

Exporter Briefing – Tung Ho of Taiwan (Public Record)

Background

Tung Ho Steel Enterprise Corporation was formally established in 1962. Tung Ho Steel's head office located in Taipei and it has its three main operations in Miaoli, Taoyuan and Kaohsiung. The main finished products that Tung Ho produces include H-beams, Channels, I-beams, Universal Mill Plates and Deformed Bars.

Structural sections which are the subject of the investigation are produced at its Miaoli & Kaohsiung works.

Production

Tung Ho feed steel is produced using Electric Arc furnaces using scrap and pig iron.

Grades

Tung Ho's website states that it regularly produces the following grades of steel.

- JIS = SS400, SM400A, SM490A
- ASTM = A36, A572 G50, A992

And produces to order

- JIS = SS490, SM 400B, SM490B, SM 490YA, SN400A, SN400B, SN 490B
- ASTM = A572 G42
- BS = 4360 43A, 4360 50B, 4360 55C

Whilst not apparent on the website they also sell into Australia product produced to

- AS/NZS 3679.1 = grade 300

The Commission should be aware that the JIS that most closely matches AS3679.1 G300 is JIS SM490A for the following reasons:

- AS/NZS 3679.1 grade 300 has a minimum yield point requirement of 300MPa and SM490A has a minimum yield point of 315 MPa
- JIS grades SS400 and SM400 only have a minimum yield point of 235MPa which is 28% less than 300MPa. In addition SS400 has no required maximum tolerance for Carbon, Silicon or Manganese.

As such the Taiwanese normal domestic prices should be calculated on the equivalent grades that only exceed a min yield point of 300MPa.

Tolerances

It should be noted that rolling of structural steel to comply with the AS/NZ 3679.1 (for export sales to Australia) involves tighter tolerances than HRS sold domestically throughout Asia. For goods that are less than 10mm in thickness, the AS/NZ 3679.1 (Clause 7.2) minimum tolerance allowed is 2.5 per cent. OneSteel understands that for domestic sales in Taiwan, a 5 per cent tolerance is permitted (to JIS-equivalent). For product that involves a thickness of 10mm and over, the AS/NZ 3679.1 tolerance is also 2.5 per cent, whereas the JIS equivalent is 4 per cent.

Accordingly, Tung Ho Steel's normal values (based upon domestic sales) require an upward adjustment of 2.5 per cent (for less than 10mm thick product), or 1.5 per cent for product with a thickness of 10mm or greater.

Sales of like goods

Tung Ho export questionnaire states that the costs of production for domestic and export goods are the same but that for the export business there are additional costs, such as inland transportation, handling, loading and ancillary expenses, packing and credit cost.

Based upon Tung Ho's questionnaire response, the following adjustments are warranted:

- downward adjustment for domestic freight on only FIS sales by Tung Ho but not for any ex-factory sales .
- upward adjustment for inland export freight charges (included in export selling price);
- upward adjustment for export handling (including containerization) loading & ancillary expenses and export fees;
- Upward adjustment for any additional packing, labeling and credit costs.
- it would also be expected that goods destined for export would incur a higher warehousing cost per tonne to those destined for domestic sale, and an upward adjustment is therefore required.

Adjustment for differences in requirements between domestic and export sales

OneSteel is also of the view that an upward adjustment of normal prices is required to account for mill "down time" associated with roll changes for products exported to Australia and New Zealand due to shorter production runs to produce product compared to those for the Taiwanese domestic market.

OneSteel considers that an appropriate adjustment could be calculated for each section size rolled (eg 610UB , 530UB, 250PFC, 200PFC etc) by

- Multiplying the roll change changeover time by the hourly fixed overhead rate (including labour) and then dividing this by the tonnes rolled.
- This number could then be subtracted from an equivalent calculation made for the Thai, Korean, Japanese or Taiwanese domestically sold sections.

PRODUCT SPECIFICATIONS

(Structural Steel and Sheet Pile)

SPECIFICATIONS

Type of Product	Classifications	Mechanical Properties									
		Yield Point N/mm ² (min.)	Tensile Strength		Yield Ratio%	Elongation % (min.)		Impact			
		Thickness			N/mm ²	(max.)	Thickness		Thickness ≥ 12 mm.		
			t ≤ 16	16 < t ≤ 40		t ≤ 5	5 < t ≤ 16	t > 16	Temp°C	Energy J (min.)	
Structural Steel	JIS G 3101 ^A : 2004	SS400	245	235	400-510	-	21	17	21	-	-
		SS490	285	275	490-610	-	19	15	19	-	-
		SS540	400	390	540 min.	-	16	13	17	-	-
	JIS G 3106 : 2004	SM400A	245	235	400-510	-	23	18	22	-	-
		SM400B	245	235	400-510	-	23	18	22	0	27
		SM490A	325	315	490-610	-	22	17	21	-	-
		SM490B	325	315	490-610	-	22	17	21	0	27
		SM490YA	365	355	490-610	-	19	15	19	-	-
		SM490YB	365	355	490-610	-	19	15	19	0	27
		SM520B	365	355	520-640	-	19	15	19	0	27
		SM520C	365	355	520-640	-	19	15	19	0	47
		SM570	460	450	570-720	-	19	19	26	-5	47
		JIS G 3136 : 2005	SN400A	235	235	400-510	-	17	17	21	-
	SN400B		235-355 ^B	235-355	400-510	80 ^C	18	18	22	27	27
	SN490B		325-445 ^B	325-445	490-610	80 ^C	17	17	21	27	27
	BS 4360 : 1986	43A	275	265	430-580	-	20	20	20	-	-
		43B	275	265	430-580	-	20	20	20	+20	27
		43C	275	265	430-580	-	20	20	20	0	27
		43D	275	265	430-580	-	20	20	20	-20	27
		50A	355	345	490-640	-	18	18	18	-	-
		50B	355	345	490-640	-	18	18	18	+20	27
		50C	355	345	490-640	-	18	18	18	0	27
		50D	355	345	490-640	-	18	18	18	-20	27
		50E ^D	355	345	490-640	-	18	18	18	-40	27
		55C ^D	450	430	550-700	-	17	17	17	0	27
	BS EN 10025-2 ^G : 2004	S235JR	235	225	360-510	-	26		+20		27 ^E
		S235J0	235	225	360-510	-	26		0		27
		S235J2	235	225	360-510	-	24		-20		27
		S275JR	275	265	410-560	-	23		+20		27 ^E
		S275J0	275	265	410-560	-	23		0		27
		S275J2	275	265	410-560	-	21		-20		27
		S355JR	355	345	470-630	-	22		+20		27 ^E
		S355J0	355	345	470-630	-	22		0		27
		S355J2	355	345	470-630	-	22		-20		27
		S355K2	355	345	470-630	-	20		-20		40
		S450J0 ^D	450	430	550-720	-	17		0		27

Remark

- A : Bend test on material grades SS400, SS490, SS540, St33, St37-2, St44-2 and St52-3.
 B : For the H section, when the t1 is 9 mm. or less, the upper limit of the yield point or proof stress shall not be applied.
 C : For the H section, when the t1 is 9 mm. or less, the upper limit of the yield ratio shall be 85%.
 D : Please contact us in advance for these items.
 E : Verified only when specified at the time of order.
 F : For grade 50 steel of thicknesses 20 mm. and less, the tensile strength shall be a minimum of 485 Mpa
 G : Delivery condition type is +AR

PRODUCT SPECIFICATIONS

(Structural Steel and Sheet Pile)

SPECIFICATIONS

Type of Product	Classifications	Chemical Compositions (ladle analysis), %														
		C	Si	Mn	P	S	CE ^F	SW ^F	Nb	V	N	Cu	Ni	Cr	Mo	Grain refining element
		(max.)			(max.)	(max.)	(max.)	(max.)			(max.)	(max.)	(max.)	(max.)	(max.)	(max.)
Structural Steel	JIS G 3101 : 2004	SS400	-	-	-	0.050	0.050	-	-	-	-	-	-	-	-	-
		SS490	-	-	-	0.050	0.050	-	-	-	-	-	-	-	-	-
		SS540	0.30	-	1.60 Max.	0.040	0.040	-	-	-	-	-	-	-	-	-
	JIS G 3106 : 2004	SM400A	0.23	-	2.50°C min.	0.035	0.035	-	-	-	-	-	-	-	-	-
		SM400B	0.20	0.35 Max.	0.60 -1.40	0.035	0.035	-	-	-	-	-	-	-	-	-
		SM490A	0.20	0.55 Max.	1.60 Max.	0.035	0.035	-	-	-	-	-	-	-	-	-
		SM490B	0.18	0.55 Max.	1.60 Max.	0.035	0.035	-	-	-	-	-	-	-	-	-
		SM490YA	0.20	0.55 Max.	1.60 Max.	0.035	0.035	-	-	-	-	-	-	-	-	-
		SM490YB	0.20	0.55 Max.	1.60 Max.	0.035	0.035	-	-	-	-	-	-	-	-	-
		SM520B	0.20	0.55 Max.	1.60 Max.	0.035	0.035	-	-	-	-	-	-	-	-	-
		SM520C	0.20	0.55 Max.	1.60 Max.	0.035	0.035	-	-	-	-	-	-	-	-	-
		SM570	0.18	0.55 Max.	1.60 Max.	0.035	0.035	0.44	-	-	-	-	-	-	-	-
	JIS G 3136 : 2005	SN400A	0.24	-	-	0.050	0.050	-	-	-	-	-	-	-	-	-
		SN400B	0.20	0.35 Max.	0.60-1.40	0.030	0.015	0.36	0.26	-	-	-	-	-	-	-
		SN490B	0.18	0.55 Max.	1.60 Max.	0.030	0.015	0.44	0.29	-	-	-	-	-	-	-
	BS 4360 : 1986	43A	0.25	0.50 Max.	1.60 Max.	0.050	0.050	-	-	-	-	-	-	-	-	-
		43B	0.21	0.50 Max.	1.50 Max.	0.050	0.050	-	-	-	-	-	-	-	-	-
		43C	0.18	0.50 Max.	1.50 Max.	0.050	0.050	0.41	-	-	-	-	-	-	-	-
		43D	0.18	0.50 Max.	1.50 Max.	0.050	0.050	0.41	-	-	-	-	-	-	-	-
		50A	0.23	0.50 Max.	1.60 Max.	0.050	0.050	-	-	0.003-0.100	0.003-0.100	-	-	-	-	-
		50B	0.20 ^B	0.50 Max.	1.50 ^A	0.050	0.050	-	-	0.003-0.100	0.003-0.100	-	-	-	-	-
		50C	0.20 ^B	0.50 Max.	1.50 ^A	0.050	0.050	0.45	-	0.003-0.100	0.003-0.100	-	-	-	-	-
		50D	0.18 ^C	0.50 Max.	1.50 ^A	0.040	0.040	0.43	-	0.003-0.100	0.003-0.100	-	-	-	-	-
		50E	0.18 ^C	0.10 - 0.50	1.50 ^A	0.040	0.040	0.43	-	0.003-0.100	0.003-0.100	-	-	-	-	-
		55C	0.22	0.60 Max.	1.60 Max.	0.040	0.040	0.51 ^L	-	0.003-0.100	0.003-0.200	-	-	-	-	-
	BS EN 10025-2 : 2004	S235JR	0.17	-	1.40 Max.	0.035	0.035	-	-	-	0.012	0.55	-	-	-	-
		S235J0	0.17	-	1.40 Max.	0.030	0.030	-	-	-	0.012	0.55	-	-	-	-
		S235J2	0.17	-	1.40 Max.	0.025	0.025	-	-	-	-	0.55	-	-	-	-
		S275JR	0.21	-	1.50 Max.	0.035	0.035	-	-	-	0.012	0.55	-	-	-	-
		S275J0	0.18	-	1.50 Max.	0.030	0.030	-	-	-	0.012	0.55	-	-	-	-
		S275J2	0.18	-	1.50 Max.	0.025	0.025	-	-	-	-	0.55	-	-	-	-
		S355JR	0.24	0.55 Max.	1.60 Max.	0.035	0.035	-	-	-	0.012	0.55	-	-	-	-
		S355J0	0.20	0.55 Max.	1.60 Max.	0.030	0.030	-	-	-	0.012	0.55	-	-	-	-
		S355J2	0.20	0.55 Max.	1.60 Max.	0.025	0.025	-	-	-	-	0.55	-	-	-	-
		S355K2	0.20	0.55 Max.	1.60 Max.	0.025	0.025	-	-	-	-	0.55	-	-	-	-
		S450J0	0.20	0.55 Max.	1.70 Max.	0.030	0.030	-	-	0.05 Max.	0.13 Max.	0.025	0.55	-	-	-

