.1 is withdrawn and replaced with the following clause.

"8.2.2.1 All the 3 samples which met the requirements as in clause 8.2.1.2 shall be cut at either end to make from each 1 test piece about 0.30 m long."

10. Clause 9.1.1.2 is withdrawn and replaced with the following clause.

"9.1.1.2 Procedure
Measurement shall be made at positions located not less than 150 mm from both ends."

11. Text in (2) of clause 9.1.3.1 is withdrawn and replaced with the following text.

"(2) A steel ruler accurate to 0.5 mm."

12. Clause 9.1.3.4 is withdrawn and replaced with the following clause.

"9.1.3.4 Report
The report shall include the squareness reading in mm."

13. Text in (2) of clause 9.1.4.1 is withdrawn and replaced with the following text.

"(2) A steel ruler accurate to 0.5 mm."

14. Clause 9.1.5.1 is withdrawn and replaced with the following clause.

"9.1.5.1 Apparatus

A steel ruler accurate to 0.5 mm."

15. Text in (2) of clause 9.1.6.1 is withdrawn and replaced with the following text.

"(2) A steel ruler accurate to 0.5 mm."

16. Text in (2) of clause 9.1.7.1 is withdrawn and replaced with the following text.

"(2) A steel ruler accurate to 0.5 mm."

17. Clause 9.1.7.4 is withdrawn and replaced with the following clause.

"9.1.7.4 Report
The report shall include the maximum reading of squareness of cut end in mm of B or H."

18. The clause 9.4 is added.

"9.4 Bending (applicable only to grade SS400 SS490 and SS540)

The procedure shall be in accordance with TIS 244 Part 11, the test piece shall withstand being bent through 180°, and the radius of bending is 1.5 times test piece thickness for grade SS 400 and 2 times test piece thickness for grade SS 490 and SS540."

Such Ministerial Notification shall come into force upon 60 days after their publication in the Government Gazette.

Given on 19 September B.E.2539(1996)
Deputy Minister of Industry
For Minister of Industry

Published in the Government Gazette Vol. 113, Part 87 ngor., dated 29 October B.E. 2539(1996)

Unofficial Translation

In the event of any doubt or misunderstanding arising from this translation, the standard in Thai will be held to be authoritative

TIS 1227-2537 (1994)
Thai Industrial Standard
for
Hot-rolled Structural Steel Sections

1. Scope

1.1 This standard specifies types and grades, sizes, thickness and tolerances, chemical composition, requirements, mark and label, sampling and criteria for conformity, and testing for hot-rolled structural steel sections which shall be referred to hereinafter as structural steel.

1.2 This standard covers only structural steel made from mild steel by the process of hot rolling which may be used in structural works.

1.3 This standard does not apply to steel sections which are covered by the particular standard.

2. Definitions

For the purpose of this standard, the following definitions apply:

2.1 STRUCTURAL STEEL SECTIONS: Steel products of various sectional shapes for structural works.

2.2 HOT ROLLING: The rolling and processing for the making of structural steel sections at temperature higher than the critical temperature.

3. Types and grades

3.1 Structural steel is classified by the sectional shape into 5 types as given in Table 1.

3.2 Structural steel is classified by the mechanical and chemical properties into 4 grades i.e. SM 400, SM 490, SM 520 and SM 570 as given in Table 11 and 12.

4. Sizes, thickness and tolerances

4.1 The sizes and thickness of structural steel shall be as given in Table 2 to 7. The tolerances on size, thickness, length, squareness, bend and eccentricity for angle, channel, I-section and T-section steel shall comply with Table 8 and the tolerances on size, thickness, length, squareness, bend, eccentricity, concavity of web and squareness of cut end for H-section steel shall comply with Table 9.
Compliance is checked in accordance with clause 9.1.

Note. 1. The mass per 1 metre length shall be calculated from the following formula:
Mass per 1 metre length = 0.785a kg
Where a is the cross-sectional area, in cm^2, according to Tables 2 to 7 or as calculated from the formula given in Appendix A.

2. The radius of curvature, cross-sectional area, mass per m, distance from centre of gravity, moment of inertia, radius of gyration, tan $\propto$ and modulus of section in tables 2 to 7 and Table 10 are given as information.

4.2 The length of structural steel shall equal 6 m or shall be as specified by the manufacturer.

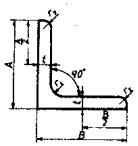
Tolerances shall comply with Tables 8 and 9.

Compliance is checked in accordance with clause 9.1.2.

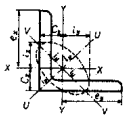
Table 1
Types and sectional shape of structural steel
(clause 3.1)

Type		Sectional shape
Angle steel	Equal leg	
	Unequal leg	
Channel steel		
H-section steel		
I-section steel		
T-section steel		

Table 2
Size and thickness of equal-leg angles
(clause 4.1)



Moment of inertia $I = ai^2$
Radius of gyration $i = \sqrt{\frac{I}{a}}$
Modulus of section $Z_x = \frac{I_x}{A - C_x}$
$Z_y = \frac{I_y}{B - C_y}$

