



# WIDE FLANGE SHAPES





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Cities in redevelopment, high-rise buildings under construction, freeways undergoing modernization – these and many other projects call for wide flange shapes. Because of their outstanding properties, wide flange shapes are widely used for beams, columns and other architectural members, as well as in pile foundations, bridges and other civil engineering works.

Japan's first wide flange shapes were produced in 1961 on JFE Steel Corporation's universal mill. Since then, JFE Steel has been supplying superior quality wide flange shapes based on advanced technology, efficient equipment and intensive research and development activities. JFE Steel's wide flange shapes are available up to 1000 mm in web height and 515 mm in flange width.

Further, JFE Steel's whole production process for order booking through shipment is handled by an advanced computer-controlled order processing system, so the company can provide customers with better service for any requirement.

## Features of JFE Steel's Wide Flange Shapes:

- 1 Sophisticated properties that satisfy the needs of the day perfectly.**
- 2 A simple configuration, yet excellent cross-sectional performance.**
- 3 Multipurpose application in broad range of crosssectional configurations with other shapes.**
- 4 Marked reduction in construction costs and time through rationalized design work, faster fabrication, and easier on-site execution.**



## 2 Applications



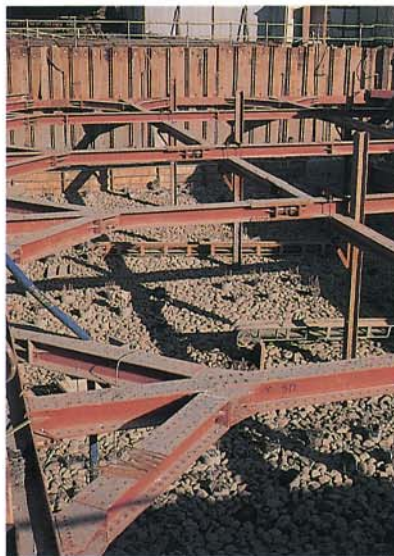
▲ Metropolitan Government Office building