Remark

- A : It is permissible to vary the carbon and manganese contents (ladle analysis) for grades 50B, 50C, 50D and 50E on the basis of an increase of 0.06% manganese for each decrease of 0.01% carbon vice versa up to maximum manganese content of 1.60% and a maximum carbon content of 0.22% for grades 50B and 50C and 0.20% for grades 50D and 50E.
- B : For grades 50B and 50C over 16 mm. thick, a maximum carbon content of 0.22% for ladle is permitted
- C : For grades 50D and 50E over 16 mm. thick, a maximum carbon content of 0.20% for ladle is permitted
- D : For grades 355D over 16 mm. thick, a maximum carbon content of 0.20% for ladle is permitted
- E : The carbon and manganese contents may be varied (ladle analysis) for grades 355D on the basis of an increase of 0.06% manganese for each decrease of 0.01% a maximum carbon content of 0.20%
- F : %Cu min 0.20 when copper steel is specified
- G : For each reduction of 0.01% point below the specified carbon maximum, an increase of 0.06% point manganese above the specified maximum is permitted, up to a maximum of 1.60%
- H : The following elements may be present to the limits stated, subject to a maximum total of 1.00% Cu max. 0.50%, Ni max. 0.50%, Cr Max 0.30%, Mo Max. 0.10%
- I : Carbon Equivalent : (JIS Version) CE = C+Mn/6+Si/24+Ni/40+Cr/5+Mo/4+V/14 (AS, ASTM, BS Standard) CE=C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15
- J : Chemical composition on sensitivity of welding crack = C+Si/30+Mn/20+Cu/20+Ni/60+Cr/20+Mo/15+V/10+5B
- K : The maximum total of C and Mn/6 is 0.40%
- L : Maximum %CEV 0.51 when t<19mm.
- M : The maximum total of Cu, Ni, Cr and Mo is 0.80%
- N : The maximum total of Nb and V is 0.10% and the Max. Al(Total) Content is 0.06%
- O : The maximum total of Nb, V and Ti is 0.12%
- P : Maximum of the Aluminium Total content is 0.06%
- Q : The maximum total of Nb and V is 0.15%
- R : The max. carbon content for t < 16 mm. is 0.17%
- S : Niobium content shall be 0.005-0.050% or Vanadium content shall be 0.01-0.15%

PRODUCT SPECIFICATIONS

(Structural Steel and Sheet Pile)

SPECIFICATIONS

Type of Product	Classifications	Mechanical Properties								
		Yield Point N/mm ² (min.)	Tensile Strength		Yield Ratio%	Elongation % (min.)		Impact		
		Thickness			N/mm ²	(max.)	Thickness		thickness t ≥ 12 mm.	
		t ≤ 16	16 < t ≤ 40			t ≤ 5	5 < t ≤ 16	t > 16	Temp °C	Energy J (min.)
Structural Steel	BS 7191 :1989	355D ^D	355	345	490-640	-	18		-20	50
		355EM ^D	355	345	460-620	-	18		-40	50
		355EMZ ^D	355	345	460-620	-	18		-40	50
	ASTM A36/A36M : 2005	A36	250		400-550	-	20		-	-
	ASTM A992/A992M : 2006a	A992	345-450		450min.	85	18		-	-
	ASTM A572/A572M : 2007	A572 Gr.42	290		415 min.	-	20		-	-
		A572 Gr.50	345		450 min. ^F	-	18		-	-
		A572 Gr.55 ^D	380		485 min.	-	17		-	-
		A572 Gr.60 ^D	415		520 min.	-	16		-	-
		A572 GR.65 ^D	450		550 min.	-	15		-	-
	DIN 17100:1980 ^A	St33	185	175	290 min.	-	18		-	-
		St37-2	235	225	340-470	-	26		+20	27
		St44-2	275	265	410-540	-	22		+20	27
		St50-2	295	285	470-610	-	20		-	-
		St52-3	355	345	490-630	-	22		0	27
		St60-2 ^D	335	325	570-710	-	16		-	-
	AS/NZS 3679.1 : 2000		t<11	11 ≤ t ≤ 17	17<t<40					
		250	260	250	250	410 min.	-	22	-	-
		250L0	260	250	250	410 min.	-	22	0	27
		250L15	260	250	250	410 min.	-	22	-15	27
		300	320	300	280	440 min.	-	22	-	-
		300L0	320	300	280	440 min.	-	22	0	27
		300L15	320	300	280	440 min.	-	22	-15	27
		350	360	340	340	480 min.	-	20	-	-
		350L0	360	340	340	480 min.	-	20	0	27
		350L15	360	340	340	480 min.	-	20	-15	27
	ABS Materials and Welding 2009	A	235		400-550	-	22		+20	-
		B	235		400-520	-	22		0	27
		D	235		400-520	-	22		-20	27
		E ^D	235		400-520	-	22		-40	27
		AH32	315		440-590	-	22		0	31
		DH32	315		440-590	-	22		-20	31
		EH32 ^D	315		440-590	-	22		-40	31
		AH36	355		490-620	-	21		0	34
		DH36	355		490-620	-	21		-20	34
		EH36 ^D	355		490-620	-	21		-40	34
		AH40	390		510-650	-	20		0	39
		DH40	390		510-650	-	20		-20	39
		EH40 ^D	390		510-650	-	20		-40	39
Sheet Pile	JIS A 5528 : 2000	SY295	295		490 min	-	17		-	-
		SY390	390		540 min	-	15		-	-

Remark

- A : Bend test on material grades SS400, SS490, SS540, St33, St37-2, St44-2 and St52-3.
 B : For the H section, when the t1 is 9 mm. or less, the upper limit of the yield point or proof stress shall not be applied.
 C : For the H section, when the t1 is 9 mm. or less, the upper limit of the yield ratio shall be 85%.
 D : Please contact us in advance for these items.
 E : Verified only when specified at the time of order.
 F : For grade 50 steel of thicknesses 20 mm. and less, the tensile strength shall be a minimum of 485 Mpa
 G : Delivery condition type is +AR

PRODUCT SPECIFICATIONS

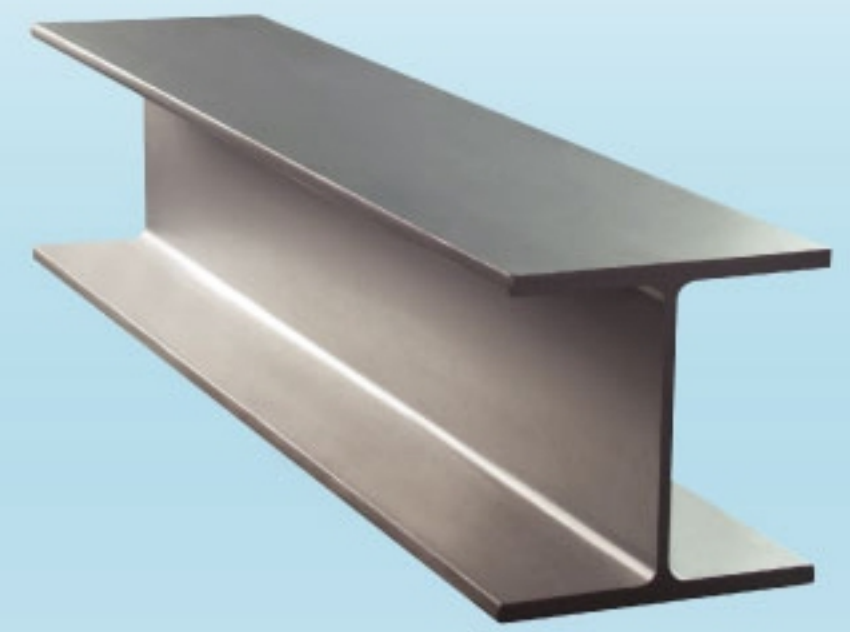
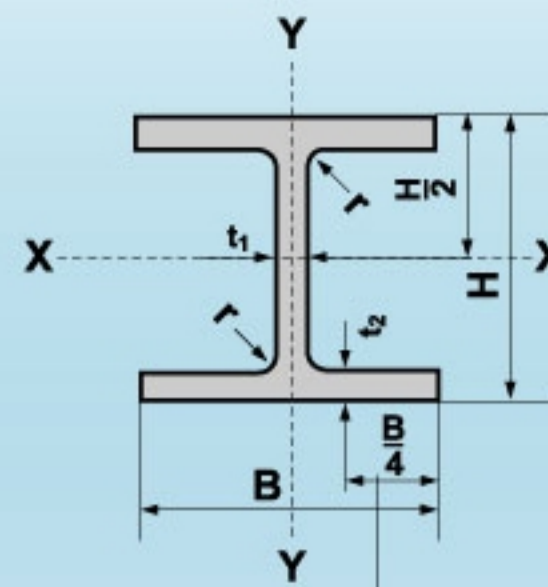
(Structural Steel and Sheet Pile)

SPECIFICATIONS

Type of Product	Classifications	Chemical Compositions (ladle analysis),%															
		C	Si	Mn	P	S	CE ^E	SW ^F	Nb	V	N	Cu	Ni	Cr	Mo	Grain refining element	Micro-alloying element
Structural Steel	BS 7191 :1989	355D ^N	0.18 ^D	0.10 - 0.50	1.50 ^E	0.040	0.040	0.43	-	0.003 - 0.100	0.003 - 0.100	-	-	-	-	-	-
		355EM ^{MNOP}	0.18	0.25 - 0.55	1.60Max.	0.025	0.015	0.43	-	0.04Max.	0.08Max.	0.014	0.35	0.30	0.25	0.08	-
		355EMZ ^{MNOP}	0.18	0.25 - 0.55	1.60Max.	0.025	0.008	0.43	-	0.04Max.	0.08Max.	0.014	0.35	0.30	0.25	0.08	-
	ASTM A36/A36M ^F : 2005	A36	0.26	0.40Max.	-	0.040	0.050	-	-	-	-	-	-	-	-	-	-
	ASTM A992/A992M : 2004a ⁹	A992	0.23	0.40Max.	0.50 - 1.50	0.035	0.045	0.45	-	0.05Max.	0.15Max.	-	0.6	0.45	0.35	0.15	-
	ASTM A572/A572M : 2007 ⁸	A572 Gr.42	0.21	0.40Max.	1.35 ^G	0.040	0.050	-	-	-	-	-	-	-	-	-	-
		A572 Gr.50	0.23	0.40Max.	1.35 ^G	0.040	0.050	-	-	-	-	-	-	-	-	-	-
		A572 Gr.55	0.25	0.40Max.	1.35 ^G	0.040	0.050	-	-	-	-	-	-	-	-	-	-
		A572 Gr.60	0.26	0.40Max.	1.35 ^G	0.040	0.050	-	-	-	-	-	-	-	-	-	-
		A572 GR.65	0.23	0.40Max.	1.65Max.	0.040	0.050	-	-	-	-	-	-	-	-	-	-
	DIN 17100 : 1980	St33	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		St37-2 ^R	0.20	-	-	0.050	0.050	-	-	-	0.009	-	-	-	-	-	-
		St44-2	0.21	-	-	0.050	0.050	-	-	-	0.009	-	-	-	-	-	-
		St50-2	0.30	-	-	0.050	0.050	-	-	-	0.009	-	-	-	-	-	-
		St52-3	0.20	-	-	0.040	0.040	-	-	-	-	-	-	-	-	-	-
	AS/NZS ^H 3679.1 : 2000	250	0.25	0.40Max.	-	0.040	0.040	0.43	-	-	-	-	-	-	-	0.15	-
		250L0	0.20	0.40Max.	1.50Max.	0.040	0.040	0.42	-	-	-	-	-	-	-	0.15	-
		250L15	0.20	0.40Max.	1.50Max.	0.040	0.040	0.42	-	-	-	-	-	-	-	0.15	-
		300	0.25	0.50Max.	1.60Max.	0.040	0.040	0.44	-	-	-	-	-	-	-	0.15	-
		300L0	0.25	0.50Max.	1.60Max.	0.040	0.040	0.44	-	-	-	-	-	-	-	0.15	-
		300L15	0.25	0.50Max.	1.60Max.	0.040	0.040	0.44	-	-	-	-	-	-	-	0.15	-
		350	0.22	0.50Max.	1.60Max.	0.040	0.040	0.45	-	-	-	-	-	-	-	0.15	0.15
		350L0	0.22	0.50Max.	1.60Max.	0.040	0.040	0.45	-	-	-	-	-	-	-	0.15	0.15
		350L15	0.22	0.50Max.	1.60Max.	0.040	0.040	0.45	-	-	-	-	-	-	-	0.15	0.15
		A ^K	0.21	0.50 Max.	2.50C _(mm)	0.035	0.035	-	-	-	-	-	-	-	-	-	-
Sheet Pile	ABS Materials and Welding 2009	B ^K	0.21	0.35Max.	0.80Max.	0.035	0.035	-	-	-	-	-	-	-	-	-	-
		D ^K	0.21	0.10-0.35	0.60Max.	0.035	0.035	-	-	-	-	-	-	-	-	-	-
		E ^K	0.18	0.10-0.35	0.70Max.	0.035	0.035	-	-	-	-	-	-	-	-	-	-
		AH32	0.18	0.10-0.50	0.90-1.60	0.035	0.035	-	-	0.020-0.050	0.050-0.100	-	0.35	0.40	0.20	0.08	0.015
		DH32	0.18	0.10-0.50	0.90-1.60	0.035	0.035	-	-	0.020-0.050	0.050-0.100	-	0.35	0.40	0.20	0.08	0.015
		EH32	0.18	0.10-0.50	0.90-1.60	0.035	0.035	-	-	0.020-0.050	0.050-0.100	-	0.35	0.40	0.20	0.08	0.015
		AH36	0.18	0.10-0.50	0.90-1.60	0.035	0.035	-	-	0.020-0.050	0.050-0.100	-	0.35	0.40	0.20	0.08	0.015
		DH36	0.18	0.10-0.50	0.90-1.60	0.035	0.035	-	-	0.020-0.050	0.050-0.100	-	0.35	0.40	0.20	0.08	0.015
		EH36	0.18	0.10-0.50	0.90-1.60	0.035	0.035	-	-	0.020-0.050	0.050-0.100	-	0.35	0.40	0.20	0.08	0.015
		AH40	0.18	0.10-0.50	0.90-1.60	0.035	0.035	-	-	0.020-0.050	0.050-0.100	-	0.35	0.40	0.20	0.08	0.015
		DH40	0.18	0.10-0.50	0.90-1.60	0.035	0.035	-	-	0.020-0.050	0.050-0.100	-	0.35	0.40	0.20	0.08	0.015
		EH40	0.18	0.10-0.50	0.90-1.60	0.035	0.035	-	-	0.020-0.050	0.050-0.100	-	0.35	0.40	0.20	0.08	0.015
	JIS A 5528 : 2006	SY295	-	-	-	0.040	0.040	-	-	-	-	-	-	-	-	-	-
		SY390	-	-	-	0.040	0.040	-	-	-	-	-	-	-	-	-	-