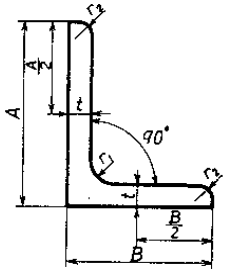


Size mm	Thickness mm	Radius of curvature mm		Cross sectional area cm²	Mass per metre kg/m	Distance of centre of gravity cm		Moment of inertia cm⁴				Radius of gyration cm				Modulus of section cm³	
A x B	t	r_1	r_2	a		Cx	Cy	Ix	Iy	Iu max	Iv max	ix	iy	iu max	iv max	Zx	Zy
25 x 25	3	4	2	1.427	1.12	0.719	0.719	0.797	0.797	1.26	0.332	0.747	0.747	0.940	0.483	0.448	0.448
	5	3.5	2.4	2.26	1.77	0.80	0.80	1.20	1.20	1.89	0.52	0.73	0.73	0.91	0.48	0.71	0.71
30 x 30	3	4	2	1.727	1.36	0.884	0.884	1.42	1.42	2.26	0.590	0.908	0.908	1.14	0.585	0.661	0.661
	5	5	2.4	2.78	2.18	0.92	0.92	2.16	2.16	3.41	0.92	0.88	0.88	1.11	0.57	1.04	1.04
40 x 40	3	4.5	2	2.336	1.83	1.09	1.09	3.53	3.53	5.60	1.46	1.23	1.23	1.55	0.790	1.21	1.21
	4	6	2.4	3.08	2.42	1.12	1.12	4.47	4.47	7.09	1.85	1.21	1.21	1.52	0.78	1.55	1.55
	5	4.5	3	3.755	2.95	1.17	1.17	5.42	5.42	8.59	2.25	1.20	1.20	1.51	0.774	1.91	1.91
	6	6	2.4	4.48	3.52	1.20	1.20	6.31	6.31	9.98	2.65	1.19	1.19	1.49	0.77	2.26	2.26
45 x 45	4	6.5	3	3.492	2.74	1.24	1.24	6.50	6.50	10.3	2.70	1.36	1.36	1.72	0.880	2.00	2.00
	5	6.5	3	4.302	3.38	1.28	1.28	7.91	7.91	12.5	3.29	1.36	1.36	1.71	0.874	2.46	2.46
50 x 50	3	7	2.4	2.96	2.33	1.31	1.31	6.86	6.86	10.8	2.88	1.51	1.52	1.91	0.99	1.86	1.86
	4	6.5	3	3.892	3.06	1.37	1.37	9.06	9.06	14.4	3.76	1.53	1.53	1.92	0.983	2.49	2.49
	5	6.5	3	4.802	3.77	1.41	1.41	11.1	11.1	17.5	4.58	1.52	1.52	1.91	0.976	3.08	3.08
	6	6.5	4.5	5.644	4.43	1.44	1.44	12.6	12.6	20.0	5.23	1.50	1.50	1.88	0.963	3.55	3.55
60 x 60	4	6.5	3	4.692	3.68	1.61	1.61	16.0	16.0	25.4	6.62	1.85	1.85	2.33	1.19	3.66	3.66
	5	6.5	3	5.802	4.55	1.66	1.66	19.6	19.6	31.2	8.09	1.84	1.84	2.32	1.18	4.52	4.52
65 x 65	5	8.5	3	6.367	5.00	1.77	1.77	25.3	25.3	40.1	10.5	1.99	1.99	2.51	1.28	5.35	5.35
	6	8.5	4	7.527	5.91	1.81	1.81	29.4	29.4	46.6	12.2	1.98	1.98	2.49	1.27	6.26	6.26
	8	8.5	6	9.761	7.66	1.88	1.88	36.8	36.8	58.3	15.3	1.94	1.94	2.44	1.25	7.96	7.96

Size and thickness of equal-leg angles (continued)

Size mm	Thickness mm	Radius of curvature mm		Cross sectional area cm²	Mass per metre kg/m	Distance of centre of gravity cm		Moment of inertia cm^4				Radius of gyration cm				Modulus of section cm³	
A x B	t	r_1	r_2	a		Cx	Cy	Ix	Iy	Iu max	Iv max	ix	iy	iu max	iv max	Zx	Zy
70 x 70	6	8.5	4	8.127	6.38	1.93	1.93	37.1	37.1	58.9	15.3	2.14	2.14	2.69	1.37	7.33	7.33
75 x 75	6	8.5	4	8.727	6.85	2.06	2.06	461	46.1	73.2	19.0	2.30	2.30	2.90	1.48	8.47	8.47
	9	8.5	6	12.69	9.96	2.17	2.17	64.4	64.4	102	26.7	2.25	2.25	2.84	1.45	12.1	12.1
	12	8.5	6	16.56	13.0	2.29	2.29	81.9	81.9	129	34.5	2.22	2.22	2.79	1.44	15.7	15.7
80 x 80	6	8.5	4	9.327	7.32	2.18	2.18	56.4	56.4	89.6	23.2	2.46	2.46	3.10	1.58	9.70	9.70
90 x 90	6	10	5	10.55	8.28	2.42	2.42	80.7	80.7	128	33.4	2.77	2.77	3.48	1.78	12.3	12.3
	7	10	5	12.22	9.59	2.46	2.46	93.0	93.0	148	38.8	2.76	2.76	3.48	1.77	14.2	14.2
	10	10	7	17.00	13.3	2.57	2.57	125	125	199	51.7	2.71	2.71	3.42	1.74	19.5	19.5
	12	11	4.8	20.3	15.9	2.66	2.66	148	148	234	61.7	2.7	2.7	3.4	1.75	23.3	23.3
	13	10	7	21.71	17.0	2.69	2.69	156	156	248	65.3	2.68	2.68	3.38	1.73	24.8	24.8
100 x 100	7	10	5	13.62	10.7	2.71	2.71	129	129	205	53.2	3.08	3.08	3.88	1.98	17.7	17.7
	10	10	7	19.00	14.9	2.82	2.82	175	175	278	72.0	3.04	3.04	3.83	1.95	24.4	24.4
	12	12	4.8	22.7	17.8	2.90	2.90	207	207	328	85.7	3.02	3.02	3.8	1.94	29.1	29.1
	13	10	7	24.31	19.1	2.94	2.94	220	220	348	91.1	3.00	3.00	3.78	1.94	31.1	31.1
120 x120	8	12	5	18.76	14.7	3.24	3.24	258	258	410	106	3.71	3.71	4.67	2.38	29.5	29.5
130 x 130	9	12	6	22.74	17.9	3.53	3.53	366	366	583	150	4.01	4.01	5.06	2.57	38.7	38.7
	12	12	8.5	29.76	23.4	3.64	3.64	467	467	743	192	3.96	3.96	5.00	2.54	49.9	49.9
	15	12	8.5	36.75	28.8	3.76	3.76	568	568	902	234	3.93	3.93	4.95	2.53	61.5	61.5
150 x 150	12	14	7	34.77	27.3	4.14	4.14	740	740	1180	304	4.61	4.61	5.82	2.96	68.1	68.1
	15	14	10	42.74	33.6	4.24	4.24	888	888	1410	365	4.56	4.56	5.75	2.92	82.6	82.6
	19	14	10	53.38	41.9	4.40	4.40	1090	1090	1730	451	4.52	4.52	5.69	2.91	103	103
175 x 175	12	15	11	40.52	31.8	4.73	4.73	1170	1170	1860	480	5.38	5.38	6.78	3.44	91.8	91.8
	15	15	11	50.21	39.4	4.85	4.85	1440	1440	2290	589	5.35	5.35	6.75	3.42	114	114
200 x 200	15	17	12	57.75	45.3	5.46	5.46	2180	2180	3470	891	6.14	6.14	7.75	3.93	150	150
	20	17	12	76.00	59.7	5.67	5.67	2820	2820	4490	1160	6.09	6.09	7.68	3.90	197	197
	25	17	12	93.75	73.6	5.86	5.86	3420	3420	5420	1410	6.04	6.04	7.61	3.88	242	242
250 x 250	25	24	12	119.4	93.7	7.10	7.10	6950	6950	11000	2860	7.63	7.63	9.62	4.90	388	388
	35	24	18	162.6	128	7.45	7.45	9110	9110	14400	3790	7.49	7.49	9.42	4.83	519	519