▲ Opera House



▲ Sound insulating walls



▲ Cofferdams



▲ High-rise building



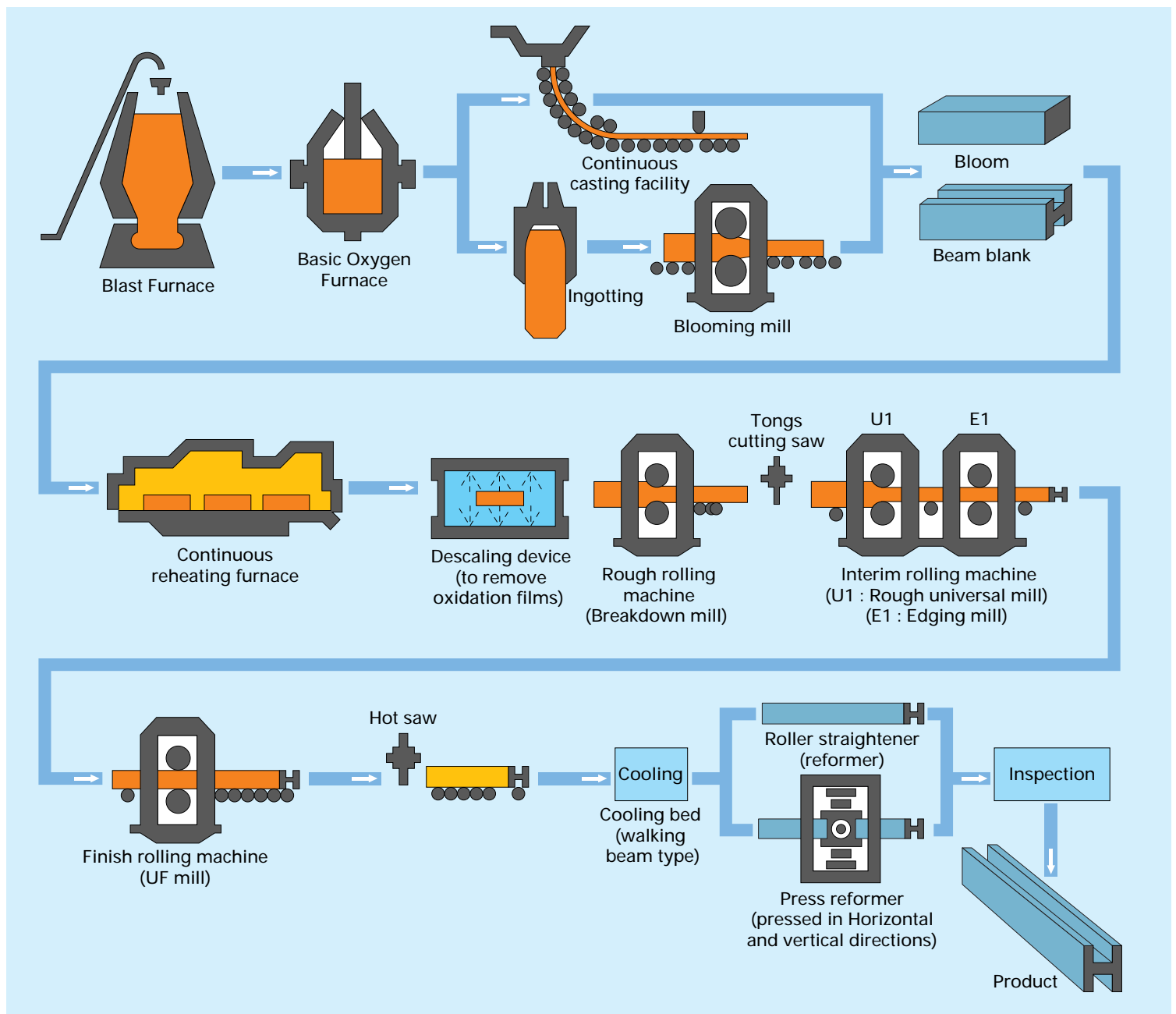
▲ Station building



▲ Warehouse



# 3 Manufacturing Process



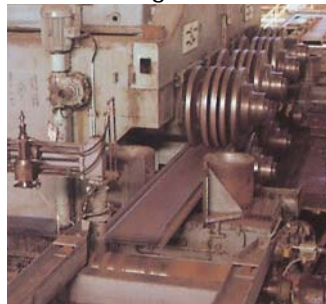
● Rough universal mill



● Cooling bed



● Roller straightener



● Shipment of products



# 4 Specifications

## (1) Specifications

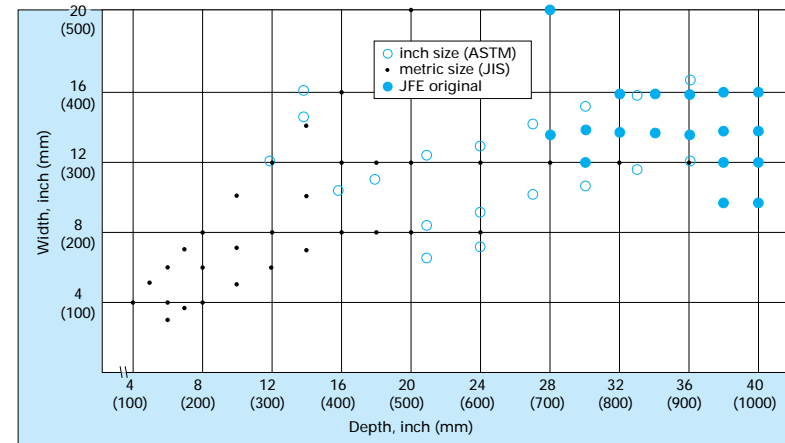
<b>1. ASTM</b>	ASTM A36, A572, A992 etc.
<b>2. BS</b>	BS 4360-43 (A, B*, C*, D*, DD*) BS 4360-50 (A, B, C*, D*) BS 7191-Gr275, 355
<b>3. JFE STEEL STANDARD</b>	HBL-JH450*
<b>4. JIS</b>	JIS G 3136 (SN400A, B, C, SN490B, C) JIS G 3101 (SS400) JIS G 3106 (SM400A, B, C, SM490A, B, C, SM490YA, YB, SM520B) JIS G 3114 (SMA400AP, SMA400AW, SMA490AP, SMA490AW)

\*Note : Specifications marked with an asterisk may be subject to negotiation and acceptance.

## (2) Corresponding specifications

Type of material	Classified by tensile strength		Specifications			
	Tensile strength class (N/mm <sup>2</sup> )	Special specification	ASTM	BS 4360	JFE STEEL STANDARD	JIS
General structure	400	—	A 36	Gr. 43A	—	G 3101 SS400 G 3136 SN400A
Welded structure	400	—	A572 Gr. 42	Gr. 438	—	G 3106 SM400A
		Charpy impact test	—	Gr. 43C	—	G 3106 SM400B, C G 3136 SN400B
		Charpy impact test for low temperature	—	Gr. 43D Gr. 43DD	—	—
		Charpy impact test Through thickness properties	—	—	—	G 3136 SN400C
	490	—	—	—	—	G 3106 SM490A
		Charpy impact test	—	—	—	G 3106 SM490B, C G 3136 SN490B
		Charpy impact test Through thickness properties	—	—	—	G 3136 SN490C
	490 (High yield point)	—	A572 Gr. 50 A992	Gr. 50A, B	—	G 3106 SM490YA
		Charpy impact test	A572 Gr. 50 A992	Gr. 50C	—	G 3106 SM490YB, SM520B, C
		Charpy impact test for low temperature	—	Gr. 50D	—	—
	550	Charpy impact test	A913	Gr. 55C	HBL-JH450	—
Atmospheric corrosion resistant steels for welded structure	400	—	—	—	—	G 3114 SMA400A
		Charpy impact test	—	—	—	—
	490	—	—	—	—	G 3114 SMA490A
		Charpy impact test	—	—	—	—
		Charpy impact test for low temperature	—	—	—	—

## (3) Available Size (Nominal)



## (4) Available Length

- ① BASE SIZE : 20 ~ 98 ft (6 ~ 30m)  
② HEAVY SIZE : Maximum Unit Weight 14.2 Mt

Nominal Size	Mass		Length	
	lbs/ft	kg/m	(ft)	(m)
14 x 16	730	1086.0	20 ~ 42	6 ~ 13.0
	665	989.6	20 ~ 47	6 ~ 14.3
	605	900.3	20 ~ 51	6 ~ 15.7
	550	818.5	20 ~ 56	6 ~ 17.3
	500	744.1	20 ~ 62	6 ~ 19.0
	455	677.1	20 ~ 68	6 ~ 21.9
	426	634.0	20 ~ 73	6 ~ 22.3
	398	592.3	20 ~ 78	6 ~ 23.9
	370	550.6	20 ~ 84	6 ~ 25.7
	342	509.0	20 ~ 91	6 ~ 27.8
	314	467.0	20 ~ 98	6 ~ 30.0
	311	462.8	20 ~ 98	6 ~ 30.0

Note : Cut-off pitch 100mm or 1 inch.

## (5) JFE Steel Standard, ASTM, BS

Standard	Grade	Chemical composition % Max.												Tensile test							Impact test			
		C	Si	Mn	P	S	Cu	Cr	Ni	Mo	Nb (Columbium)	V	Ceq.	Yield point or yield stress N/mm <sup>2</sup>				Tensile strength N/mm <sup>2</sup> Min.	Yield ratio Max. %	Elongation		Test temp. °C	Charpy absorption energy J Min.	Test piece
														Flange thickness mm						Test piece	% Min.			
														t ≤16	t ≤40	t ≤63	t ≤100							
Alloy steel structural shape for use in building framing (JFE STEEL standard)	*HBL-JH450 <sup>*1</sup>	0.07	0.10 ~ 0.40	0.50 ~ 1.50	0.035	0.025	0.70~1.30	0.35	0.40~0.70	0.07	0.01~0.05	0.01	—	450 ~ 550 [65 ~ 80ksi]				550 [80ksi]	85	8in.[200mm] 2in.[ 50mm]	15 17	21	54 <sup>*10</sup>	Longitudinal v-notch
Steel for structural shapes for use in building framing (ASTM A992)	—	0.23	0.40	0.50 ~ 1.50	0.035	0.045	0.60	0.35	0.45	0.15	0.05	0.11	0.47 0.45	345 ~ 450 [50 ~ 65ksi]				450 [65ksi]	85	8in.[200mm] 2in.[ 50mm]	18 21	21	27 <sup>*10</sup>	Longitudinal v-notch
High-strength low-alloy columbium-vanadium structural steel 1 (ASTM A572)	Grade 50 [345]	0.23	0.40 <sup>*2</sup> 0.15~0.40 <sup>*3</sup>	1.35 <sup>*4</sup>	0.04	0.05	Alloy content <sup>*5</sup> Type Elements 0.005 ~ 0.05 1 Columbium 0.01 ~ 0.15 2 Vanadium 0.005 ~ 0.05				3 Columbium Vanadium Cb plus V 4 Vanadium Nitrogen	0.01 ~ 0.15 0.02 ~ 0.15 0.01 ~ 0.15 0.015 max.		345 [50ksi]				450 [65ksi]	85	8in.[200mm] 2in.[ 50mm]	18 21 <sup>*6</sup>	—	—	—
Standard specification for carbon structural steel (ASTM A36)	—	0.26	0.40 <sup>*2</sup> 0.15~0.40 <sup>*3</sup>	0.85~1.35 <sup>*3</sup>	0.04	0.05	—	—	—	—	—	—	—	250 [36ksi]				450 ~ 550 [58 ~ 80ksi]	—	8in.[200mm] 2in.[ 50mm]	20 21 <sup>*6</sup>	—	—	—
Weldable structural steels (BS 4360 : 1986)	43A	0.25	0.50	1.60	0.050	0.050	—	—	—	—	—	—	—	275	265	255	245	430 ~ 580	—	[200mm] <sup>*9</sup> [5.65 ; So]	20 22	—	—	—
	* 43B	0.21	0.50	1.50	0.050	0.050	—	—	—	—	—	—	—									20 <sup>*7</sup>	27	—
	* 43C	0.18	0.50	1.50	0.050	0.050	—	—	—	—	—	—	0.41									0	27	—
	* 43D	0.18	0.50	1.50	0.050	0.050	—	—	—	—	—	—	0.41									-20	27	—
	* 43DD	0.16	0.10 ~ 0.50	1.50	0.040	0.040	—	—	—	—	—	—	0.39									-30	27	—
	50A	0.23	0.50	1.60	0.050	0.050	—	—	—	—	0.003 ~ 0.10	0.003 ~ 0.10	—	355	345	340	325	490~640 <sup>*8</sup>	—	[200mm] <sup>*9</sup> [5.65 ; So]	18 20	—	—	Longitudinal v-notch
	50B	0.20	0.50	1.50	0.050	0.050	—	—	—	—			—									20 <sup>*7</sup>	27	
	* 50C	0.20	0.50	1.50	0.050	0.050	—	—	—	—			0.45 <sup>*2</sup> 0.47 <sup>*3</sup>									0	27	
	* 50D	0.18	0.50	1.50	0.040	0.040	—	—	—	—			0.43 <sup>*4</sup> 0.45 <sup>*5</sup>									-20	27	