Remark

- A : It is permissible to vary the carbon and manganese contents (ladle analysis) for grades 50B, 50C, 50D and 50E on the basis of an increase of 0.06% manganese for each decrease of 0.01% carbon vice versa up to maximum manganese content of 1.60% and a maximum carbon content of 0.22% for grades 50B and 50C and 0.20% for grades 50D and 50E.
- B : For grades 50B and 50C over 16 mm. thick, a maximum carbon content of 0.22% for ladle is permitted
- C : For grades 50D and 50E over 16 mm. thick, a maximum carbon content of 0.20% for ladle is permitted
- D : For grades 355D over 16 mm. thick, a maximum carbon content of 0.20% for ladle is permitted
- E : The carbon and manganese contents may be varied (ladle analysis) for grades 355D on the basis of an increase of 0.06% manganese for each decrease of 0.01% a maximum carbon content of 0.20%
- F : %Cu min 0.20 when copper steel is specified
- G : For each reduction of 0.01% point below the specified carbon maximum, an increase of 0.06% point manganese above the specified maximum is permitted, up to a maximum of 1.60%
- H : The following elements may be present to the limits stated, subject to a maximum total of 1.00% Cu max. 0.50%, Ni max. 0.50%, Cr Max 0.30%, Mo Max. 0.10%
- I : Carbon Equivalent : (JIS Version) CE = C+Mn/6+Si/24+Ni/40+Cr/5+Mo/4+V/14 (AS, ASTM, BS Standard) CE = C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15
- J : Chemical composition on sensitivity of welding crack = C+Si/30+Mn/20+Cu/20+Ni/60+Cr/20+Mo/15+V/10+5B
- K : The maximum total of C and Mn/6 is 0.40%
- L : Maximum %CEV 0.51 when t < 19mm.
- M : The maximum total of Cu, Ni, Cr and Mo is 0.80%
- N : The maximum total of Nb and V is 0.10% and the Max. Al(Total) Content is 0.06%
- O : The maximum total of Nb, V and Ti is 0.12%
- P : Maximum of the Aluminium Total content is 0.06%
- Q : The maximum total of Nb and V is 0.15%
- R : The max. carbon content for t < 16 mm. is 0.17%
- S : Niobium content shall be 0.005-0.050% or Vanadium content shall be 0.01-0.15%



W-SHAPES

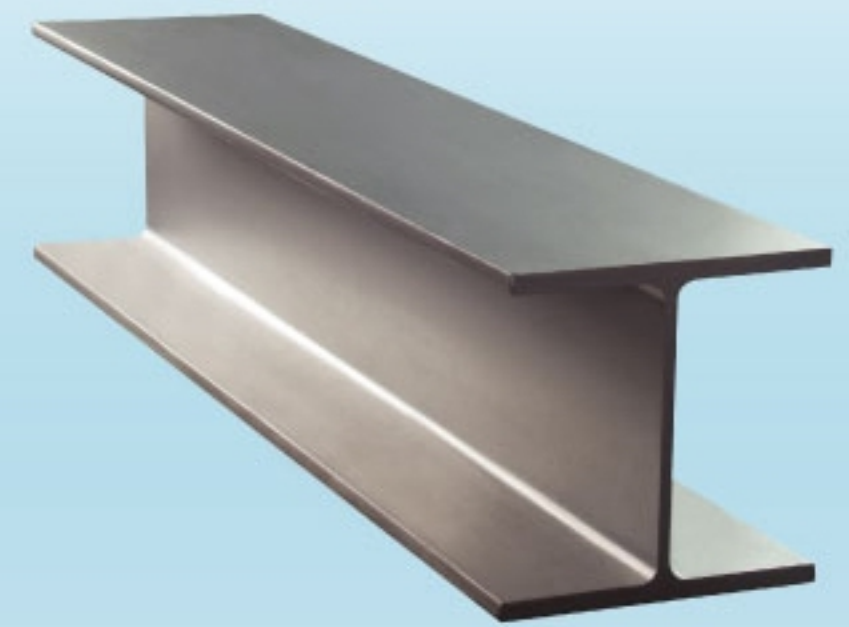
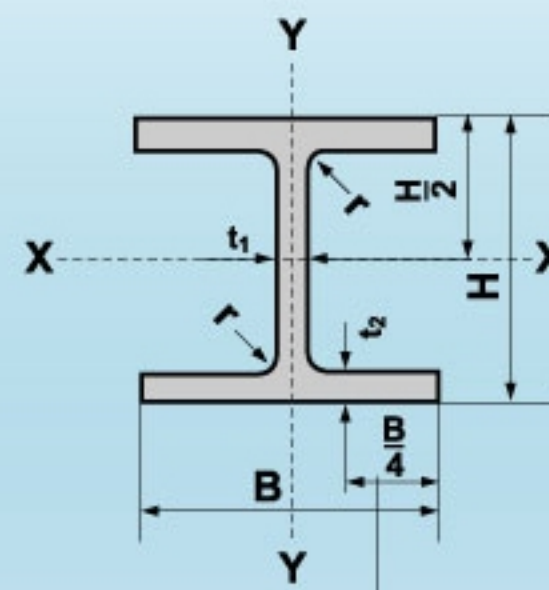
ASTM A 6/A 6M : 2003

ASTM STANDARD

Nominal size	Weight		Sectional Dimension										Sectional Area
			H		B		t ₁		t ₂		r		
	kg/m	lb/ft	mm	in	mm	in	mm	in	mm	in	mm	in	cm ²
W4 (4"x4") (102x102)	19.3	13	106	4.16	103	4.060	7.1	0.280	8.8	0.345	6.4	0.25	24.7
W5 (5"x5") (127x127)	23.8	16	127	5.01	127	5.000	6.1	0.240	9.1	0.360	7.6	0.30	30.4
	28.1	19	131	5.15	128	5.030	6.9	0.270	10.9	0.430	7.6	0.30	35.9
W6 (6"x4") (152x102)	18.0	12	153	6.03	102	4.000	5.8	0.230	7.1	0.280	6.4	0.25	22.9
	24.0	16	160	6.28	102	4.030	6.6	0.260	10.3	0.405	6.4	0.25	30.6
W6 (6"x6") (152x152)	22.5	15	152	5.99	152	5.990	5.8	0.230	6.6	0.260	7.6	0.30	28.6
	29.8	20	157	6.20	153	6.020	6.6	0.260	9.3	0.365	7.6	0.30	37.9
	37.1	25	162	6.38	154	6.080	8.1	0.320	11.6	0.455	7.6	0.30	47.4
W8 (8"x4") (203x102)	19.3	13	203	7.99	102	4.000	5.8	0.230	6.5	0.255	7.6	0.30	24.8
	22.5	15	206	8.11	102	4.015	6.2	0.245	8.0	0.315	7.6	0.30	28.6
W8 (8"x5¼") (203x133)	26.6	18	207	8.14	133	5.250	5.8	0.230	8.4	0.330	7.6	0.30	33.9
	31.3	21	210	8.28	134	5.270	6.4	0.250	10.2	0.400	7.6	0.30	39.7
W8 (8"x8") (203x203)	46.1	31	203	8.00	203	7.995	7.2	0.285	11.0	0.435	10.2	0.40	58.9
	52.0	35	206	8.12	204	8.020	7.9	0.310	12.6	0.495	10.2	0.40	66.5
	59.0	40	210	8.25	205	8.070	9.1	0.360	14.2	0.560	10.2	0.40	75.5
	71.0	48	216	8.50	206	8.110	10.2	0.400	17.4	0.685	10.2	0.40	91.0
	86.0	58	222	8.75	209	8.220	13.0	0.510	20.6	0.810	10.2	0.40	110.0
	100.0	67	229	9.00	210	8.280	14.5	0.570	23.7	0.935	10.2	0.40	127.0
W10 (10"x4") (254x102)	25.3	17	257	10.11	102	4.010	6.1	0.240	8.4	0.330	7.6	0.30	32.2
	28.4	19	260	10.24	102	4.200	6.4	0.250	10.0	0.395	7.6	0.30	36.3
W10 (10"x5¼") (254x146)	32.7	22	258	10.17	146	5.750	6.1	0.240	9.1	0.360	7.6	0.30	41.9
	38.5	26	262	10.33	147	5.770	6.6	0.260	11.2	0.440	7.6	0.30	49.1
	44.8	30	266	10.47	148	5.810	7.6	0.300	13.0	0.510	7.6	0.30	57.0
W10 (10"x10") (254x254)	73.0	49	253	9.98	254	10.000	8.6	0.340	14.2	0.560	12.7	0.50	92.9
	80.0	54	256	10.09	255	10.030	9.4	0.370	15.6	0.615	12.7	0.50	102.0
	89.0	60	260	10.22	256	10.080	10.7	0.420	17.3	0.680	12.7	0.50	114.0
	101.0	68	264	10.40	257	10.130	11.9	0.470	19.6	0.770	12.7	0.50	129.0
	115.0	77	269	10.60	259	10.190	13.5	0.530	22.1	0.870	12.7	0.50	146.0
	131.0	88	275	10.84	261	10.265	15.4	0.605	25.1	0.990	12.7	0.50	167.0
	149.0	100	282	11.10	263	10.340	17.3	0.680	28.4	1.120	12.7	0.50	190.0
	167.0	112	289	11.36	265	10.415	19.2	0.755	31.8	1.250	12.7	0.50	212.0
W12 (12"x4") (305x102)	*21.0	*14	303	11.91	101	3.970	5.1	0.200	5.7	0.225	7.6	0.30	26.8
	23.8	16	305	11.99	101	3.990	5.6	0.220	6.7	0.265	7.6	0.30	30.4
	28.3	19	309	12.16	102	4.005	6.0	0.235	8.9	0.350	7.6	0.30	35.9
	32.7	22	313	12.31	102	4.030	6.6	0.260	10.8	0.425	7.6	0.30	41.8
W12 (12"x6½") (305x165)	38.7	26	310	12.22	165	6.490	5.8	0.230	9.7	0.380	8.9	0.35	49.4
	44.5	30	313	12.34	166	6.520	6.6	0.260	11.2	0.440	8.9	0.35	56.7
	52.0	35	317	12.50	167	6.560	7.6	0.300	13.2	0.520	8.9	0.35	66.5
W12 (12"x8") (305x203)	60.0	40	303	11.94	203	8.005	7.5	0.295	13.1	0.515	15.2	0.60	76.1
	67.0	45	306	12.06	204	8.045	8.5	0.335	14.6	0.575	15.2	0.60	85.2
	74.0	50	310	12.19	205	8.080	9.4	0.375	16.3	0.640	15.2	0.60	94.8
W12 (12"x12") (305x305)	97.0	65	308	12.12	305	12.000	9.9	0.390	15.4	0.605	15.2	0.60	123.0
	107.0	72	311	12.25	306	12.040	10.9	0.430	17.0	0.670	15.2	0.60	136.0
	117.0	79	314	12.38	307	12.080	11.9	0.470	18.7	0.735	15.2	0.60	150.0