Table 3
Size and thickness of unequal-leg angles
(clause 4.1)

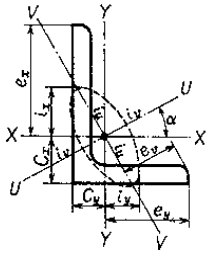


Moment of inertia $I = ai^2$

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

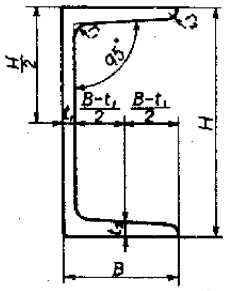
Modulus of section $Z_x = \frac{I_x}{A - C_x}$

$Z_y = \frac{Iy}{B - C_y}$



Size mm	Thickness mm	Radius of curvature mm		Cross sectional area cm²	Mass per metre kg/m	Distance of centre of gravity cm		Moment of inertia cm⁴				Radius of gyration cm				Tan ∝	Modulus of section cm³	
A x B	t	r_1	r_2	a		Cx	Cy	Ix	Iy	Iu max	Iv max	ix	iy	iu max	iv max		Zx	Zy
90 x 75	9	8.5	6	14.04	11.0	2.75	2.00	109	68.1	143	34.1	2.78	2.20	3.19	1.56	0.676	17.4	17.4
100 x 75	7	10	5	11.87	9.32	3.06	1.83	118	56.9	144	30.8	3.15	2.19	3.49	1.61	0.548	17.0	10.0
	10	10	7	16.50	13.0	3.17	1.94	159	76.1	194	41.3	3.11	2.15	3.43	1.58	0.543	23.3	13.7
125 x 75	7	10	5	13.62	10.7	4.10	1.64	219	60.4	243	36.4	4.01	2.11	4.23	1.64	0.362	26.1	10.3
	10	10	7	19.00	14.9	4.22	1.75	299	80.8	330	49.0	3.96	2.06	4.17	1.61	0.357	36.1	14.1
	13	10	7	24.31	19.1	4.35	1.87	376	101	415	61.9	3.93	2.04	4.13	1.60	0.352	46.1	7.9
125 x 90	10	10	7	20.50	16.1	3.95	2.22	318	138	380	76.2	3.94	2.59	4.30	1.93	0.505	37.2	20.3
	13	10	7	26.26	20.6	4.07	2.34	401	173	477	96.3	3.91	2.57	4.26	1.91	0.501	47.5	25.9
150 x 90	9	12	6	20.94	16.4	4.95	1.99	485	133	537	80.4	4.81	2.52	5.06	1.96	0.361	48.2	19.0
	12	12	8.5	27.36	21.5	5.07	2.10	619	167	685	102	4.76	2.47	5.00	1.93	0.357	62.3	24.3
150 x 100	9	12	6	21.84	17.1	4.76	2.30	502	181	579	104	4.79	2.88	5.15	2.15	0.439	49.1	23.5
	12	12	8.5	28.56	22.4	4.88	2.41	642	228	738	132	4.74	2.83	5.09	2.15	0.435	63.4	30.1
	15	12	8.5	35.25	27.7	5.00	2.53	782	276	897	161	4.71	2.80	5.04	2.14	0.431	78.2	37.0

Table 4
Size and thickness of channel steel
(clause 4.1)

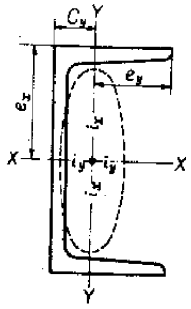


Moment of inertia $I = ai^2$

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

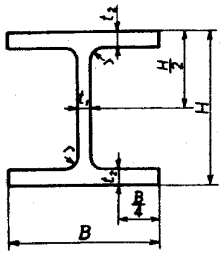
Modulus of section $Z_x = \frac{I_x}{H - H/2}$

$Z_y = \frac{Iy}{B - C_y}$



Size mm	Thickness mm		Radius of curvature mm		Cross sectional area cm²	Mass per metre kg/m	Distance of centre of gravity cm		Moment of inertia cm²		Radius of gyration cm		Modulus of section cm³	
H X B	t_1	t_2	r_1	r_1	a		C_x	C_y	I_x	I_y	i_x	i_y	Z_x	Z_y
50 x 25	5	6	6	3	4.92	3.86	0	0.81	16.8	2.49	1.85	0.71	6.73	1.48
75 x 40	5	7	8	4	8.818	6.92	0	1.28	75.3	12.2	2.92	1.17	20.1	4.47
100 x 50	5	7.5	8	4	11.92	9.36	0	1.54	188	26.0	3.97	1.48	37.6	7.52
125 x 65	6	8	8	4	17.11	13.4	0	1.90	424	61.8	4.98	1.90	67.8	13.4
150 x75	6.5	10	10	5	23.71	18.6	0	2.28	861	117	6.03	2.22	115	22.4
	9	12.5	15	7.5	30.59	24.0	0	2.31	1050	147	5.86	2.19	140	28.3
180 x 75	7	10.5	11	5.5	27.20	21.4	0	2.13	1380	131	7.12	2.19	153	24.3
200 x 80	7.5	11	12	6	31.33	24.6	0	2.21	1950	168	7.88	2.32	195	29.1
200 x 90	8	13.5	14	7	38.65	30.3	0	2.74	2490	277	8.02	2.68	249	44.2
250 x 90	9	13	14	7	44.07	34.6	0	2.40	4180	294	9.74	2.58	344	44.5
	11	14.5	17	8.5	51.17	40.2	0	2.40	4680	239	9.56	2.54	374	49.9
300 x 90	9	13	14	7	48.57	38.1	0	2.22	6440	309	11.5	2.52	429	45.7
	10	15.5	19	9.5	55.74	43.8	0	2.34	7410	360	11.5	2.54	494	54.1
	12	16	19	9.5	61.90	48.6	0	2.28	7870	379	11.3	2.48	525	56.4
380 x 100	10.5	16	18	9	69.39	54.5	0	2.41	14500	535	14.5	2.78	763	70.5
	13	16.5	18	9	78.96	62.0	0	2.33	15600	565	14.1	2.67	823	73.6
	13	20	24	12	85.71	67.3	0	2.54	17600	655	14.3	2.76	926	87.8

Table 5
Size and thickness of H-section steel
(clause 4.1)