\*Notes : Specifications marked with an asterisk may be subject to negotiation and acceptance.

\*1 : HBL-JH450 : Titanium, max 0.04% ; Boron, max 0.0005 to 0.003% ; Nitrogen, max 0.012% ; Tin, max 0.03%.

\*2 : Shapes to 426lb/ft [634kg/m]

\*3 : Shapes over 426lb/ft [634kg/m]

\*4 : For each reduction of 0.01% below the specified carbon maximum, an increase of 0.06% manganese above the specified maximum will be permitted up to a maximum of 1.50%.

\*5 : Alloy content shall be in accordance with type 1, 2, 3 or 4 and the contents of the applicable elements shall be reported on the test report.

\*6 : For wide flange shapes over 426lb/ft [634kg/m] elongation in 2 in. [50mm] of 19% minimum applies.

\*7 : Verification of the specified impact value to be carried out only when option is invoked by the purchaser.

\*8 : Minimum T. S. 480N/mm<sup>2</sup> for material over 63mm thick.

\*9 : Up to and including 9mm thick, 16% for grade 43 and 15% for grade 50.

Carbon equivalent : (JIS) CE = C + Mn/6 + Si/24 + Ni/40 + Cr/5 + Mo/4 + V/14

(ASTM) CE = C + Mn/6 + (Cr + Mo + V)/5 + (Cu + Ni)/15

(BS) CE = C + Mn/6 + (Cr + Mo + V)/5 + (Cu + Ni)/15

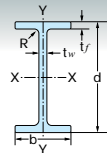
\*10 : Requirements of Charpy V-notch impact test shall not apply unless specified in the order.

## (6) JIS Specification

Standard	Grade	Chemical composition											Tensile test														Characteristic in the thickness direction - Reduction of area %	Bending			Impact test			
		C	Si	Mn	P	S	Cu	Cr	Ni	Other		Yield point or yield stress N/mm <sup>2</sup>					Tensile strength N/mm <sup>2</sup>	Yield ratio %				Elongation			Bend angle	Radius of inside diameter		Test piece	Test temp. ℃	Charpy absorption energy J	Test piece			
										Carbon equivalent %	Chemical composition on sensitivity of welding crack %	thickness			mm					thickness mm				Thickness mm								Test piece	%	
												6 ≤ t <12	12 ≤ t <16	16	16 < t ≤40	40 < t ≤75		75 < t ≤100	6 ≤ t <12	12 ≤ t <16	16	16 < t ≤40	40 < t ≤100											
Rolled steels for building structure (JIS G 3136-1994)	SN400A	6mm ≤ t ≤ 100mm	≤0.24	—	—	≤0.050	≤0.050	—	—	—	—	235 ≤	235 ≤	235	235 ≤	215 ≤	400~510	—	—	—	—	—	6 < t ≤ 16 16 < t ≤ 50 40 < t ≤ 100	No.1A No.1A No.4	17 ≤ 21 ≤ 23 ≤	—	—	—	—	—	27 ≤	Longitudinal No.4		
	SN400B	6mm ≤ t ≤ 50mm 50mm < t ≤ 100mm	≤0.20 ≤0.22	≤0.35	0.60~1.40	≤0.030	≤0.015	—	—	—	—	235 ≤	235~355	235~355	235~355	215~335		—	≤80	≤80	≤80	≤80	6 < t ≤ 16 16 < t ≤ 50 40 < t ≤ 100	No.1A No.1A No.4	18 ≤ 22 ≤ 24 ≤	25 ≤ (average for 3 pieces)	—	—	—	0				
	SN400C	16mm ≤ t ≤ 50mm 50mm < t ≤ 100mm	≤0.20 ≤0.22	≤0.35	0.60~1.40	≤0.020	≤0.008	—	—	—	≤0.36	/	/	235~355	235~355	215~335	/	/	≤80	≤80	≤80	6 < t ≤ 16 16 < t ≤ 50 40 < t ≤ 100	No.1A No.1A No.4	18 ≤ 22 ≤ 24 ≤	15 ≤ (for each test value)	—	—	—	0					
	SN490B	6mm ≤ t ≤ 50mm 50mm < t ≤ 100mm	≤0.18 ≤0.20	≤0.55	≤1.60	≤0.030	≤0.015	—	—	—	t ≤ 40mm ≤0.44	325 ≤	325~445	325~445	325~445	295~415	—	≤80	≤80	≤80	≤80	6 < t ≤ 16 16 < t ≤ 50 40 < t ≤ 100	No.1A No.1A No.4	17 ≤ 21 ≤ 23 ≤	25 ≤ (average for 3 pieces)	—	—	—	0					
	SN490C	16mm ≤ t ≤ 50mm 50mm < t ≤ 100mm	≤0.18 ≤0.20	≤0.55	≤1.60	≤0.020	≤0.008	—	—	—	40mm < t ≤100mm ≤0.46	/	/	325~445	325~445	295~415	490~610	/	/	≤80	≤80	≤80	6 < t ≤ 16 16 < t ≤ 50 40 < t ≤ 100	No.1A No.1A No.4	17 ≤ 21 ≤ 23 ≤	15 ≤ (for each test value)	—	—	—	0				
Rolled steels for general structure (JIS G 3101-1987)	SS400	—	—	—	≤0.050	≤0.050	—	—	—	—	—	245 ≤			235 ≤	215 ≤	215 ≤	400~510	—	—	—	—	—	≤5 5 < t ≤ 16 16 < t ≤ 50 40 < t ≤ 100	No.5 No.1A No.1A No.4	21 ≤ 17 ≤ 17 ≤ 23 ≤	180°	1.5 times thickness	No.1	—	—	—		
Rolled steels for welded structure (JIS G 3106-1992)	SM490A	t ≤ 50mm 50mm < t ≤ 200mm	≤0.20 ≤0.22	≤0.55	≤1.60	≤0.035	≤0.035	—	—	—	—	325 ≤			315 ≤	295 ≤	295 ≤	490~610	—	—	—	—	—	≤5 5 < t ≤ 16 16 < t ≤ 50 40 < t ≤ 100	No.5 No.1A No.1A No.4	22 ≤ 17 ≤ 17 ≤ 23 ≤	—	—	—	—	—	Longitudinal No.4		
	SM490B	t ≤ 50mm 50mm < t ≤ 200mm	≤0.18 ≤0.20	≤0.55	≤1.60	≤0.035	≤0.035	—	—	—	—	325 ≤			315 ≤	295 ≤	295 ≤	490~610	—	—	—	—	—	≤5 5 < t ≤ 16 16 < t ≤ 50 40 < t ≤ 100	No.5 No.1A No.1A No.4	22 ≤ 17 ≤ 17 ≤ 23 ≤	—	—	—	0	27 ≤			
	SM490YA	t ≤ 100mm	≤0.20	≤0.55	≤1.60	≤0.035	≤0.035	—	—	—	—	365 ≤			355 ≤	335 ≤	325 ≤	490~610	—	—	—	—	—	≤5 5 < t ≤ 16 16 < t ≤ 50 40 < t ≤ 100	No.5 No.1A No.1A No.4	19 ≤ 15 ≤ 15 ≤ 21 ≤	—	—	—	—	—		27 ≤	
	SM490YB											365 ≤			355 ≤	335 ≤	325 ≤	490~610	—	—	—	—	—	≤5 5 < t ≤ 16 16 < t ≤ 50 40 < t ≤ 100	No.5 No.1A No.1A No.4	19 ≤ 15 ≤ 15 ≤ 21 ≤	—	—	—	0				
	SM520B	t ≤ 100mm	≤0.20	≤0.55	≤1.60	≤0.035	≤0.035	—	—	—	—	365 ≤			355 ≤	355 ≤	325 ≤	520~640	—	—	—	—	—	≤5 5 < t ≤ 16 16 < t ≤ 50 40 < t ≤ 100	No.5 No.1A No.1A No.4	19 ≤ 15 ≤ 15 ≤ 21 ≤	—	—	—	0	27 ≤			
Hot-rolled atmospheric corrosion resisting steels for welded structure (JIS G 3114-1988)	SMA400A	W	≤0.18	0.15~0.65	≤1.25	≤0.035	≤0.035	0.30~0.50	0.45~0.75	0.05~0.30	In all types, elements effective to weatherability, such as Mo, Nb, Ti, V, and Zr may be added. But, the total of these elements shall not exceed 0.15%	245 ≤			235 ≤	215 ≤	215 ≤	400~540	—	—	—	—	—	≤16 16 < t ≤ 40	No.1A No.1A No.4	17 ≤ 21 ≤ 23 ≤	—	—	—	—	—	—		
	SMA400A	P	≤0.18	≤0.55	≤1.25	≤0.035	≤0.035	0.20~0.35	0.30~0.55	—		365 ≤			355 ≤	335 ≤	255 ≤	490~610	—	—	—	—	—	≤16 16 < t ≤ 40	No.1A No.1A No.4	15 ≤ 19 ≤ 21 ≤	—	—	—	—	—			
	SMA490A	W	≤0.18	0.15~0.65	≤1.40	≤0.035	≤0.035	0.30~0.50	0.45~0.75	0.05~0.30		365 ≤			355 ≤	335 ≤	255 ≤	490~610	—	—	—	—	—	≤16 16 < t ≤ 40	No.1A No.1A No.4	15 ≤ 19 ≤ 21 ≤	—	—	—	—	—			
	SMA490A	P	≤0.18	≤0.55	≤1.40	≤0.035	≤0.035	0.20~0.35	0.35~0.55	—		365 ≤			355 ≤	335 ≤	255 ≤	490~610	—	—	—	—	—	≤16 16 < t ≤ 40	No.1A No.1A No.4	15 ≤ 19 ≤ 21 ≤	—	—	—	—	—			