Note

- * Please contact us in advance for these items.
- The Hot-rolled sections listed in this table are rolled at specific intervals determined by Siam Yamato Steel.
- Contact us for product availability, rolling frequency and other pertinent information.



W-SHAPES

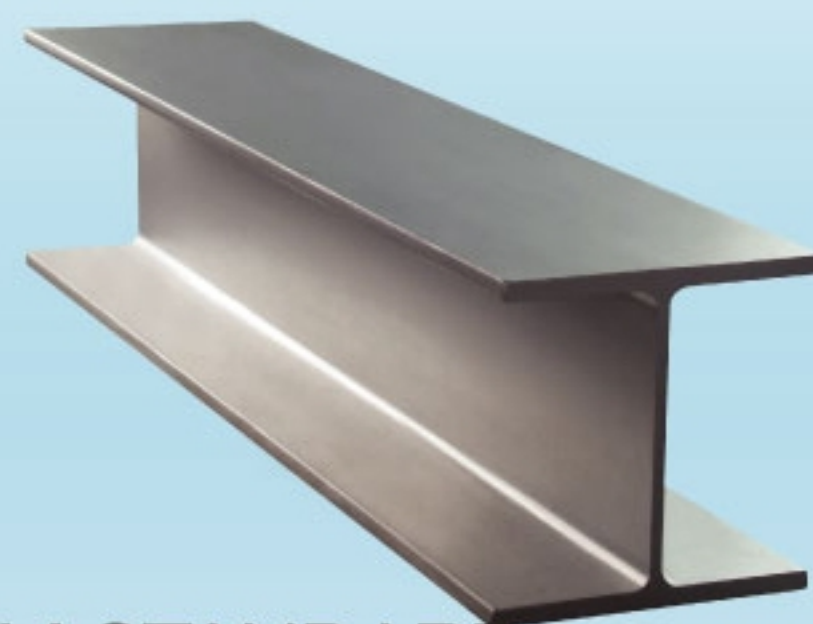
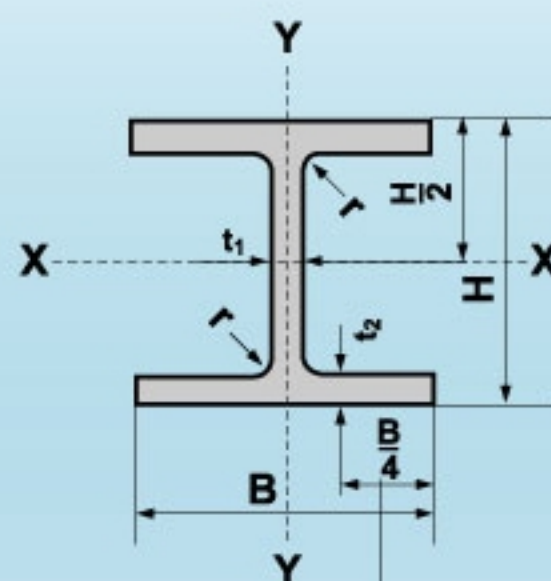
ASTM A 6/A 6M : 2003

ASTM STANDARD

Sectional Area	Moment of inertia				Radius of Gyration				Modulus of Section				Nominal Size
	I_x	I_y	I_x	I_y	I_x	I_y	I_x	I_y	Z_x	Z_y	Z_x	Z_y	
in ²	cm ⁴	in ⁴	cm ⁴	in ⁴	cm	in	cm	in	cm ³	in ³	cm ³	in ³	
3.83	475	11.41	160	3.84	4.39	1.73	2.55	1.00	90	5.47	31	1.90	W4 (4"x4") (102x102)
4.68	883	21.21	312	7.50	5.41	2.13	3.21	1.26	139	8.48	49	3.00	W5 (5"x5") (127x127)
5.54	1,090	26.19	381	9.15	5.53	2.18	3.27	1.29	166	10.13	60	3.63	W6 (6"x4") (152x102)
3.55	919	22.08	126	3.03	6.33	2.49	2.35	0.93	120	7.32	25	1.51	W6 (6"x6") (152x152)
4.74	1,340	32.19	183	4.40	6.62	2.61	2.45	0.96	168	10.25	36	2.19	W6 (6"x6") (152x152)
4.43	1,210	29.07	387	9.30	6.50	2.56	3.68	1.45	159	9.70	51	3.11	W6 (6"x6") (152x152)
5.87	1,710	41.08	554	13.31	6.72	2.65	3.82	1.50	218	13.30	72	4.42	W6 (6"x6") (152x152)
7.34	2,220	53.34	707	16.99	6.85	2.70	3.87	1.52	274	16.72	92	5.60	W6 (6"x6") (152x152)
3.84	1,650	39.64	115	2.76	8.16	3.21	2.15	0.85	163	9.95	23	1.37	W8 (8"x4") (203x102)
4.44	2,000	48.05	142	3.41	8.36	3.29	2.23	0.88	194	11.84	28	1.70	W8 (8"x5 1/4") (203x133)
5.26	2,580	61.98	329	7.90	8.71	2.43	3.11	1.22	249	15.19	50	3.02	W8 (8"x5 1/4") (203x133)
6.16	3,130	75.20	410	9.85	8.87	3.49	3.21	1.26	298	18.19	61	3.73	W8 (8"x5 1/4") (203x133)
9.13	4,550	109.31	1,530	36.76	8.79	3.46	5.10	2.01	448	27.34	151	9.21	W8 (8"x8") (203x203)
10.30	5,270	126.61	1,780	42.76	8.91	3.51	5.18	2.04	512	31.24	175	10.68	W8 (8"x8") (203x203)
11.70	6,120	147.03	2,040	49.01	8.99	3.54	5.19	2.04	583	35.58	199	12.14	W8 (8"x8") (203x203)
14.10	7,660	184.03	2,540	61.02	9.17	3.61	5.28	2.08	709	43.27	247	15.07	W8 (8"x8") (203x203)
17.10	9,470	227.52	3,140	75.44	9.28	3.65	5.34	2.10	853	52.05	300	18.31	W8 (8"x8") (203x203)
19.70	11,300	271.48	3,660	87.93	9.43	3.71	5.37	2.11	987	60.23	349	21.30	W8 (8"x8") (203x203)
4.99	3,420	82.17	149	3.58	10.30	4.06	2.15	0.85	266	16.23	29	1.78	W10 (10"x4") (254x102)
5.62	3,990	95.86	178	4.28	10.50	4.13	2.22	0.87	307	18.73	35	2.13	W10 (10"x5 1/4") (254x146)
6.49	4,910	117.96	475	11.41	10.80	4.25	3.37	1.33	381	23.25	65	3.97	W10 (10"x5 1/4") (254x146)
7.61	6,010	144.39	594	14.27	11.10	4.37	3.48	1.37	459	28.01	81	4.93	W10 (10"x5 1/4") (254x146)
8.84	7,110	170.82	703	16.89	11.20	4.41	3.51	1.38	535	32.65	95	5.80	W10 (10"x5 1/4") (254x146)
14.40	11,300	271.48	3,880	93.22	11.00	4.33	6.46	2.54	893	54.49	306	18.67	W10 (10"x10") (254x254)
15.80	12,600	302.72	4,310	103.55	11.10	4.37	6.50	2.56	984	60.05	338	20.63	W10 (10"x10") (254x254)
17.60	14,300	343.56	4,840	116.28	11.20	4.41	6.52	2.57	1,100	67.13	378	23.07	W10 (10"x10") (254x254)
20.00	16,400	394.01	5,550	133.34	11.30	4.45	6.56	2.58	1,240	75.67	432	26.36	W10 (10"x10") (254x254)
22.60	18,900	454.07	6,410	154.00	11.40	4.49	6.63	2.61	1,410	86.04	495	30.21	W10 (10"x10") (254x254)
25.90	22,100	530.95	7,450	178.99	11.50	4.53	6.68	2.63	1,610	98.25	571	34.84	W10 (10"x10") (254x254)
29.40	25,900	622.25	8,620	207.10	11.70	4.61	6.74	2.65	1,840	112.28	656	40.03	W10 (10"x10") (254x254)
32.90	30,000	720.75	9,880	237.37	11.90	4.69	6.81	2.68	2,080	126.93	746	45.52	W10 (10"x10") (254x254)
4.16	3,690	88.60	98	2.36	11.70	4.62	1.91	0.75	244	14.90	20	1.19	W12 (12"x4") (305x102)
4.71	4,290	103.00	117	2.82	11.90	4.67	1.96	0.77	280	17.10	23	1.41	W12 (12"x4") (305x102)
5.57	5,410	130.00	157	3.73	12.20	4.82	2.09	0.82	349	21.30	31	1.88	W12 (12"x4") (305x102)
6.48	6,490	156.00	194	4.66	12.50	4.91	2.15	0.85	416	25.40	38	2.31	W12 (12"x4") (305x102)
7.65	8,480	203.73	723	17.37	13.10	0.52	3.83	1.51	547	33.38	88	5.35	W12 (12"x6 1/2") (305x165)
8.79	9,920	238.33	588	14.13	13.20	0.52	3.88	1.53	634	38.69	103	6.29	W12 (12"x6 1/2") (305x165)
10.30	11,900	285.90	1,030	24.75	13.40	0.53	3.93	1.55	748	45.65	123	7.51	W12 (12"x6 1/2") (305x165)
11.80	12,900	309.92	1,830	43.97	13.00	5.12	4.91	1.93	851	51.93	180	10.98	W12 (12"x8") (305x203)
13.20	14,500	348.36	2,070	49.73	13.00	5.12	4.93	1.94	948	57.85	203	12.39	W12 (12"x8") (305x203)
14.70	16,500	396.41	2,340	56.22	13.20	5.20	4.97	1.96	1,060	64.69	228	13.91	W12 (12"x8") (305x203)
19.10	22,200	533.36	7,290	175.14	13.40	5.28	7.70	3.03	1,440	87.87	478	29.17	W12 (12"x12") (305x305)
21.10	24,800	595.82	8,120	195.08	13.50	5.31	7.73	3.04	1,590	97.03	531	32.40	W12 (12"x12") (305x305)
23.20	27,500	660.69	9,020	216.71	13.50	5.31	7.75	3.05	1,750	106.79	588	35.88	W12 (12"x12") (305x305)

Note

- * Please contact us in advance for these items.
- The Hot-rolled sections listed in this table are rolled at specific intervals determined by Siam Yamato Steel.
- Contact us for product availability, rolling frequency and other pertinent information.