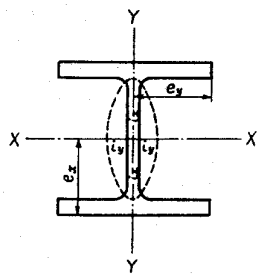


Moment of inertia $I = ai^2$

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

Modulus of section $Z_x = \frac{I_x}{H - H/2}$

$Z_y = \frac{Iy}{B - B/2}$

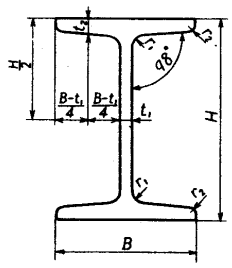


Size mm	Thickness mm		Radius of curvature mm	Cross sectional area cm²	Mass per metre kg/m	Moment of inertia cm²		Radius of gyration cm		Modulus of section cm³	
H X B	t_1	t_2	r	a		I_x	I_y	i_x	i_y	Z_x	Z_y
100 x 50	5	7	8	11.85	9.30	187	14.8	3.98	1.12	37.5	5.91
100 x 100	6	8	10	21.90	17.2	383	134	4.18	2.47	76.5	26.7
126 x 60	6	8	9	16.84	13.2	413	29.2	4.95	1.32	66.1	9.73
125 x 125	6.5	9	10	30.31	23.8	847	293	5.29	3.11	136	47.0
148 x 100	6	9	11	26.84	21.1	1020	151	6.17	2.37	138	30.1
150 x 75	5	7	8	17.85	14.0	666	49.5	6.11	1.66	88.8	13.2
150 x 150	7	10	11	40.14	31.5	1640	563	6.39	3.75	219	75.1
175 x 90	5	8	9	23.04	18.1	1210	97.5	7.26	2.06	139	21.7
175 x 175	7.5	11	12	51.21	40.2	2880	984	7.50	4.38	330	112
194 x 150	6	9	13	39.01	30.6	2690	507	8.30	3.61	277	67.6
198 x 99	4.5	7	11	23.18	18.2	1580	114	8.26	2.21	160	23.0
200 x 100	5.5	8	11	27.16	21.3	1840	134	8.24	2.22	184	26.8
200 x 200	8	12	13	63.53	49.9	4720	1600	8.62	5.02	472	160
200 x 204	12	12	13	71.53	56.2	4980	1700	8.35	4.88	498	167
208 x 202	10	16	13	83.69	65.7	6530	2200	8.83	5.13	628	218
244 x 175	7	11	16	56.24	44.1	6120	984	10.4	4.18	502	113
244 x 252	11	11	16	82.06	64.4	8790	2940	10.3	5.98	720	233
248 x 124	5	8	12	32.68	25.7	3540	255	10.4	2.79	285	41.1
248 x 249	8	13	16	84.70	66.5	9930	3350	10.8	6.29	801	269
250 x 125	6	9	12	37.66	29.6	4050	294	10.4	2.79	324	47.0
250 x 250	9	14	16	92.18	72.4	10800	3650	10.8	6.29	867	292
250 x 255	14	14	16	104.7	82.2	11500	3880	10.5	6.09	919	304
294 x 200	8	12	18	72.38	56.8	11300	1600	12.5	4.71	771	160
294 x 302	12	12	18	107.7	84.5	16900	5520	12.5	7.16	1150	365
298 x 149	5.5	8	13	40.80	32.0	6320	442	12.4	3.29	424	59.3
298 x 201	9	14	18	83.36	65.4	13300	1900	12.6	4.77	893	189
298 x 299	9	14	18	110.8	87.0	18800	6240	13.0	7.51	1270	417
300 x 150	6.5	9	13	46.78	36.7	7210	508	12.4	3.29	481	67.7
300 x 300	10	15	18	119.8	94.0	20400	6750	13.1	7.51	1360	450
300 x 305	15	15	18	134.8	106	21500	7100	12.6	7.26	440	466
304 x 301	11	17	18	134.8	106	23400	7730	13.2	7.57	1540	514
336 x 249	8	12	20	88.15	69.2	18500	3090	14.5	5.92	1100	248
338 x 351	13	13	20	135.3	106	28200	9380	14.4	8.33	1670	534
340 x 250	9	14	20	101.5	79.7	21700	3650	14.6	6.00	1280	292

Table 5
Size and thickness of H-section steel (continued)

Size	Thickness		Radius of curvature	Cross sectional area	Mass per metre	Moment of inertia		Radius of gyration		Modulus of section	
mm	mm		mm	cm²	kg/m	cm²		cm		cm³	
H X B	t_1	t_2	r	a		I_x	I_y	i_x	i_y	Z_x	Z_y
344 x 348	10	16	20	146.0	115	33300	11200	15.1	8.78	1940	646
344 x 354	16	16	20	166.6	131	35300	11800	14.6	8.43	2050	669
346 x 174	6	9	14	52.68	41.4	11100	792	14.5	3.88	611	91.0
350 x 175	7	11	14	63.14	49.6	13600	984	14.7	3.95	775	112
350 x 350	12	19	20	173.9	137	40300	13600	15.2	8.84	2300	776
350 x 357	19	19	20	198.4	156	42800	14400	14.7	8.53	2450	809
354 x 176	8	13	14	73.68	57.8	16100	1180	14.8	4.01	909	134
386 x 299	9	14	22	120.1	94.3	33700	6240	16.7	7.21	1740	418
388 x 402	15	15	22	178.5	140	49000	16300	16.6	9.54	2520	809
390 x 300	10	16	22	136.0	107	38700	7210	16.9	7.28	1980	481
394 x 398	11	18	22	186.8	147	56100	18900	17.3	10.1	2850	951
396 x 199	7	11	16	72.16	56.6	20000	1450	16.7	4.48	1010	145
400 x 200	8	13	16	84.12	66.0	23700	1740	16.8	4.54	1190	174
400 x 400	13	21	22	218.7	172	66600	22400	17.5	10.1	3330	1120
400 x 408	21	21	22	250.7	197	70900	23800	16.8	9.75	3540	1170
404 x 201	9	15	16	96.16	75.5	27500	2030	16.9	4.60	1360	202
411 x 405	18	28	22	295.4	232	92800	31000	17.7	10.2	4480	1530
428 x 407	20	35	22	360.7	283	119000	39400	18.2	10.4	5570	1930
434 x 299	10	15	24	135.0	106	48800	6690	18.6	7.04	2160	448
440 x 300	11	18	24	157.4	124	56100	8110	18.9	7.18	2550	541
446 x 199	8	12	18	84.30	65.2	28700	1590	18.5	4.33	1290	159
446 x 302	13	21	24	184.3	145	66400	9660	19.0	7.24	2980	639
450 x 200	9	14	18	96.76	76.0	33500	1870	18.6	4.40	1490	187
456 x 201	10	17	18	113.3	88.8	40400	2310	18.9	4.51	177	230
458 x 417	30	50	22	528.6	415	187000	60500	18.8	10.7	8170	2900
482 x 300	11	15	26	145.5	114	60400	6760	20.4	6.82	2500	451
488 x 300	11	18	26	163.5	128	71000	8110	20.8	7.04	2910	541
494 x 302	13	21	26	191.4	150	83800	9660	20.9	7.10	3390	640
496 x 199	9	14	20	101.3	79.5	41900	1840	20.3	4.27	1690	185
498 x 432	45	70	22	770.1	605	298000	94400	19.7	11.1	12000	4370
500 x 200	10	16	20	114.2	89.6	47800	2140	20.5	4.33	1910	214
506 x 201	11	19	20	131.3	103	56500	2580	20.7	4.43	2230	257
582 x 300	12	17	28	174.5	137	103000	7670	24.3	6.63	3530	511
588 x300	12	20	28	192.5	151	118000	9020	24.8	6.85	4020	601
594 x 302	14	23	28	222.4	175	137000	10600	24.9	6.90	4620	701
596 x 199	10	15	22	120.5	94.6	68700	1980	23.9	4.05	2310	199
600 x 200	11	17	22	134.4	106	77600	2280	24.0	4.12	2590	228
606 x 201	12	20	22	152.5	120	90400	2720	24.3	4.22	2980	271
612 x 202	13	23	22	170.7	134	103000	3180	24.6	4.31	3380	314
692 x 300	13	20	28	211.5	166	172000	9020	28.6	6.53	4980	602
700 x 300	13	24	28	235.5	185	201000	10800	29.3	6.78	5760	722
792 x 300	14	22	28	243.4	191	254000	9930	32.3	6.39	6410	662
800 x 300	14	26	28	267.4	210	292000	11700	33.0	6.62	7290	782
890 x 299	15	23	28	270.9	213	345000	10300	35.7	6.16	7760	688
900 x 300	16	28	28	309.8	243	411000	12600	36.4	6.39	9140	843
912 x 302	18	34	28	364.0	286	498000	15700	37.0	6.56	10900	1040