Notes : • For SS400 and SM490 of a thickness of more than 100mm, the minimum yield point shall be 205N/mm<sup>2</sup> and 285N/mm<sup>2</sup> respectively.  
 • For SN400A, SN400B, SN400C, SN490B, SN490C, SM490YA, SM490YB, and SM520B, other alloy elements may be added as required.  
 • For SN400B, SN400C, SN490B, SN490C, SM490B, SM490YB, and SM520B, the impact test shall be made for a thickness of more than 12mm and the Charpy absorption energy shall be obtained as an average for three test pieces.  
 • SM490YA, SM490YB and SM520B having a flange 40mm thick or moer are not manufactured usually.  
 If you want these products, consult with us beforehand.

Notes : • Carbon equivalent = C + Mn/6 + Si/24 + Ni/40 + Cr/5 + Mo/4 + V/14  
 • Chemical composition on sensitivity of welding cracks. (%) = C + Si/30 + Mn/20 + Cu/20 + Ni/60 + Cr/20 + Mo/15 + V/10 + 5B  
 • For SN400B, SN400C, SN490B and SN490C, the upper limit of yield point or proof stress does not apply to the Wide Flange shapes having t2 of 16mm or less and t1 of 9mm or less.  
 • For SN400B, SN400C, SN490B and SN490C, the upper limit of yield ratio shall be 85% for the Wide Flange shapes having t2 of 16mm or less and t1 of 9mm or less.  
 • For SN400C and SN490C, the method of the characteristic test in the thickness direction shall be in accordance with JIS G3199.