W-SHAPES

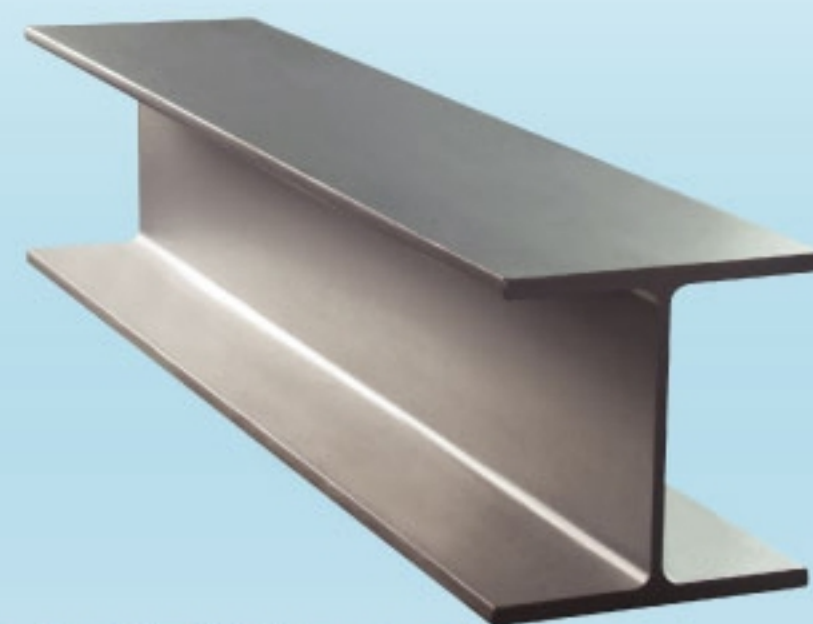
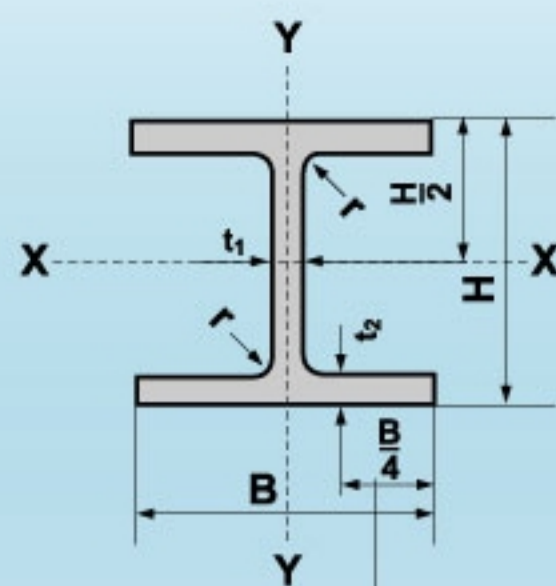
ASTM A 6/A 6M : 2003

ASTM STANDARD

Nominal size	Weight		Sectional Dimension										Sectional Area
			H		B		t ₁		t ₂		r		
	kg/m	lb/ft	mm	in	mm	in	mm	in	mm	in	mm	in	cm ²
W12 (12"x12") (305x305)	129.0	87	318	12.53	308	12.125	13.1	0.515	20.6	0.810	15.2	0.60	165.0
	143.0	96	323	12.71	309	12.160	14.0	0.550	22.9	0.900	15.2	0.60	182.0
	158.0	106	327	12.89	310	12.220	15.5	0.610	25.1	0.990	15.2	0.60	201.0
	179.0	120	333	13.12	313	12.320	18.0	0.710	28.1	1.105	15.2	0.60	228.0
	202.0	136	341	13.41	315	12.400	20.1	0.790	31.8	1.250	15.2	0.60	257.0
	226.0	152	348	13.71	317	12.480	22.1	0.870	35.6	1.400	15.2	0.60	289.0
	253.0	170	356	14.03	319	12.480	24.4	0.960	39.6	1.560	15.2	0.60	323.0
	283.0	190	365	14.03	322	12.570	26.9	1.060	44.1	1.735	15.2	0.60	360.0
W14 (14"x5") (356x127)	32.9	22	349	13.74	127	5.000	5.8	0.230	8.5	0.335	10.2	0.40	41.9
	39.0	26	353	13.91	128	5.025	6.5	0.255	10.7	0.420	10.2	0.40	49.6
W14 (14"x6¾") (356x171)	44.0	30	352	13.84	171	6.730	6.9	0.270	9.8	0.385	10.2	0.40	57.1
	51.0	34	355	13.98	171	6.745	7.2	0.285	11.6	0.455	10.2	0.40	64.5
	57.8	38	358	14.10	172	6.770	7.9	0.310	13.1	0.515	10.2	0.40	72.3
W14 (14"x10") (356x254)	91.0	61	353	13.89	254	9.995	9.5	0.375	16.4	0.645	15.2	0.60	115.0
	101.0	68	357	14.04	255	10.035	10.5	0.415	18.3	0.720	15.2	0.60	129.0
	110.0	74	360	14.17	256	10.070	11.4	0.450	19.9	0.785	15.2	0.60	141.0
	122.0	82	363	14.31	257	10.130	13.0	0.510	21.7	0.855	15.2	0.60	155.0
W14 (14"x14½") (356x368)	134.0	90	356	14.02	369	14.520	11.2	0.440	18.0	0.710	15.2	0.60	171.0
	147.0	99	360	14.16	370	14.565	12.3	0.485	19.8	0.780	15.2	0.60	188.0
	162.0	109	364	14.32	371	14.605	13.3	0.525	21.8	0.860	15.2	0.60	206.0
	179.0	120	368	14.48	373	14.670	15.0	0.590	23.9	0.940	15.2	0.60	228.0
	196.0	132	372	14.66	374	14.725	16.4	0.645	26.2	1.030	15.2	0.60	250.0
● W14 (14"x16") (356x406)	216.0	145	375	14.80	394	15.500	17.3	0.680	27.7	1.09	15.2	0.60	275.5
	237.0	159	381	15.00	395	15.570	18.9	0.750	30.2	1.19	15.2	0.60	301.3
W16 (16"x5½") (406x140)	38.8	26	399	15.69	140	5.500	6.4	0.250	8.8	0.345	10.2	0.40	49.5
	46.1	31	403	15.88	140	5.525	7.0	0.275	11.2	0.440	10.2	0.40	58.8
W16 (16"x7") (406x178)	53.0	36	403	15.86	177	6.985	7.5	0.295	10.9	0.430	10.2	0.40	68.4
	60.0	40	407	16.01	178	6.995	7.7	0.305	12.8	0.505	10.2	0.40	76.1
	67.0	45	410	16.13	179	7.035	8.8	0.345	14.4	0.565	10.2	0.40	85.8
	75.0	50	413	16.26	180	7.070	9.7	0.380	16.0	0.630	10.2	0.40	94.8
	85.0	57	417	16.43	181	7.120	10.9	0.430	18.2	0.715	10.2	0.40	108.0
W18 (18"x6") (457x152)	52.0	35	450	17.70	152	6.000	7.6	0.300	10.8	0.425	10.2	0.40	66.5
	60.0	40	455	17.90	153	6.015	8.0	0.315	13.3	0.525	10.2	0.40	76.1
	68.0	46	459	18.06	154	6.060	9.1	0.360	15.4	0.605	10.2	0.40	87.1
W18 (18"x7½") (457x191)	74.0	50	457	17.99	190	7.495	9.0	0.355	14.5	0.570	10.2	0.40	94.8
	82.0	55	460	18.11	191	7.530	9.9	0.390	16.0	0.630	10.2	0.40	105.0
	89.0	60	463	18.24	192	7.555	10.5	0.415	17.7	0.695	10.2	0.40	114.0
	97.0	65	466	18.35	193	7.590	11.4	0.450	19.0	0.750	10.2	0.40	123.0
	106.0	71	469	18.47	194	7.635	12.6	0.495	20.6	0.810	10.2	0.40	134.0
W21 (21"x6½") (533x165)	66.0	44	525	20.66	165	6.500	8.9	0.350	11.4	0.450	12.7	0.50	83.9
	74.0	50	529	20.83	166	6.530	9.7	0.380	13.6	0.535	12.7	0.50	94.8
	85.0	57	535	21.06	166	6.555	10.3	0.405	16.5	0.650	12.7	0.50	108.0
W21 (21"x8¼") (533x210)	92.0	62	533	20.99	209	8.240	10.2	0.400	15.6	0.615	12.7	0.50	118.0
	101.0	68	537	21.13	210	8.270	10.9	0.430	17.4	0.685	12.7	0.50	129.0
	109.0	73	539	21.24	211	8.295	11.6	0.455	18.8	0.740	12.7	0.50	139.0
	123.0	83	544	21.43	212	8.355	13.1	0.515	21.2	0.835	12.7	0.50	157.0
	138.0	93	549	21.62	214	8.420	14.7	0.580	23.6	0.930	12.7	0.50	176.0

Note

- The Hot-rolled sections listed in this table are rolled at specific intervals determined by Siam Yamato Steel.
- Contact us for product availability, rolling frequency and other pertinent information.
- Please seek for our reconfirmation.



W-SHAPES

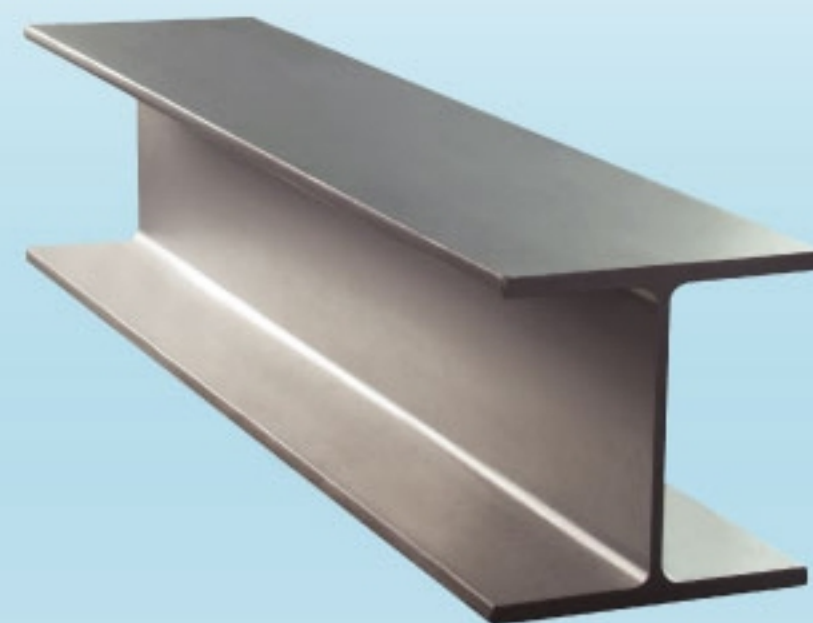
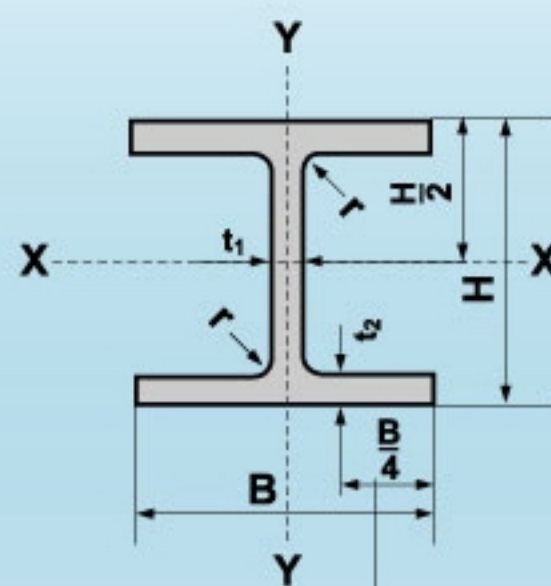
ASTM A 6/A 6M : 2003