Table 6
Size and thickness of I-section steel
(clause 4.1)

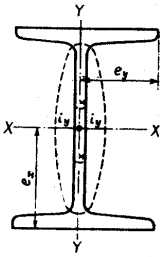


Moment of inertia $I = ai^2$

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

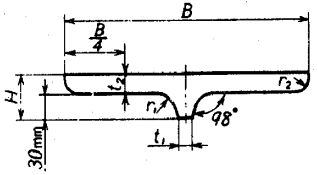
Modulus of section $Z_x = \frac{I_x}{H - H/2}$

$Z_y = \frac{Iy}{B - B/2}$



Size mm	Thickness mm		Radius of curvature mm		Cross sectional area cm²	Mass per metre kg/m	Distance of cenre of gravity cm		Moment of inertia cm²		Radius of gyration cm		Modulus of section cm³	
H X B	t_1	t_2	r_1	r_2	a		C_x	C_y	I_x	I_y	i_x	i_y	Z_x	Z_y
100 x 75	5	8	7	3.5	16.43	12.9	0	0	281	47.3	4.14	1.70	56.2	12.6
125 x 75	5.5	9.5	9	4.5	20.45	16.1	0	0	538	57.5	5.13	1.68	86.0	15.3
150 x 75	5.5	9.5	9	4.5	21.83	17.1	0	0	819	57.5	6.12	1.62	109	15.3
150 x125	8.5	14	13	6.5	46.15	36.2	0	0	1760	385	6.18	2.89	235	61.6
180 x 100	6	10	10	5	30.06	23.6	0	0	1670	138	7.45	2.14	186	27.5
200 x 100	7	10	10	5	33.06	26.6	0	0	2170	138	8.11	2.05	217	27.7
200 x 150	9	16	15	7.5	64.16	50.4	0	0	4460	753	8.34	3.43	446	10.0
250 x 125	7.5	12.5	12	6	48.79	38.3	0	0	5180	337	10.3	2.63	414	53.9
	10	19	21	10.5	70.73	55.5	0	0	7310	538	10.2	2.76	585	86.0
	8	13	12	6	61.58	48.3	0	0	9480	588	12.4	3.09	632	78.4
300 x 150	10	18.5	19	9.5	83.47	65.5	0	0	12700	886	12.3	3.26	849	118
	11.5	22	23	11.5	97.88	76.8	0	0	14700	1080	12.2	3.32	978	143
350 x 150	9	15	13	6.5	74.58	58.5	0	0	15200	702	14.3	3.07	870	93.5
	12	24	25	12.5	111.1	87.2	0	0	22400	1180	14.2	3.26	1280	158
400 x 150	10	18	17	8.5	91.73	72.0	0	0	24100	864	16.2	3.07	1200	115
	12.5	25	27	13.5	122.1	95.8	0	0	31700	1240	16.1	3.18	1580	165
450 x 175	11	20	19	9.5	116.8	91.7	0	0	39200	1510	18.3	3.60	1740	173
	13	26	27	13.5	146.1	115	0	0	48800	2020	18.3	3.72	2170	231
600 x 190	13	25	25	12.5	169.4	133	0	0	98400	2460	24.1	3.81	3280	259
	16	35	38	19	224.5	176	0	0	130000	3540	24.1	3.97	4330	373

Table 7
Size and thickness of T-section steel
(clause 4.1)