## (1) Wide Flange Shapes (ASTM A 6 Inch Series)

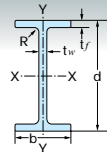
### Inch Sizes

Section Designation in.	Area A, in. <sup>2</sup>	Depth d, in.	Flange		Web Thick- ness t <sub>w</sub> , in.	Corner Radius in.	Elastic Properties						Plastic Modulus		
			Width b <sub>f</sub> , in.	Thick- ness t <sub>f</sub> , in.			Axis X-X			Axis Y-Y					
							I <sub>x</sub> in. <sup>4</sup>	S <sub>x</sub> in. <sup>3</sup>	r <sub>x</sub> in.	I <sub>y</sub> in. <sup>4</sup>	S <sub>y</sub> in. <sup>3</sup>	r <sub>y</sub> in.	Z <sub>x</sub> in. <sup>3</sup>	Z <sub>y</sub> in. <sup>3</sup>	
W36 x 16½ x 393LBS	115.6	37.80	16.83	2.200	1.220	0.95	27,491	1,455	15.42	1,754	208.4	3.90	1,671	324.6	
x 359LBS	105.4	37.40	16.73	2.010	1.120	0.95	24,763	1,324	15.33	1,573	188.1	3.86	1,515	292.4	
x 328LBS	96.40	37.09	16.63	1.850	1.020	0.95	22,495	1,213	15.28	1,421	171.0	3.84	1,381	265.1	
x 300LBS	88.30	36.74	16.66	1.680	0.945	0.95	20,349	1,108	15.18	1,296	155.7	3.83	1,257	241.0	
x 280LBS	82.40	36.52	16.60	1.570	0.885	0.95	18,877	1,034	15.13	1,198	144.4	3.81	1,170	223.2	
x 260LBS	76.50	36.26	16.55	1.440	0.840	0.95	17,269	952.5	15.03	1,090	131.7	3.78	1,077	203.6	
x 245LBS	72.10	36.08	16.51	1.350	0.800	0.95	16,139	894.6	14.97	1,014	122.9	3.75	1,010	189.8	
x 230LBS	67.60	35.90	16.47	1.260	0.760	0.95	15,022	836.9	14.90	939.7	114.1	3.73	943.3	176.2	
W36 x 12	x 210LBS	61.80	36.69	12.18	1.360	0.830	0.75	13,191	719.1	14.61	411.4	67.55	2.58	832.8	107.0
x 194LBS	57.00	36.49	12.15	1.260	0.765	0.75	12,140	665.4	14.58	378.1	62.24	2.57	768.2	98.24	
x 182LBS	53.60	36.33	12.08	1.180	0.725	0.75	11,310	622.6	14.53	347.5	57.55	2.55	718.1	90.75	
x 170LBS	50.00	36.17	12.03	1.100	0.680	0.75	10,498	580.5	14.48	320.2	53.23	2.53	668.4	83.77	
x 160LBS	47.00	36.01	12.00	1.020	0.650	0.75	9,755	541.8	14.40	294.7	49.11	2.50	623.9	77.27	
x 150LBS	44.20	35.85	11.98	0.940	0.625	0.75	9,039	504.3	14.30	269.8	45.07	2.47	581.4	70.95	
x 135LBS	39.70	35.55	11.95	0.790	0.600	0.75	7,801	438.9	14.01	225.4	37.73	2.38	509.4	59.69	
W33 x 15½ x 387LBS	114.0	35.95	16.20	2.280	1.260	0.70	24,318	1,353	14.62	1,621	200.1	3.77	1,561	312.0	
x 354LBS	104.1	35.55	16.10	2.090	1.160	0.70	21,946	1,235	14.52	1,458	181.1	3.74	1,418	281.7	
x 318LBS	93.50	35.16	15.99	1.890	1.040	0.70	19,518	1,110	14.45	1,290	161.4	3.71	1,268	250.2	
x 291LBS	85.60	34.84	15.91	1.730	0.960	0.70	17,670	1,014	14.37	1,163	146.2	3.69	1,154	226.3	
x 263LBS	77.40	34.53	15.81	1.570	0.870	0.70	15,833	917.0	14.31	1,035	131.0	3.66	1,039	202.3	
x 241LBS	70.90	34.18	15.86	1.400	0.830	0.70	14,175	829.5	14.14	932.5	117.6	3.63	938.7	181.7	
x 221LBS	65.00	33.93	15.81	1.275	0.775	0.70	12,847	757.3	14.05	840.3	106.3	3.59	855.4	164.2	
x 201LBS	59.10	33.68	15.75	1.150	0.715	0.70	11,527	684.5	13.97	749.2	95.17	3.56	771.6	146.8	
W33 x 11½ x 152LBS	44.70	33.49	11.57	1.055	0.635	0.70	8,157	487.1	13.50	272.8	47.17	2.47	558.6	73.92	
x 141LBS	41.60	33.30	11.54	0.960	0.605	0.70	7,452	447.6	13.39	246.2	42.70	2.43	513.6	66.93	
x 130LBS	38.30	33.09	11.51	0.855	0.580	0.70	6,709	405.5	13.23	217.9	37.86	2.39	466.5	59.46	
x 118LBS	34.70	32.86	11.48	0.740	0.550	0.70	5,901	359.1	13.05	187.1	32.60	2.32	414.8	51.32	
W30 x 15	x 326LBS	95.70	32.40	15.37	2.050	1.140	0.65	16,758	1,034	13.24	1,244	161.9	3.61	1,190	251.6
x 292LBS	85.70	32.01	15.26	1.850	1.020	0.65	14,851	927.9	13.17	1,097	143.9	3.58	1,061	222.9	
x 261LBS	76.70	31.61	15.16	1.650	0.930	0.65	13,064	826.5	13.05	959.2	126.6	3.54	940.6	195.8	
x 235LBS	69.00	31.30	15.06	1.500	0.830	0.65	11,674	746.0	13.01	854.5	113.5	3.52	844.2	175.1	
x 211LBS	62.00	30.94	15.11	1.315	0.775	0.65	10,259	663.1	12.86	756.5	100.2	3.49	748.8	154.5	
x 191LBS	56.10	30.68	15.04	1.185	0.710	0.65	9,170	597.8	12.78	672.8	89.47	3.46	673.0	137.8	
x 173LBS	50.80	30.44	14.99	1.065	0.655	0.65	8,198	538.6	12.70	598.0	79.82	3.43	605.1	122.8	
W30 x 10½ x 132LBS	38.90	30.31	10.55	1.000	0.615	0.65	5,765	380.4	12.18	196.1	37.18	2.25	437.4	58.44	
x 124LBS	36.50	30.17	10.52	0.930	0.585	0.65	5,359	355.3	12.12	180.7	34.38	2.23	408.2	53.99	
x 116LBS	34.20	30.01	10.50	0.850	0.565	0.65	4,933	328.8	12.01	164.3	31.30	2.19	378.4	49.23	
x 108LBS	31.70	29.83	10.48	0.760	0.545	0.65	4,466	299.4	11.87	146.0	27.88	2.15	345.7	43.95	
x 99LBS	29.10	29.65	10.45	0.670	0.520	0.65	3,995	269.5	11.72	127.8	24.46	2.10	312.2	38.64	