ASTM STANDARD

Sectional Area	Moment of Inertia				Radius of Gyration				Modulus of Section				Nominal Size
	I_x	I_y	I_x	I_y	I_x	I_y	I_x	I_y	Z_x	Z_y	Z_x	Z_y	
in ²	cm ⁴	in ⁴	cm ⁴	in ⁴	cm	in	cm	in	cm ³	in ³	cm ³	in ³	
25.60	30,800	739.97	10,000	240.25	13.70	5.39	7.78	3.06	1,940	118.39	649	39.60	W12 (12"x12") (305x305)
28.20	34,800	836.07	11,300	271.48	13.80	5.43	7.88	3.10	2,150	131.20	731	44.61	
31.20	38,600	927.37	12,500	300.31	13.90	5.47	7.89	3.11	2,360	144.02	806	49.19	
35.30	44,500	1,690.12	14,400	345.96	14.00	5.51	7.95	3.13	2,670	162.93	920	56.14	
39.90	52,000	1,249.30	16,600	398.82	14.20	5.59	8.02	3.16	3,050	186.12	1,050	64.07	
44.70	59,600	1,431.90	18,900	454.07	14.40	5.67	8.09	3.19	3,430	209.31	1,190	72.62	
50.00	68,200	1,638.51	21,500	516.54	14.50	5.71	8.16	3.21	3,830	233.72	1,350	82.38	
55.80	78,700	1,890.78	24,600	591.02	14.80	5.83	8.27	3.26	4,310	263.01	1,530	93.37	W14 (14"x5") (356x127)
6.49	8,290	199.17	291	6.99	14.10	5.55	2.64	1.04	475	28.99	46	2.81	
7.69	10,200	245.06	375	9.01	14.30	5.63	2.75	1.08	578	35.27	59	3.58	W14 (14"x6 3/4") (356x171)
8.85	12,100	290.70	816	19.60	14.60	5.75	3.78	1.49	688	41.98	95	5.77	
10.00	14,100	338.75	968	23.26	14.80	5.83	3.87	1.52	794	48.45	113	6.90	W14 (14"x10") (356x254)
11.20	16,000	384.40	1,110	26.67	14.90	5.87	3.93	1.55	894	54.56	129	7.87	
17.90	26,700	641.47	4,480	107.63	15.20	5.98	6.21	2.44	1,510	92.15	353	21.54	W14 (14"x14 1/2") (356x368)
20.00	30,200	725.56	5,060	121.57	15.30	6.02	6.26	2.46	1,690	103.13	397	24.23	
21.80	33,100	795.23	5,570	133.82	15.30	6.02	6.29	2.48	1,840	112.28	435	26.55	W14 (14"x16") (356x406)
24.10	36,500	876.92	6,150	147.75	15.30	6.02	6.30	2.48	2,010	122.66	479	29.23	
26.50	41,500	997.04	15,100	362.78	15.60	6.14	9.40	3.70	2,330	142.19	818	49.92	W16 (16"x5 1/2") (406x140)
29.10	46,300	1,112.36	16,700	401.22	15.70	6.18	9.42	3.71	2,570	156.83	903	55.10	
32.00	51,600	1,239.69	18,600	446.87	15.80	6.22	9.48	3.73	2,840	173.31	1,000	61.02	W16 (16"x7") (406x178)
35.30	57,500	1,381.44	20,700	497.32	15.90	6.26	9.53	3.75	3,130	191.00	1,110	67.74	
38.80	63,600	1,528.00	22,900	550.17	15.90	6.26	9.57	3.77	3,420	208.70	1,220	74.45	W18 (18"x6") (457x152)
42.70	71,200	1,710	28,200	677.00	16.10	6.33	10.1	3.98	3,800	232	1,430	87.30	
46.70	79,100	1,900	31,100	748.00	16.20	6.38	10.2	4.00	4,160	254	1,580	96.20	W18 (18"x7 1/2") (457x191)
7.68	12,600	302.72	402	9.66	15.90	6.26	2.85	1.12	632	38.57	57.4	3.50	
9.12	15,600	374.79	514	12.35	16.30	6.42	2.95	1.16	774	47.23	73	4.48	W21 (21"x6 1/2") (533x165)
10.60	18,600	446.87	1,010	24.27	16.50	6.50	3.85	1.52	923	56.32	114	6.96	
11.80	21,600	518.94	1,200	28.83	16.90	6.65	3.97	1.56	1,060	64.69	135	8.24	W21 (21"x8 1/4") (533x210)
13.30	24,500	588.61	1,380	33.15	16.90	6.65	4.02	1.58	1,200	73.23	154	9.40	
14.70	27,500	660.69	1,560	37.48	17.00	6.69	4.05	1.59	1,330	81.16	173	10.56	W21 (21"x8 1/4") (533x210)
16.80	31,500	756.79	1,800	43.25	17.10	6.73	4.08	1.61	1,510	92.15	199	12.14	
10.30	21,200	509.33	634	15.23	17.90	7.05	3.09	1.22	942	57.48	83	5.09	W21 (21"x8 1/4") (533x210)
11.80	25,500	612.64	796	19.12	18.30	7.20	3.24	1.28	1,120	68.35	104	6.35	
13.50	29,700	713.55	941	22.61	18.40	7.24	3.28	1.29	1,290	78.72	122	7.44	W21 (21"x8 1/4") (533x210)
14.70	33,300	800.04	1,660	39.88	18.80	7.40	4.19	1.65	1,460	89.09	175	10.68	
16.20	37,000	888.93	1,860	44.69	18.90	7.44	4.23	1.67	1,610	98.25	195	11.90	W21 (21"x8 1/4") (533x210)
17.60	41,000	985.03	2,090	50.21	19.00	7.48	4.28	1.69	1,770	108.01	218	13.30	
19.10	44,500	1,069.12	2,280	54.78	19.00	7.48	4.31	1.70	1,910	116.56	236	14.40	W21 (21"x8 1/4") (533x210)
20.80	48,800	1,172.42	2,510	60.30	19.10	7.52	4.33	1.70	2,080	126.93	259	15.81	
13.00	35,000	840.88	857	20.59	20.40	8.03	3.20	1.26	1,330	81.16	104	6.35	W21 (21"x8 1/4") (533x210)
14.70	41,000	985.03	1,040	24.99	20.80	8.19	3.31	1.30	1,550	94.59	125	7.63	
16.70	48,500	1,165.22	1,260	30.27	21.20	8.35	3.42	1.35	1,810	110.45	152	9.28	W21 (21"x8 1/4") (533x210)
18.30	55,200	1,326.19	2,380	57.18	21.60	8.50	4.49	1.77	2,070	126.32	228	13.91	
20.00	61,700	1,482.35	2,690	64.63	21.90	8.62	4.57	1.80	2,300	140.35	256	15.62	W21 (21"x8 1/4") (533x210)
21.50	66,700	1,602.47	2,950	70.87	21.90	8.62	4.61	1.81	2,470	150.73	280	17.09	
24.30	76,100	1,828.31	3,380	81.20	22.00	8.66	4.64	1.83	2,800	170.87	319	19.47	W21 (21"x8 1/4") (533x210)
27.30	86,100	2,068.56	3,870	92.98	22.10	8.70	4.69	1.85	3,140	191.61	362	22.09	

Note

- The Hot-rolled sections listed in this table are rolled at specific intervals determined by Siam Yamato Steel.
- Contact us for product availability, rolling frequency and other pertinent information.
- Please seek for our reconfirmation.



W-SHAPES

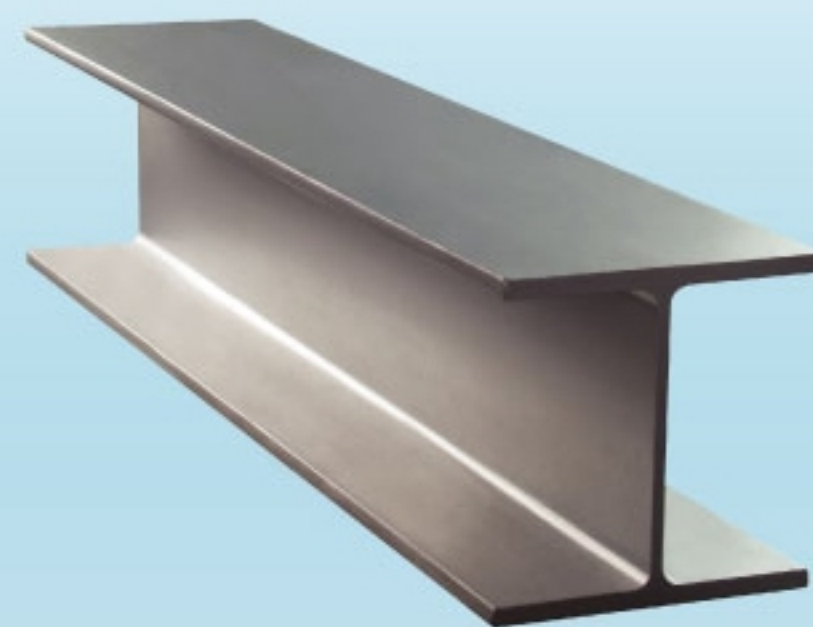
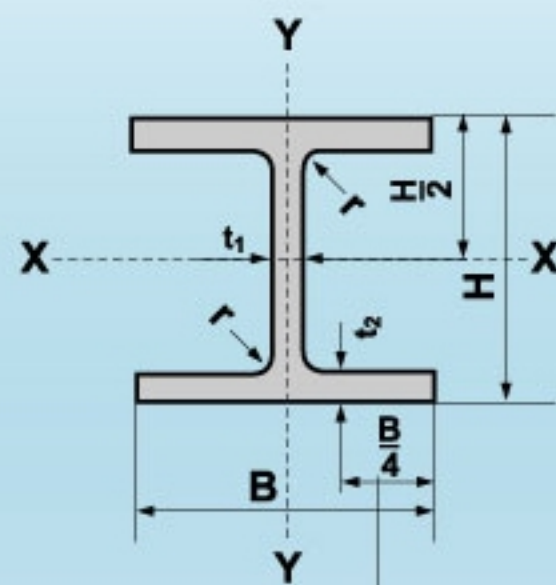
ASTM A 6/A 6M : 2003

ASTM STANDARD

Nominal size	Weight		Sectional Dimension										Sectional Area
			H		B		t ₁		t ₂		r		
	kg/m	lb/ft	mm	in	mm	in	mm	in	mm	in	mm	in	cm ²
W24 (24"x7") (610x178)	82.0	55	599	23.57	178	7.005	10.0	0.395	12.8	0.505	12.7	0.50	105.0
	92.0	62	603	23.74	179	7.040	10.9	0.430	15.0	0.590	12.7	0.50	117.0
W24 (24"x9") (610x229)	101.0	68	603	23.73	228	8.965	10.5	0.415	14.9	0.585	12.7	0.50	130.0
	113.0	76	608	23.92	228	8.990	11.2	0.440	17.3	0.680	12.7	0.50	145.0
	125.0	84	612	24.10	229	9.020	11.9	0.470	19.6	0.770	12.7	0.50	159.0
	140.0	94	617	24.31	230	9.065	13.1	0.515	22.2	0.875	12.7	0.50	179.0
	153.0	103	623	24.53	229	9.000	14.0	0.550	24.9	0.980	12.7	0.50	196.0
W24 (24"x12¾") (610x324)	155.0	104	611	24.06	324	12.750	12.7	0.500	19.0	0.750	12.7	0.50	197.0
	174.0	117	616	24.26	325	12.800	14.0	0.550	21.6	0.850	12.7	0.50	222.0
	195.0	131	622	24.48	327	12.855	15.4	0.605	24.4	0.960	12.7	0.50	248.0
	217.0	146	628	24.74	328	12.900	16.5	0.650	27.7	1.090	12.7	0.50	277.0
	241.0	162	635	25.00	329	12.955	17.1	0.705	31.0	1.220	12.7	0.50	308.0
W27 (27"x10") (686x254)	125.0	84	678	26.71	253	9.960	11.7	0.460	16.3	0.640	15.2	0.60	160.0
	140.0	94	684	26.92	254	9.990	12.4	0.490	18.9	0.745	15.2	0.60	179.0
	152.0	102	688	27.09	254	10.015	13.1	0.515	21.1	0.830	15.2	0.60	194.0
	170.0	114	693	27.29	256	10.070	14.5	0.570	23.6	0.930	15.2	0.60	216.0
	192.0	129	702	27.63	254	10.010	15.5	0.610	27.9	1.100	15.2	0.60	244.0
W30 (30"x10½") (762x267)	134.0	90	750	26.40	264	10.400	11.9	0.470	15.5	0.610	16.5	0.65	170.4
	147.0	99	753	29.10	265	10.450	13.2	0.520	17.0	0.670	16.5	0.65	188.0
	161.0	108	758	31.70	266	10.475	13.8	0.545	19.3	0.760	16.5	0.65	205.0
	173.0	116	762	34.20	267	10.495	14.4	0.565	21.6	0.850	16.5	0.65	221.0
	185.0	124	766	36.50	267	10.515	14.9	0.585	23.6	0.930	16.5	0.65	235.0
	196.0	132	770	38.90	268	10.545	15.6	0.615	25.4	1.000	16.5	0.65	251.0
W33 (33"x11½") (838x292)	220.0	148	779	30.67	266	10.480	16.5	0.650	30.0	1.180	16.5	0.65	281.0
	176.0	118	835	32.86	292	11.480	14.0	0.550	18.8	0.740	17.8	0.70	224.0
	193.0	130	840	33.09	292	11.510	14.7	0.580	21.7	0.855	17.8	0.70	247.0
	210.0	141	846	33.30	293	11.535	15.4	0.605	24.4	0.960	17.8	0.70	268.0
	226.0	152	851	33.49	294	11.565	16.1	0.635	26.8	1.050	17.8	0.70	289.0
	251.0	169	859	33.82	292	11.500	17.0	0.670	31.0	1.220	17.8	0.70	319.0

Note

- The Hot-rolled sections listed in this table are rolled at specific intervals determined by Siam Yamato Steel.
- Contact us for product availability, rolling frequency and other pertinent information.