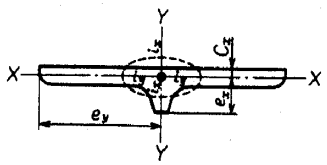


Moment of inertia $I = ai^2$

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

Modulus of section $Z_x = \frac{I_x}{H - C_x}$

$Z_y = \frac{Iy}{B - B/2}$



Size mm	Width mm	Height mm	Thickness mm		Radius of curvature mm		Cross sectional area cm^2	Mass per metre kg/m	Distance of centre of gravity cm		Moment of inertia cm^4		Radius of gyration cm		Modulus of section cm^3	
B x t_2	B	H	t_1	t_2	r_1	r_2	a		Cx	Cy	Ix	Iy	ix	iy	Zx	Zy
150 x 9	150	39	12	9	8	3	18.52	14.5	0.934	0	16.5	254	0.942	3.70	5.55	33.8
150 x 12	150	42	12	12	8	3	23.02	18.1	1.02	0	20.7	338	0.949	3.83	6.52	45.1
150 x 15	150	45	12	15	8	3	27.52	21.6	1.13	0	25.9	423	0.971	3.92	7.70	56.4
200 x12	200	42	12	12	8	3	29.02	22.8	0.935	0	22.3	99	0.877	5.25	6.83	79.9
200 x16	200	46	12	16	8	3	37.02	29.1	1.09	0	30.5	1070	0.907	5.37	8.68	107
200 x 19	200	49	12	19	8	3	43.02	33.8	1.22	0	38.5	1270	0.946	5.43	10.4	127
200 x 22	200	42	12	22	8	3	49.02	38.5	1.35	0	48.3	1470	0.993	5.47	12.6	147
250 x 16	250	46	12	16	20	3	46.05	36.2	1.06	0	33.6	2080	0.854	6.72	9.49	167
250 x 19	250	49	12	19	20	3	53.55	42.0	1.19	0	43.1	2470	0.897	6.80	11.6	198
250 x22	250	52	12	22	20	3	61.05	47.9	1.33	0	55.0	2870	0.949	6.85	14.2	229
250 x 25	250	55	12	25	20	3	68.55	53.8	1.46	0	69.6	3260	1.01	6.90	17.2	261

Table 8
Tolerances on size, thickness, length, squareness, bend and eccentricity for angle, channel, I-section and T-section steel
(clause 4.1 and 4.2)

Units in mm

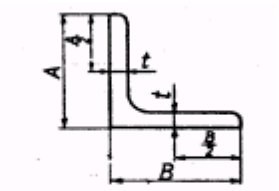
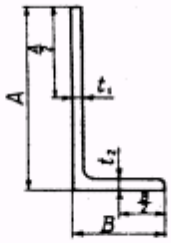
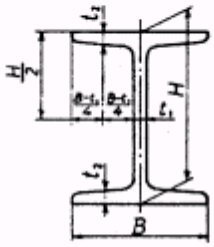
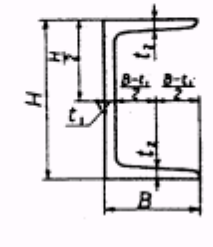
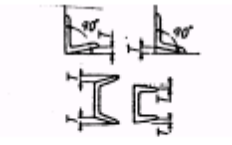
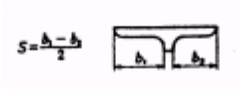
Structural steel			Tolerance	Note
A or B	Less than 50		± 1.5	
	50 to less than 100		± 2.0	
	100 to less than 200		± 3.0	
	200 and over		± 4.0	
H	Less than 100		± 1.5	
	100 to less than 200		± 2.0	
	200 to less than 400		± 3.0	
	400 and over		± 4.0	
Thickness (t or t_1, t_2)	H not over 130	Less than 6.3	± 0.6	
		6.3 to less than 10	± 0.7	
		10 to less than 16	± 0.8	
		16 and over	± 1.0	
	H over 130	Less than 6.3	± 0.7	
		6.3 to less than 10	± 0.8	
		10 to less than 16	± 1.0	
		16 to less than 25	± 1.5	
		25 and over	± 1.5	
Length	Not over 7		± 40 0	
	Over 7		Upper limit: 40 mm, plus 5 mm for every 1 m in excess of the 7 m length Lower limit: Nil	
Squareness (T)	I-section		2% of B, max.	
	Angle and channel		2.5 % of B, max.	
Bend	I-section and T-section		0.2 % of length, max.	
	Angle and channel		0.3 % of length, max.	
Eccentricity (S)	T-section		± 3.0	

Table 9
Tolerances on size, thickness, length, squareness, bend, Eccentricity, concavity of web and squareness of cut end for H-section steel
(clause 4.1 and 4.2)

Units in mm

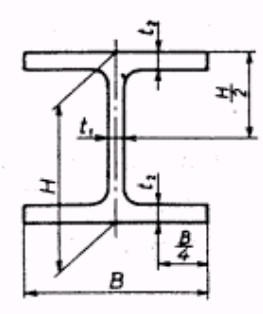
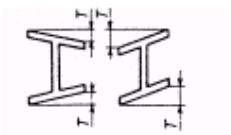
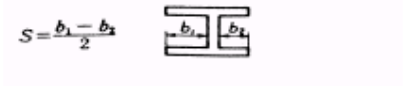
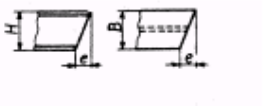
Structural steel			Tolerance	Note
H	Less than 400		± 2.0	
	400 to less than 600		± 3.0	
	600 and over		± 4.0	
B	Less than 100		± 2.0	
	100 to less than 200		± 2.5	
	200 and over		± 3.0	
Thickness (t1, t2)	t_1	Less than 16	± 0.7	
		16 to less than 25	± 1.0	
		25 to less than 40	± 1.5	
	t_2	Less than 16	± 1.0	
		16 to less than 25	± 1.5	
		25 to less than 40	± 1.7	
Length	Not over 7		± 40 0	
	Over 7		Upper limit: 40 mm, plus 5 mm for every 1 m in excess of the 7 m lengt Lower limit: Nil	
Squareness (T)	H not over 300		1.0 % of B, max. but not exceeding 1.5 mm	
	H over 300		1.2 % of B, max. but not exceeding 1.5 mm	
Bend	H not over 300		0.15% of length, max.	
	H over 300		0.10% of length, max.	
Eccentricity (S)	H not over 300 and B not over 200		± 2.5	
	H not over 300 and B over 200		± 3.5	
Concavity of web (W)	H	Less than 400	2.0	
		400 to less than 600	2.5	
		600 and over	3.0	
Squareness of cut end (e)			1.6 % of B or H max. but not exceeding 3.0 mm	

Table 10
Tolerances on mass per metre
(clause 4.1)

Thickness mm	Tolerance %
Less than 10	± 5
10 and over	± 4

Note. 1. The maximum thickness shall apply.
2. These tolerances shall apply in the purchase of a single set of structural steel of the same size and thickness comprising not less than 10 pieces and a mass of not less than 1000 kg.

5. Chemical composition

5.1 The chemical composition of structural steel when determined by the ladle analysis shall comply with Table 11.
Compliance is checked in accordance with clause 9.2.