### mm Sizes (Reference)

Section Designation		Area A, cm²	Depth d, mm	Width b <sub>f</sub> , mm	Web Thickness t <sub>w</sub> , mm	Flange Thickness t <sub>f</sub> , mm	Corner Radius mm	Elastic Properties						Plastic Modulus		
								Axis X-X			Axis Y-Y					
Serial	Size mm	Mass Per Unit Length kg/m						I <sub>x</sub> cm⁴	S <sub>x</sub> cm³	r <sub>x</sub> cm	I <sub>y</sub> cm⁴	S <sub>y</sub> cm³	r <sub>y</sub> cm	Z <sub>x</sub> cm³	Z <sub>y</sub> cm³	
W 920 x 420		584.8	745.8	960.1	427.5	31.0	55.9	24.1	1,144,244	23,836	39.17	72,997	3,415	9.89	27,385	5,320
		534.2	680.0	950.0	424.9	28.5	51.1	24.1	1,030,642	21,698	38.93	65,452	3,081	9.81	24,821	4,790
		488.1	621.9	942.1	422.4	25.9	47.0	24.1	936,348	19,878	38.81	59,164	2,801	9.76	22,635	4,344
		446.4	569.7	933.2	423.0	24.0	42.7	24.1	846,880	18,150	38.56	53,940	2,550	9.73	20,595	3,948
		416.7	531.6	927.6	421.5	22.5	39.9	24.1	785,681	16,940	38.44	49,868	2,366	9.68	19,171	3,658
		386.9	493.5	921.0	420.4	21.3	36.6	24.1	718,900	15,611	38.17	45,381	2,159	9.59	17,644	3,337
		364.6	465.2	916.4	419.4	20.3	34.3	24.1	671,723	14,660	38.01	42,232	2,014	9.53	16,546	3,111
		342.3	436.1	911.9	418.3	19.3	32.0	24.1	625,178	13,712	37.85	39,099	1,869	9.47	15,456	2,886
W 920 x 310		312.5	398.7	931.9	309.4	21.1	34.5	19.0	548,979	11,782	37.11	17,125	1,107	6.55	13,645	1,754
		288.7	367.7	926.8	307.7	19.4	32.0	19.0	504,004	10,876	37.02	15,597	1,014	6.51	12,559	1,601
		270.8	345.8	922.8	306.7	18.4	30.0	19.0	470,711	10,202	36.90	14,461	943.0	6.47	11,766	1,487
		253.0	322.6	918.7	305.6	17.3	27.9	19.0	436,952	9,512	36.79	13,333	872.6	6.43	10,952	1,373
		238.1	303.2	914.7	304.8	16.5	25.9	19.0	406,062	8,879	36.58	12,266	804.8	6.36	10,225	1,266
		223.2	285.2	910.6	304.2	15.9	23.9	19.0	376,264	8,264	36.31	11,237	738.8	6.28	9,528	1,163
		200.9	256.1	903.0	303.5	15.2	20.1	19.0	324,710	7,192	35.59	9,382	618.2	6.05	8,347	978.1
		575.9	735.5	913.1	411.5	32.0	57.9	17.8	1,012,116	22,169	37.12	67,482	3,280	9.59	25,572	5,113
W 840 x 400		526.8	671.6	903.0	408.9	29.5	53.1	17.8	913,518	20,233	36.88	60,674	2,968	9.50	23,234	4,616
		473.2	603.2	893.1	406.0	26.4	48.0	17.8	812,518	18,195	36.70	53,681	2,644	9.43	20,776	4,101
		433.1	552.3	884.9	404.0	24.4	43.9	17.8	735,382	16,621	36.50	48,393	2,396	9.36	18,908	3,709
		391.4	499.4	877.1	401.4	22.1	39.9	17.8	659,042	15,028	36.34	43,065	2,146	9.29	17,022	3,314
		358.6	457.4	868.2	402.8	21.1	35.6	17.8	590,015	13,592	35.92	38,801	1,927	9.21	15,382	2,977
		328.9	419.4	861.8	401.4	19.7	32.4	17.8	534,568	12,406	35.70	34,959	1,742	9.13	14,013	2,689
		299.1	381.3	855.5	399.9	18.2	29.2	17.8	479,803	11,217	35.48	31,179	1,559	9.05	12,644	2,405
		226.2	288.4	850.6	293.8	16.1	26.8	17.8	339,555	7,984	34.29	11,360	773.3	6.27	9,155	1,212
W 840 x 295		209.8	268.4	845.8	293.0	15.4	24.4	17.8	310,150	7,334	34.01	10,249	699.6	6.18	8,416	1,097
		193.5	247.1	840.5	292.4	14.7	21.7	17.8	279,325	6,647	33.62	9,075	620.7	6.06	7,647	974.8
		175.6	223.9	834.6	291.6	14.0	18.8	17.8	245,627	5,886	33.14	7,791	534.3	5.90	6,798	841.2
W 760 x 380		485.1	617.4	823.0	390.4	29.0	52.1	16.5	697,610	16,953	33.62	51,791	2,653	9.16	19,496	4,123
		434.5	552.9	813.1	387.5	25.9	47.0	16.5	618,280	15,208	33.44	45,680	2,358	9.09	17,383	3,653
		388.4	494.8	802.9	384.9	23.6	41.9	16.5	543,700	13,543	33.15	39,915	2,074	8.98	15,412	3,208
		349.7	445.2	795.0	382.4	21.1	38.1	16.5	485,889	12,224	33.03	35,569	1,860	8.94	13,834	2,869
		314.0	400.0	785.9	383.7	19.7	33.4	16.5	427,026	10,867	32.67	31,497	1,642	8.87	12,271	2,531
		284.2	361.9	779.3	382.0	18.0	30.1	16.5	381,701	9,796	32.47	28,004	1,466	8.80	11,028	2,258
		257.5	327.7	773.2	380.6	16.6	27.1	16.5	341,237	8,827	32.26	24,887	1,308	8.71	9,916	2,012
		196.4	251.0	769.9	267.8	15.6	25.4	16.5	239,949	6,233	30.94	8,157	609.2	5.70	7,167	957.4
W 760 x 265		184.5	235.5	766.3	267.1	14.9	23.6	16.5	223,049	5,821	30.78	7,524	563.4	5.65	6,689	884.8
		172.6	220.6	762.3	266.6	14.4	21.6	16.5	205,374	5,388	30.51	6,839	513.1	5.57	6,202	806.8
		160.7	204.5	757.7	266.1	13.8	19.3	16.5	185,887	4,907	30.14	6,080	456.9	5.45	5,665	720.2
		147.3	187.7	753.1	265.4	13.2	17.0	16.5	166,280	4,416	29.77	5,319	400.9	5.32	5,116	633.2