W-SHAPES

ASTM A 6/A 6M : 2003

ASTM STANDARD

Sectional Area	Moment of Inertia				Radius of Gyration				Modulus of Section				Nominal Size
	I_x	I_y	I_x	I_y	I_x	I_y	I_x	I_y	Z_x	Z_y	Z_x	Z_y	
in ²	cm ⁴	in ⁴	cm ⁴	in ⁴	cm	in	cm	in	cm ³	in ³	cm ³	in ³	
16.20	56,000	1,345.41	1,210	29.07	23.10	9.09	3.39	1.33	1,870	114.11	136	8.30	W24 (24"x7") (610x178)
18.20	64,600	1,552.02	1,440	34.60	23.40	9.21	3.49	1.37	2,140	130.59	161	9.82	
20.10	76,400	1,835.52	2,950	70.87	24.30	9.57	4.78	1.88	2,530	154.39	259	15.81	W24 (24"x9") (610x229)
22.40	87,500	2,102.20	3,430	82.41	24.70	9.72	4.88	1.92	2,880	175.75	301	18.37	
24.70	98,500	2,366.47	3,930	94.42	24.90	9.80	4.97	1.96	3,220	196.50	343	20.93	
27.70	112,000	2,690.81	4,510	108.35	25.00	9.84	5.02	1.98	3,630	221.52	392	23.92	
30.30	125,000	3,003.14	5,000	120.13	25.30	9.96	5.06	1.99	4,010	244.71	437	26.67	W24 (24"x12¾") (610x324)
30.60	129,000	3,099.24	10,800	259.47	25.50	10.04	7.39	2.91	4,220	257.52	667	40.70	
34.40	147,000	3,531.69	12,400	297.91	25.70	10.12	7.47	2.94	4,770	291.08	763	46.56	
38.50	168,000	4,036.22	14,200	341.16	26.00	10.24	7.55	2.97	5,400	329.53	869	53.03	
43.30	191,000	4,588.79	16,300	391.61	26.30	10.35	7.67	3.02	6,080	371.02	994	60.66	
47.70	215,000	5,165.40	18,400	442.06	26.40	10.39	7.73	3.04	6,770	413.13	1,120	68.35	W27 (27"x10") (686x254)
20.10	119,000	2,858.99	4,410	105.95	27.30	10.75	5.25	2.07	3,510	214.19	349	21.30	
22.40	136,000	3,267.41	5,170	124.21	27.60	10.87	5.39	2.12	3,980	242.87	407	24.84	
24.70	151,000	3,627.79	5,780	138.87	27.90	10.98	5.46	2.15	4,390	267.89	455	27.77	
27.70	170,000	4,084.27	6,620	159.05	28.10	11.06	5.54	2.18	4,910	299.63	517	31.55	W30 (30"x10½") (762x267)
30.30	198,000	4,756.97	7,640	183.55	28.50	11.22	5.60	2.20	5,640	344.17	602	36.74	
20.10	150,000	3,603.76	4,770	114.60	29.70	11.69	5.30	2.09	4,000	244.09	361	22.03	
22.40	166,000	3,988.17	5,290	127.09	29.70	11.69	5.30	2.09	4,410	269.11	399	24.35	
24.70	186,000	4,468.67	6,070	145.83	30.10	11.85	5.44	2.14	4,910	299.63	456	27.83	
24.70	206,000	4,949.17	6,870	165.05	30.50	12.01	5.58	2.20	5,410	330.14	515	31.43	
24.70	223,000	5,357.60	7,510	180.43	30.80	12.13	5.65	2.22	5,820	355.16	563	34.36	
30.30	240,000	5,766.02	8,170	196.29	30.90	12.17	5.71	2.25	6,230	380.18	610	37.22	W33 (33"x11½") (838x292)
43.60	278,000	6,678.98	9,440	226.80	31.50	12.40	5.80	2.28	7,140	435.71	710	43.33	
34.70	246,000	5,910.17	7,820	187.88	33.10	13.03	5.91	2.33	5,890	359.43	536	32.71	
38.30	278,000	6,678.98	9,030	216.95	33.50	13.19	6.05	2.38	6,620	403.98	618	37.71	
41.60	311,000	7,471.80	10,300	247.46	34.10	13.43	6.20	2.44	7,350	448.52	703	42.90	
44.70	340,000	8,168.53	11,400	273.89	34.30	13.50	6.28	2.47	7,990	487.58	776	47.35	W33 (33"x11½") (838x292)
49.40	386,000	9,273.69	12,900	309.92	34.80	13.70	6.36	2.50	8,990	548.60	884	53.94	

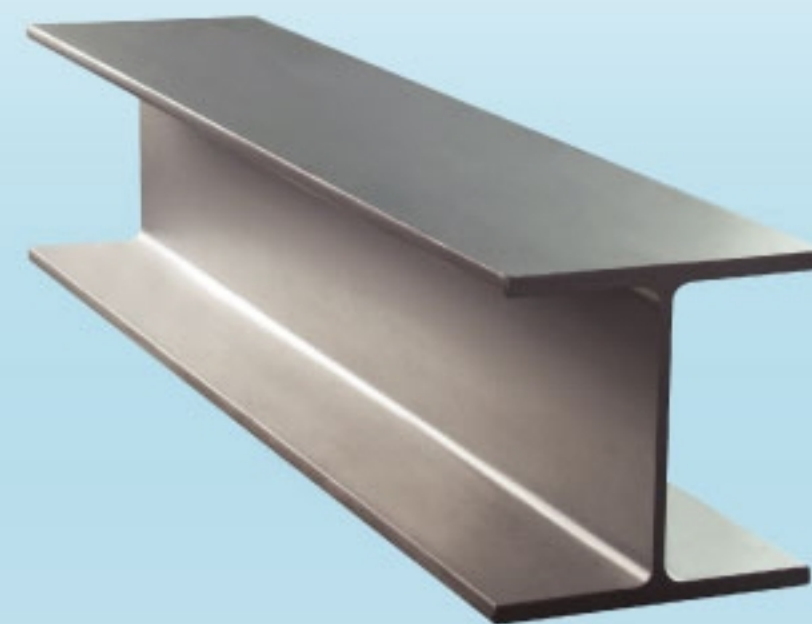
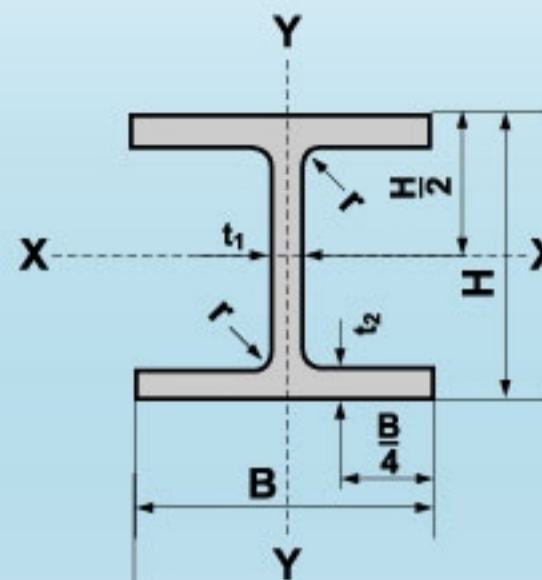
Note

- The Hot-rolled sections listed in this table are rolled at specific intervals determined by Siam Yamato Steel.
- Contact us for product availability, rolling frequency and other pertinent information.

H-PILES

ASTM A 6/A 6M : 2003

ASTM STANDARD



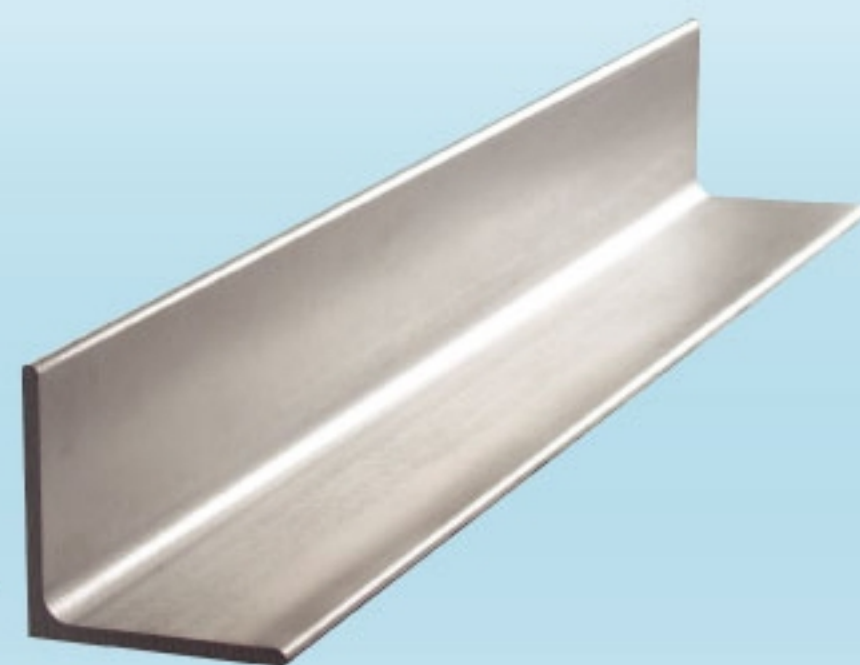
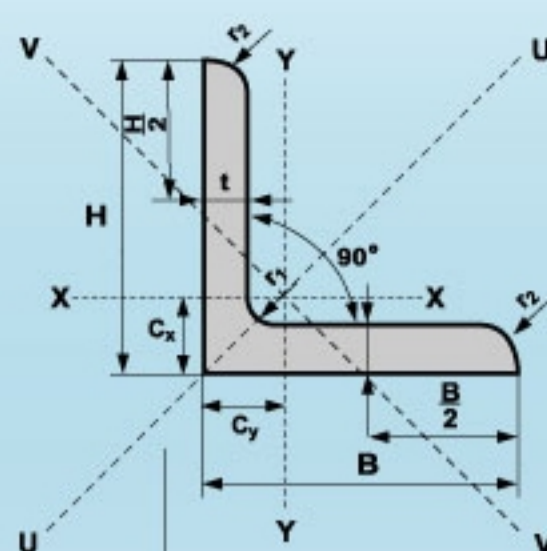
Nominal Size		Weight		Sectional Dimension							Sectional Area		
				H		B		t ₁		t ₂			
mmxmmxkg/m	kg/m	lb/ft	mm	in	mm	in	mm	in	mm	in	cm ²	in ²	
HP8 (8"x8")	53	36	204	8.02	207	8.155	11.3	0.445	11.3	0.445	68.4	10.6	
HP10(10"x10")	62	42	246	9.70	256	10.075	10.5	0.415	10.7	0.420	80.0	12.4	
	85	57	254	9.99	260	10.225	14.4	0.565	14.4	0.565	108.0	16.8	
HP12 (12"x12")	79	53	299	11.78	306	12.045	11.0	0.435	11.0	0.435	100.0	15.5	
	93	63	303	11.94	308	12.125	13.1	0.515	13.1	0.515	119.0	18.4	
	110	74	308	12.13	310	12.215	15.4	0.605	15.5	0.610	141.0	21.8	
	125	84	312	12.28	312	12.295	17.4	0.685	17.4	0.685	159.0	24.6	
HP14(14"x14-1/2")	108	73	346	13.61	370	14.585	12.8	0.505	12.8	0.505	138.0	21.4	
	132	89	351	13.83	373	14.695	15.6	0.615	15.6	0.615	168.0	26.1	
	152	102	356	14.01	376	14.785	17.9	0.705	17.9	0.705	194.0	30.0	
	174	117	361	14.21	378	14.885	20.4	0.805	20.4	0.805	222.0	34.4	

- Note**
- The Hot-rolled sections listed in this table are rolled at specific intervals determined by Siam Yamato Steel.
 - Contact us for product availability, rolling frequency and other pertinent information.