Table 11
Grades and chemical composition on ladle analysis
(clauses 3.2 and 5.1)

Grade	Chemical composition, % by weight				
	Carbon Max.	Silicon Max.	Manganese	Phosphorus Max.	Sulfur Max.
SM 400	0.20	0.35	0.60 to 1.40	0.035	0.035
SM 490	0.18	0.55	1.60 max.	0.035	0.035
SM 520	0.20	0.55	1.60 max.	0.035	0.035
SM 570	0.18	0.55	1.60 max.	0.050	0.050

Note. For product analysis, the limits given in Table 11 may be exceeded by the following:

Carbon:	0.03
Silicon:	0.05
Manganese:	0.05
Phosphorus:	0.01
Sulfur:	0.01

6. Requirements

6.1 Workmanship
Structural steel shall have its entire surface smooth and free from splits or cracks.
Compliance is checked by visual inspection.

6.2 Mechanical properties

6.2.1 Yield strength, tensile strength and elongation
These shall comply with Table 12.
Compliance is checked in accordance with clause 9.3.

6.2.2 Impact strength (where thickness is 12 mm or more)
This shall comply with table 12.

Compliance is checked in accordance with TIS 244, Part 8, with the product grades SM 400, SM 490 and SM 520 being tested at 0°C and grade SM 570 at -5°C.

Table 12
Grades, yield strength, tensile strength and elongation and impact resistance
(clauses 3.2 and 6.2)

Grade	Yield strength min. MPa		Tensile strength	Elongation, min %			Impact resistance min.
	Thickness not over 16 mm	Thickness over 16 mm	MPa	Thickness not over 5 mm	Thickness 5 to 16 mm	Thicknes s over 16 mm	J
SM 400	245	235	400 to 510	23	18	22	27
SM 490	325	315	490 to 610	22	17	21	27
SM 520	365	355	520 to 640	19	15	19	27
SM 570	460	390	570 to 720	19	19	26	47

7. Mark and label

7.1 Each section of structural steel shall bear at least number, letter or mark representing clearly and legibly the following information:
(1) Grade;
(2) Size, thickness and length;
(3) Cast number or other equally informative mark;
(4) Name of a manufacturer or factory or registered trade-mark.
Marking as of clauses 7.1(1) and (4) shall be indelible.
In case foreign language is used, the meaning shall correspond to that in Thai specified above.

7.2 Any person who manufactures products complying with this standard may use the Standards Mark in connection with his products only after having received a licence from the Industrial Product Standards Council.

8. Sampling and criteria for conformity

8.1 Lot in this standard refers to structural steel of the same type, grade and size and thickness which are manufactured or delivered or purchased at one time.

8.2 Sampling plan and acceptance shall comply with the sampling plan specified below or with any other technically equivalent plan.

8.2.1 Sampling and acceptance for test on size, thickness, length, squareness, bend, eccentricity, concavity of web and squareness of cut end

8.2.1.1 Three sections shall be taken at random from the products of the same lot.

8.2.1.2 Provided all the samples comply with the requirements of clauses 4.1 and 4.2, that lot of structural steel shall be deemed to meet the requirements.

8.2.2 Sampling and acceptance for test on workmanship

8.2.2.1 All the 3 samples which met the requirements as in clause 8.2.1.2 shall be cut at either end to make from each 1 test piece about 1.50 m long.

8.2.2.2 Provided all the samples comply with the requirements of clauses 6.1, that lot of structural steel shall be deemed to meet the requirements.

8.2.3 Sampling and acceptance for test on chemical composition and mechanical properties

8.2.3.1 All the 3 pieces which met the requirements as in clause 8.2.2.2 shall be used. One test piece shall be cut to make 2 test specimens, one of which shall be used for test on chemical composition and the other mechanical properties. The other 2 test pieces shall be reserved for retest.

8.2.3.2 Provided the test specimens comply with the requirement of clauses 5.1 or 6.2, as applicable, that lot of structural steel shall be deemed to meet the requirement.

Where fracture occurs at a position less than 1/4 of the gauge length from the nearest gauge mark, test shall be repeated on a new test specimen cut from the same test piece.

If the test specimen fails to comply with clause 6.2.1, the reserved test pieces shall be cut to make from each 1 test specimen which shall be subjected to retest. Provided all the specimens meet the requirement of clauses 6.2.1, in the retest, that lot of structural steel shall be deemed to comply with the requirement.

8.3 Criteria for conformity

Provided the samples meet all the requirements of clause 8.2.1.2, 8.2.2.2, 8.2.3.2, that lot of structural steel shall be deemed to comply with this standard.

9. Tests

9.1 Size, thickness, length, squareness, bend, eccentricity, concavity of web and squareness of cut endDimensions

9.1.1 Dimensions A, B, H and thickness

9.1.1.1 Apparatus

A measuring device with accurate to 0.5 mm for measuring dimensions A, B and H and a measuring device accurate to 0.05 mm for measuring thickness.

9.1.1.2 Procedure

Measurement shall be made at positions located not less than 150 mm from both ends and at the middle section.

9.1.1.3 Report

The report shall include all readings obtained.

9.1.2 Length

The length of the sample shall be measured by means of a metal measuring tape accurate to 1 m and of sufficient length that will permit measurement of an entire section at one operation.

9.1.3 Squareness

9.1.3.1 Apparatus

(1) Angle steel having its long leg longer than the side to be measured
(2) A steel rule accurate to 1 mm

9.1.3.2 Procedure

(1) Place the sample on a flat smooth surface so that side B is square to the surface.
(2) Measure the width of side B in mm.
(3) Place the angle steel so that the long leg is square to the surface and slide so that its edge makes contact with the sample on the side to be measured.
(4) Measure the normal distance between the end of the sample and the edge of the angle in mm (T).

9.1.3.3 Calculation

Squareness is calculated from the formula:

$$\text{Squareness, \%} = \frac{T}{B} \times 100$$

9.1.3.4 Report

The report shall include the squareness reading in %.

9.1.4 Bend

9.1.4.1 Apparatus

(1) A thread of a length greater than the sample

(2) A steel rule accurate to 1 mm

9.1.4.2 Procedure

(1) Place the sample on a flat surface so that one side make close contact with the surface and measure the length of the sample in mm (L).

(2) Tie the thread between both ends of the vertical side and measure the maximum normal distance between the thread and the horizontal sample surface in mm (c).

(3) Invert the sample so that another side is in contact with the flat surface and proceed as in clause 9.1.4.2(2) on all sides.

9.1.4.3 Calculation

Bend is calculated from the formula:

$$\text{Bend, \%} = \frac{c}{L} \times 100$$

9.1.4.4 Report

The report shall include the maximum bend reading in %.

9.1.5 Eccentricity

9.1.5.1 Apparatus

A steel rule accurate to 1 mm

9.1.5.2 Procedure

Measure the distance between the edge of the flange and the surface of the web on both sides in mm (b_1 and b_2, respectively)

9.1.5.3 Calculation

Eccentricity is calculated from the formula:

$$\text{Eccentricity, mm} = \frac{b_1 - b_2}{2}$$

9.1.5.4 Report

The report shall include the maximum eccentricity reading in mm.