## (1) Wide Flange Shapes (ASTM A 6 Inch Series)

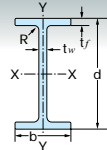
## Inch Sizes

Section Designation in.	Area A, in. <sup>2</sup>	Depth d, in.	Flange		Web Thick- ness t <sub>w</sub> , in.	Corner Radius in.	Elastic Properties						Plastic Modulus		
			Width b <sub>f</sub> , in.	Thick- ness t <sub>f</sub> , in.			Axis X-X			Axis Y-Y			Z <sub>x</sub> in. <sup>3</sup>	Z <sub>y</sub> in. <sup>3</sup>	
							I <sub>x</sub> in. <sup>4</sup>	S <sub>x</sub> in. <sup>3</sup>	r <sub>x</sub> in.	I <sub>y</sub> in. <sup>4</sup>	S <sub>y</sub> in. <sup>3</sup>	r <sub>y</sub> in.			
* W27 x 14	x 336LBS	98.70	30.00	14.55	2.280	1.260	0.60	14,552	970.1	12.14	1,175	161.5	3.45	1,127	251.7
*	x 307LBS	90.20	29.61	14.45	2.090	1.160	0.60	13,093	884.4	12.05	1,053	145.8	3.42	1,022	226.8
*	x 281LBS	82.60	29.29	14.35	1.930	1.060	0.60	11,885	811.5	11.99	953.2	132.8	3.40	933.0	206.1
*	x 258LBS	75.70	28.98	14.27	1.770	0.980	0.60	10,757	742.4	11.92	859.3	120.4	3.37	849.7	186.5
*	x 235LBS	69.10	28.66	14.19	1.610	0.910	0.60	9,666	674.5	11.82	768.4	108.3	3.33	769.1	167.5
*	x 217LBS	63.80	28.43	14.12	1.500	0.830	0.60	8,872	624.1	11.80	704.4	99.80	3.32	708.3	154.0
	x 194LBS	57.00	28.11	14.04	1.340	0.750	0.60	7,821	556.5	11.71	618.4	88.12	3.29	628.6	135.7
	x 178LBS	52.30	27.81	14.09	1.190	0.725	0.60	6,985	502.3	11.56	555.1	78.82	3.26	567.3	121.5
	x 161LBS	47.40	27.59	14.02	1.080	0.660	0.60	6,277	455.0	11.51	496.7	70.86	3.24	512.0	109.1
	x 146LBS	42.90	27.38	13.97	0.975	0.605	0.60	5,627	411.0	11.45	443.1	63.46	3.21	461.2	97.53
W27 x 10	x 114LBS	33.50	27.29	10.07	0.930	0.570	0.60	4,085	299.4	11.04	158.7	31.53	2.18	342.9	49.35
	x 102LBS	30.00	27.09	10.02	0.830	0.515	0.60	3,622	267.4	10.98	139.3	27.82	2.15	305.4	43.43
	x 94LBS	27.70	26.92	9.990	0.745	0.490	0.60	3,271	243.0	10.88	124.1	24.84	2.12	277.9	38.82
	x 84LBS	24.80	26.71	9.960	0.640	0.460	0.60	2,846	213.1	10.72	105.6	21.21	2.07	244.4	33.20
W24 x 12¾	x 229LBS	67.20	26.02	13.11	1.730	0.960	0.50	7,647	587.8	10.67	651.4	99.38	3.11	675.5	154.0
	x 207LBS	60.70	25.71	13.01	1.570	0.870	0.50	6,820	530.5	10.60	577.5	88.78	3.08	606.3	137.3
	x 192LBS	56.30	25.47	12.95	1.460	0.810	0.50	6,257	491.3	10.54	529.5	81.78	3.07	559.3	126.2
	x 176LBS	51.70	25.24	12.89	1.340	0.750	0.50	5,683	450.3	10.49	479.2	74.35	3.04	510.6	114.6
	x 162LBS	47.70	25.00	12.96	1.220	0.705	0.50	5,174	413.9	10.41	442.8	68.36	3.05	467.9	105.3
	x 146LBS	43.00	24.74	12.90	1.090	0.650	0.50	4,584	370.6	10.32	390.5	60.55	3.01	417.6	93.17
	x 131LBS	38.50	24.48	12.86	0.960	0.605	0.50	4,021	328.5	10.21	340.3	52.95	2.97	369.6	81.47
	x 117LBS	34.40	24.26	12.80	0.850	0.550	0.50	3,536	291.5	10.14	297.4	46.48	2.94	327.1	71.42
	x 104LBS	30.60	24.06	12.75	0.750	0.500	0.50	3,104	258.0	10.07	259.3	40.68	2.91	288.9	62.45
W24 x 9	x 94LBS	27.70	24.31	9.065	0.875	0.515	0.50	2,699	222.0	9.87	108.9	24.03	1.98	253.8	37.53
	x 84LBS	24.70	24.10	9.020	0.770	0.470	0.50	2,367	196.5	9.79	94.40	20.93	1.95	224.2	32.64
	x 76LBS	22.40	23.92	8.990	0.680	0.440	0.50	2,099	175.5	9.69	82.53	18.36	1.92	200.5	28.64
	x 68LBS	20.10	23.73	8.965	0.585	0.415	0.50	1,829	154.1	9.55	70.41	15.71	1.87	176.6	24.55
W24 x 7	x 62LBS	18.20	23.74	7.040	0.590	0.430	0.50	1,551	130.7	9.23	34.48	9.80	1.38	153.3	15.73
	x 55LBS	16.20	23.57	7.005	0.505	0.395	0.50	1,346	114.2	9.11	29.07	8.30	1.34	134.2	13.34
W21 x 12¾	x 182LBS	53.70	22.72	12.50	1.480	0.830	0.50	4,734	416.7	9.40	482.8	77.24	3.00	476.1	119.1
	x 166LBS	48.90	22.48	12.42	1.360	0.750	0.50	4,275	380.3	9.36	435.0	70.05	2.99	432.0	107.8
	x 147LBS	43.20	22.06	12.51	1.150	0.720	0.50	3,632	329.3	9.17	375.9	60.10	2.95	373.2	92.65
	x 132LBS	38.80	21.83	12.44	1.035	0.650	0.50	3,225	295.4	9.12	332.6	53.47	2.93	333.3	82.27
	x 122LBS	35.90	21.68	12.39	0.960	0.600	0.50	2,961	273.2	9.09	304.7	49.19	2.92	307.1	75.55
	x 111LBS	32.70	21.51	12.34	0.875	0.550	0.50	2,674	248.7	9.05	274.3	44.46	2.90	278.6	68.20
	x 101LBS	29.80	21.36	12.29	0.800	0.500	0.50	2,421	226.7	9.02	247.7	40.32	2.89	253.0	61.73
W21 x 8½	x 93LBS	27.30	21.62	8.420	0.930	0.580	0.50	2,071	191.5	8.70	92.88	22.06	1.84	220.7	34.71
	x 83LBS	24.30	21.43	8.355	0.835	0.515	0.50	1,832	171.0	8.67	81.42	19.49	1.83	196.0	30.53
	x 73LBS	21.50	21.24	8.295	0.740	0.455	0.50	1,603	151.0	8.64	70.57	17.02	1.81	172.3	26.55
	x 68LBS	20.00	21.13	8.270	0.685	0.430	0.50	1,481	140.2	8.60	64.73	15.65	1.80	159.9	24.41
	x 62LBS	18.30	20.99	8.240	0.615	0.400	0.50	1,330	126.7	8.54	57.47	13.95	1.77	144.4	21.74
W21 x 6½	x 57LBS	16.70	21.06	6.555	0.650	0.405	0.50	1,169	111.0	8.36	30.65	9.35	1.35	128.6	14.84
	x 50LBS	14.70	20.83	6.530	0.535	0.380	0.50	984.4	94.52	8.18	24.94	7.64	1.30	110.1	12.18
	x 44LBS	13.00	20.66	6.500	0.450	0.350	0.50	843.0	81.60	8.06	20.69	6.37	1.26	95.38	10.17

\* JFE-STEEL original products.