ANGLES

ASTM A 6/A 6M : 2003

ASTM STANDARD



Standard Sectional Dimension			Sectional Area	Weight	Moment of Inertia (cm ⁴)				Radius of Gyration (cm)				Modulus of Section (cm ³)		Distance of center of gravity (cm)	
HxB	t				I _x	I _y	I _u	I _v	i _x	i _y	i _u	i _v	Z _x	Z _y	C _x	C _y
	mm	in	(cm ²)	(kg/m)												
● L4(4"x4") (102x102)	6.4	0.250	12.50	9.8	126	126	201	51	3.17	3.17	4.00	2.02	17.02	17.02	2.76	2.76
	7.9	0.313	15.50	12.2	154	154	246	63	3.15	3.15	3.98	2.01	20.99	20.99	2.82	2.82
	9.5	0.375	18.50	14.6	180	180	286	74	3.12	3.12	3.93	1.99	24.68	24.68	2.87	2.87
	11.1	0.583	21.40	16.8	207	207	329	85	3.11	3.11	3.92	1.99	28.61	28.61	2.94	2.94
	12.7	0.500	24.20	19.0	231	231	366	95	3.09	3.09	3.89	1.99	32.24	32.24	3.00	3.00
	15.9	0.625	29.70	23.4	277	277	437	116	3.05	3.05	3.83	1.98	39.26	39.26	3.11	3.11
● L5(5"x5") (127x127)	19.0	0.750	35.10	27.5	319	319	501	137	3.02	3.02	3.78	1.98	46.00	46.00	3.23	3.23
	7.94	0.313	19.60	15.3	308	308	492	125	3.97	3.97	5.02	2.52	33.37	33.37	3.46	3.46
	9.53	0.375	23.30	18.3	363	363	580	147	3.95	3.95	4.99	2.51	39.59	39.59	3.52	3.52
	11.1	0.438	27.00	21.3	414	414	659	169	3.91	3.91	4.93	2.50	45.32	45.32	3.56	3.56
	12.7	0.500	30.70	24.1	466	466	741	191	3.90	3.90	4.91	2.49	51.36	51.36	3.63	3.63
	15.9	0.625	37.80	29.8	564	564	895	234	3.86	3.86	4.86	2.48	63.00	63.00	3.75	3.75
L6(6"x6") (152x152)	19.1	0.750	44.80	35.1	655	655	1,035	274	3.82	3.82	4.81	2.47	74.12	74.12	3.87	3.87
	22.2	0.875	51.10	40.5	738	738	1,162	314	3.78	3.78	4.75	2.47	84.58	84.58	3.98	3.98
	11.1	0.438	32.70	25.6	729	729	1,149	306	4.73	4.73	5.93	3.06	66.3	66.3	4.21	120
	12.7	0.500	37.10	29.2	822	822	1,294	347	4.71	4.71	5.90	3.06	75.1	75.1	4.27	136
	14.3	0.563	41.50	32.6	912	912	1,434	387	4.69	4.69	5.88	3.05	83.8	83.8	4.33	152
	15.9	0.625	45.90	36.0	999	999	1,569	425	4.67	4.67	5.85	3.04	92.3	92.3	4.39	167
L8 (8"x8") (203x203)	19.0	0.750	54.50	42.7	1,160	1,160	1,849	466	4.62	4.62	5.82	2.92	108.0	108.0	4.50	197
	22.2	0.875	62.80	49.3	1,320	1,320	2,060	576	4.58	4.58	5.73	3.03	124.0	124.0	4.61	226
	15.9	0.625	62.00	48.7	2,470	2,470	3,909	1,040	6.31	6.31	7.94	4.09	169.0	169.0	5.66	305
	19.0	0.750	73.60	57.9	2,890	2,890	4,566	1,225	6.26	6.26	7.87	4.08	199.0	199.0	5.78	361
	22.2	0.875	85.02	67.0	3,300	3,300	5,207	1,406	6.22	6.22	7.82	4.06	229.0	229.0	5.89	415
	25.4	1.000	96.80	75.9	3,690	3,690	5,765	1,631	6.17	6.17	7.72	4.10	258.0	258.0	6.01	467
	28.6	1.125	108.00	84.7	4,070	4,070	6,393	1,763	6.14	6.14	7.69	4.04	287.0	287.0	6.12	518

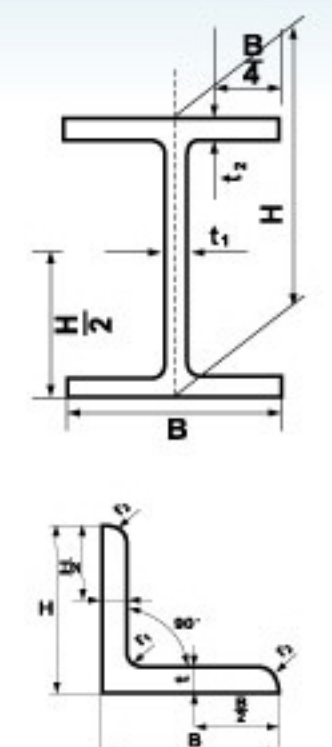

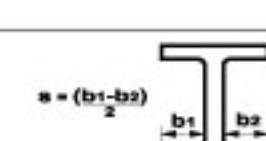
Note

- The Hot-rolled sections listed in this table are rolled at specific intervals determined by Siam Yamato Steel.
- Contact us for product availability, rolling frequency and other pertinent information.
- Please seek for our reconfirmation.

TOLERANCES

ASTM A 6 : 2003

Unit : mm.

ASTM A 6 : 2003							Remark	
H-BEAMS			ANGLES					
Dimension		Tolerance	Dimension		Tolerance			
Depth (H)	H ≤ 310	- 3.0 + 4.0	Depth (H) or Width (B)	H or B > 150	+ 5, - 3			
	H > 310	- 3.0 + 4.0						
Width (B)	B ≤ 310	- 5.0 + 6.0	Length (L)	Hor B < 75	1.5 < L < 3		+ 16	
	B > 310	- 5.0 + 6.0			3 ≤ L < 6		+ 25	
Length (L)		H ≤ 610			L ≤ 9m.		6 ≤ L ≤ 9	+ 38
	9 < L ≤ 12						+ 51	
	H > 610	L ≤ 9m.		12 < L ≤ 20	+ 64			
				L > 9m.	1.5 < L < 3		+ 25	
					3 ≤ L < 6		+ 38	
					6 ≤ L ≤ 9		+ 45	
H > 610	L > 9m.	9 < L ≤ 12			+ 57			
		12 < L ≤ 20		+ 70				
		Out-of-square (T)	H ≤ 310	≤ 3.0	Out-of-square (T)	-	2.6% of leg length	
			H > 310	≤ 4.0				
Bend	L ≤ 14m.	1 mm. x no. of meters of L, Max 10 mm.	Bend	H or B < 75	4 x no. of meters	To be applied to bend such as sweep and camber		
	L > 14m.	10 mm. + [1 mm. x (no. of meters of L - 14 m.)]		H or B ≥ 75	2 x no. of meters			
Web-off-center (s)	H ≤ 310	≤ 5.0						
	H > 310	≤ 5.0						
Mass (kg/m.)	± 2.5%		Mass (kg/m.)	± 2.5%				

Summary of Universal Beam in SYS Production Range

Nominal	WEIGHT														
	BS EN STANDARD					ASTM STANDARD					AS STANDARD				
838x292 33"x11-1/2"	kg/m Lb/ft	176	194	226			176	193	210	226	251				
762x267 30"x10-1/2"		118	130	152			118	130	141	152	162				
		134	147	173	197		134	147	161	173	185	196			
		90	99	116	132		90	99	108	116	124	132			
686x254 27"x10"		125	140	152	170		125	140	152	170	192				
		84	94	102	114		84	94	102	114	129				
610x324 24"x12-3/4"							155	174	195	217	241				
							104	117	131	146	162				
610x305 24"x12"		149	179	238											
		100	120	160											
610x229 24"x9"		101	113	125	140		101	113	125	140	153	610UB	101	113	125
		68	76	84	94		68	76	84	94	103		68	76	84
610x178 24"x7"							82	92							
							55	62							
533x210 21"x8-1/4"		82	92	101	109	122	92	101	109	123	138	530UB	82	92	
		55	62	68	73	82	62	68	73	83	93		55	62	
533x165 21"x6-1/2"							66	74	85						
							44	50	57						
457x191 18"x7-1/2"		67	74	82	89	98	74	82	89	97	106	460UB	67	75	82
		45	50	55	60	66	50	55	60	65	71		45	50	55
457x152 18"x6"		52	60	67	74	82	52	60	68						
		35	40	45	50	55	35	40	46						
406x178 16"x7"		54	60	67	74		53	60	67	75	85	410UB	54	60	
		36	40	45	50		36	40	45	50	57		36	40	
406x140 16"x5-1/2"		39	46				38.8	46.1							
		26	31				26	31							
356x406 14"x16"			235				216	237							
			158				145	159							
356x254 14"x10"							91	101	110	122					
							61	68	74	82					
356x171 14"x6-3/4"		45	51	57	67		44	51	57.8			360UB	45	51	57
		30	34	38	45		30	34	38				30	34	38
356x127 14"x5"		33	39				32.9	39							
		22	26				22	26							
305x203 12"x8"							60	67	74						
							40	45	50						
305x165 12"x6-1/2"		40	46	54			38.7	44.5	52			310UB	32	40	46
		27	31	36			26	30	35				21	27	31
305x127 12"x5"		37	42	48											
		25	28	32											
254x146 10"x5-3/4"		31	37	43			32.7	38.5	44.8			250UB	26	31	37
		21	25	29			22	26	30				17	21	25
254x102 10"x4"		25	28				25.3	28.4							
		17	19				17	19							
203x133 8"x5-1/4"		25	30				26.6	31.3				200UB	18	22	25
		17	20				18	21					12	15	17
203x102 8"x4"		23						19.3	22.5						20
		15.5						13	15						
152x102 6"x4"								18	24						
								12	16						

Summary of Universal Column / Universal Bearing Pile in SYS Production Range

Nominal	WEIGHT																			
	BS EN STANDARD								ASTM STANDARD								AS STANDARD			
356x368 14"x14-1/2"	Kg/mUC	129	153	177	202				134	147	162	179	196							
	Lb/ft	87	103	119	136				90	99	109	120	132							
	UBP	109	133	152	174				108	132	152	174								
		73	89	102	117				73	89	102	117								
305x305 12"x12"	UC	97	118	137	158	198	240	283	97	107	117	129	143	158	179	202	226	253	283	96.8 118 137 158
		65	79	92	106	133	161	190	65	72	79	87	96	106	120	136	152	170	190	
	UBP	79	38	95	110	126	149	186	223	79	93	110	125							
		53	59	64	74	85	100	125	150	53	63	74	84							
254x254 10"x10"	UC	73	89	107	132	167			73	80	89	101	115	131	149	167				72.9 89.5
		49	60	72	89	112			49	54	60	68	77	88	100	112				
	UBP	63	71	85					62	85										
		42	48	57					42	57										
203x203 8"x8"	UC	46	52	60	71	86			46.1	52	59	71	86	100						46.2 52.2 59.5
		31	35	40	48	58			31	35	40	48	58	67						
	UBP	45	54						53											
		30	36						36											
152x152 6"x6"	UC	23	30	37					22.5	29.8	37.1									23.4 30 37.2
		16	20	25					15	20	25									
127x127 5"x5"									23.8	28.1										
									16	19										
102x102 4"x4									19.3											
									13											