9.1.6 Concavity of web (H-section only)

9.1.6.1 Apparatus

(1) A thread

(2) A steel rule accurate to 1 mm

9.1.6.2 Procedure

(1) Place the sample on a flat surface so that its flange are square to the surface.

(2) Tie the thread between both tangent angles of the flange and web, the thread being square to flange, and measure the maximum vertical distance from the thread normal to the sample surface as the concavity of web.

9.1.6.3 Report

The report shall include the maximum reading of concavity of web in mm.

9.1.7 Squareness of cut end (H-section only)

9.1.7.1 Apparatus

(1) Angle steel having its long leg longer than the side to be measured (B or H)

(2) A steel rule accurate to 1 mm

9.1.7.2 Procedure

(1) Place the sample so that either side is on a flat smooth surface.

(2) Measure the width of the side square to the surface in mm (B or H).

(3) Place the angle steel so that the long leg is square to the surface and slide so that its edge makes contact with the surface of the cut end.

(4) Measure the normal distance between the cut end and the edge of the steel angle in mm (e).

9.1.7.3 Calculation

Squareness of cut end is calculated from the formula:

$$\text{Squareness of cut end, \%} = \frac{e}{\text{B or H}} \times 100$$

9.1.7.4 Report

The report shall include the maximum reading of the squareness of cut end in mm and in % of B or H.

9.2 Chemical composition

9.2.1 Procedure

The general analytical method or the equivalent shall be used.

9.2.2 Report

The report shall be include the results of each sample.

9.3 Yield strength, tensile strength and elongation

9.3.1 Procedure

A tensile testing machine capable of applying load uniformly and consistently at the specified rate.

9.3.2 Preparation of test specimens

9.3.2.1 The sample shall be cut lengthwise, by a mechanical process that does not involve overheating, at positions as shown in Figure 1 to obtain rectangles with a width to thickness ratio of 8:1 for preparation into specimens of the shape and size as shown in table 13.

Note. Where it is impracticable to cut sample at positions shown in Figure 1, specimens shall be cut at the closet positions possible. In case of H-section, if preparation as in Figure 1 is not possible, specimens shall be prepared as in the case of I-section.

9.3.2.2 The condition of the test specimens shall be that of finished structural steel. They shall not be subjected to any heat treatment. Straightening of the test specimens, if required, shall be done cold. Overbent test specimens shall be discarded.

9.3.3 Procedure

The procedure shall be in accordance with TIS 244, "Standard methods of test for iron and steel", Part 4, "Tensile testing of steel (general)".

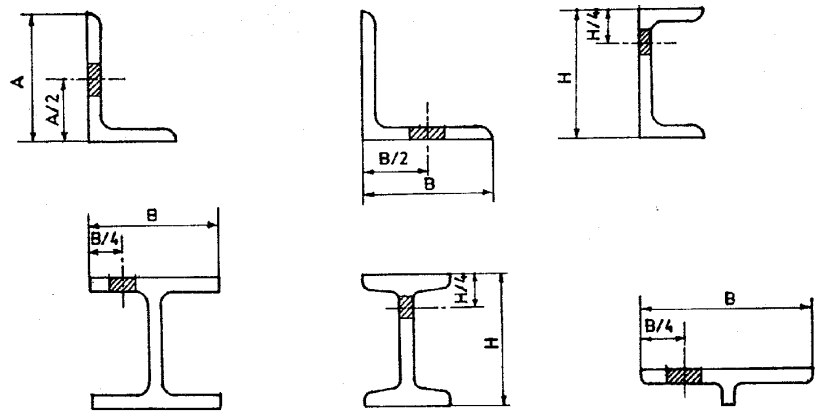
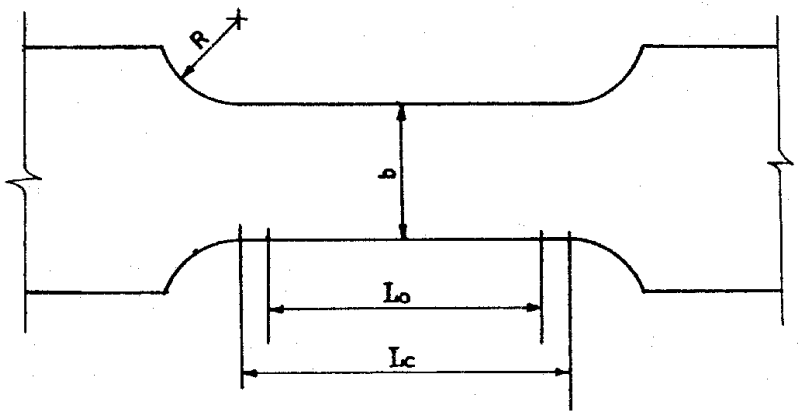


Figure 1 Positions of test specimens according to section
(clause 9.3.2.1)

Table 13
Shape and dimensions of test specimens for yield stength, tensile strength and elongation
(clause 9.3.2.1)



Thickness	Width of parallel portion b	Gauge length L_o	Length of parallel portion L_c	Radius of curvature R min
Up to 6	25 ± 0.7	50 ± 5	60 approx.	15
Over 6	40 ± 0.7	200 ± 20	220 approx.	25

Appendix B
Calculation of cross-sectional area
(clause 4.1)

A.1 The cross-sectional area (a) of structural steel in mm² shall be calculated from the following formula rounded to 4 significant figures:

A.1.1 Cross-sectional area of steel angles

A.1.1.1 Equal-leg angle

$$a = \frac{t(2A - t) + 0.215 (r_1^2 - 2r_2^2)}{100}$$

A.1.1.2 Unequal-leg angle

$$a = \frac{t(A + B - t) + 0.215 (r_1^2 - 2r_2^2)}{100}$$

A.1.2 Cross-sectional area of I-sections

$$a = \frac{Ht_1 + 2t_2 (B - t_1) + 0.615 (r_1^2 - r_2^2)}{100}$$

A.1.3 Cross-sectional area of channel steel

$$a = \frac{Ht_1 + 2t_2 (B - t_1) + 0.349 (r_1^2 - r_2^2)}{100}$$

A.1.4 Cross-sectional area of H-sections

$$a = \frac{t_1 (H - 2t_2 + 2Bt_2 + 0.858r^2}{100}$$

A.1.5 Cross-sectional area of T-sections

$$a = \frac{Bt_2 + 0.307r_1^2 + 482.6}{100}$$