## mm Sizes (Reference)

Section Designation		Area A, cm <sup>2</sup>	Depth d, mm	Width b <sub>f</sub> , mm	Web Thickness t <sub>w</sub> , mm	Flange Thickness t <sub>f</sub> , mm	Corner Radius mm	Elastic Properties						Plastic Modulus	
								Axis X-X			Axis Y-Y				
Serial Size mm	Mass Per Unit Length kg/m							I <sub>x</sub> cm <sup>4</sup>	S <sub>x</sub> cm <sup>3</sup>	r <sub>x</sub> cm	I <sub>y</sub> cm <sup>4</sup>	S <sub>y</sub> cm <sup>3</sup>	r <sub>y</sub> cm	Z <sub>x</sub> cm <sup>3</sup>	Z <sub>y</sub> cm <sup>3</sup>
W 690 x 360	500.0	636.8	762.0	369.4	32.0	57.9	15.2	605,418	15,890	30.84	48,835	2,644	8.76	18,466	4,120
	456.9	581.9	752.1	366.9	29.5	53.1	15.2	544,979	14,492	30.60	43,847	2,390	8.68	16,752	3,717
	418.2	532.9	744.0	364.5	26.9	49.0	15.2	494,712	13,299	30.46	39,676	2,177	8.63	15,289	3,377
	383.9	488.4	736.1	362.5	24.9	45.0	15.2	447,796	12,167	30.27	35,782	1,974	8.56	13,926	3,057
	349.7	445.8	728.0	360.4	23.1	40.9	15.2	402,285	11,052	30.03	31,973	1,774	8.47	12,602	2,745
	322.9	411.6	722.1	358.5	21.1	38.1	15.2	369,210	10,226	29.96	29,312	1,635	8.44	11,605	2,523
	288.7	367.7	714.0	356.4	19.1	34.0	15.2	325,496	9,118	29.75	25,724	1,444	8.36	10,300	2,223
	264.9	337.4	706.4	357.8	18.4	30.2	15.2	290,801	8,233	29.37	23,115	1,292	8.28	9,297	1,992
	239.6	305.8	700.8	356.1	16.8	27.4	15.2	261,239	7,455	29.24	20,672	1,161	8.22	8,389	1,787
	217.3	276.8	695.5	354.7	15.4	24.8	15.2	234,198	6,735	29.08	18,438	1,040	8.16	7,558	1,598
W 690 x 250	169.7	216.1	693.2	255.8	14.5	23.6	15.2	170,048	4,906	28.04	6,608	516.6	5.53	5,619	808.7
	151.8	193.5	688.1	254.4	13.1	21.1	15.2	150,741	4,381	27.89	5,799	455.9	5.47	5,005	711.7
	139.9	178.7	683.8	253.7	12.5	18.9	15.2	136,114	3,981	27.62	5,161	406.9	5.38	4,554	635.8
	125.0	160.0	678.4	253.0	11.7	16.3	15.2	118,448	3,492	27.23	4,399	347.8	5.25	4,005	544.3
W 610 x 325	340.8	433.5	660.9	333.0	24.4	43.9	12.7	318,288	9,632	27.09	27,115	1,629	7.91	11,068	2,523
	308.0	391.6	653.0	330.5	22.1	39.9	12.7	283,891	8,695	26.92	24,049	1,455	7.84	9,936	2,250
	285.7	363.2	646.9	328.9	20.6	37.1	12.7	260,363	8,050	26.78	22,032	1,340	7.79	9,163	2,068
	261.9	333.5	641.1	327.4	19.1	34.0	12.7	236,552	7,380	26.64	19,945	1,218	7.73	8,369	1,878
	241.1	307.7	635.0	329.1	17.9	31.0	12.7	215,400	6,784	26.45	18,439	1,121	7.74	7,670	1,726
	217.3	277.4	628.4	327.7	16.5	27.7	12.7	190,836	6,074	26.23	16,264	992.6	7.66	6,845	1,527
	194.9	248.4	621.8	326.5	15.4	24.4	12.7	167,346	5,383	25.94	14,162	867.5	7.55	6,057	1,335
	174.1	221.9	616.2	325.1	14.0	21.6	12.7	147,153	4,776	25.76	12,378	761.5	7.47	5,360	1,170
	154.8	197.4	611.1	323.8	12.7	19.1	12.7	129,170	4,227	25.57	10,790	666.5	7.39	4,734	1,023
	139.9	178.7	617.5	230.2	13.1	22.2	12.7	112,297	3,637	25.07	4,530	393.5	5.04	4,158	614.6
W 610 x 230	125.0	159.4	612.1	229.1	11.9	19.6	12.7	98,528	3,219	24.86	3,929	343.0	4.96	3,675	535.0
	113.1	144.5	607.6	228.3	11.2	17.3	12.7	87,367	2,876	24.61	3,433	300.7	4.88	3,285	469.1
	101.2	129.7	602.7	227.7	10.5	14.9	12.7	76,111	2,526	24.25	2,930	257.4	4.76	2,893	402.3
	92.3	117.4	603.0	178.8	10.9	15.0	12.7	64,581	2,142	23.44	1,435	160.6	3.49	2,512	257.8
W 610 x 180	81.9	104.5	598.7	177.9	10.0	12.8	12.7	56,020	1,871	23.15	1,210	136.0	3.40	2,200	218.5
	270.8	346.5	577.1	317.5	21.1	37.6	12.7	197,040	6,829	23.87	20,093	1,266	7.62	7,801	1,952
W 530 x 315	247.0	315.5	571.0	315.5	19.1	34.5	12.7	177,950	6,233	23.77	18,110	1,148	7.58	7,080	1,766
	218.8	278.7	560.3	317.8	18.3	29.2	12.7	151,168	5,396	23.28	15,653	985.1	7.49	6,116	1,519
	196.4	250.3	554.5	316.0	16.5	26.3	12.7	134,239	4,842	23.15	13,847	876.4	7.44	5,462	1,348
	181.6	231.6	550.7	314.7	15.2	24.4	12.7	123,256	4,476	23.08	12,680	805.9	7.40	5,032	1,238
	165.2	211.0	546.4	313.4	14.0	22.2	12.7	111,303	4,074	22.98	11,412	728.3	7.36	4,565	1,117
	150.3	192.3	542.5	312.2	12.7	20.3	12.7	100,763	3,715	22.91	10,315	660.8	7.33	4,147	1,012
	138.4	176.1	549.1	213.9	14.7	23.6	12.7	86,169	3,139	22.10	3,868	361.6	4.68	3,617	569.0
W 530 x 210	123.5	156.8	544.3	212.2	13.1	21.2	12.7	76,241	2,801	22.03	3,388	319.4	4.64	3,212	500.3
	108.6	138.7	539.5	210.7	11.6	18.8	12.7	66,754	2,475	21.94	2,938	278.9	4.60	2,825	435.3
	101.2	129.0	536.7	210.1	10.9	17.4	12.7	61,669	2,298	21.84	2,696	256.6	4.57	2,620	400.1
	92.3	118.1	533.1	209.3	10.2	15.6	12.7	55,340	2,076	21.68	2,392	228.6	4.51	2,366	356.2
	84.8	107.7	534.9	166.5	10.3	16.5	12.7	48,640	1,819	21.22	1,276	153.2	3.44	2,107	243.2
W 530 x 165	74.4	94.8	529.1	165.9	9.7	13.5	12.7	40,809	1,543	20.77	1,032	124.4	3.30	1,797	198.5
	65.5	83.9	524.8	165.1	8.9	11.4	12.7	35,033	1,335	20.46	858.8	104.0	3.20	1,561	166.3



## (1) Wide Flange Shapes (ASTM A 6 Inch Series)

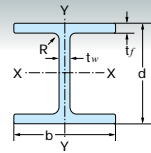
## Inch Sizes

Section Designation in.	Area A, in. <sup>2</sup>	Depth d, in.	Flange		Web Thickness t <sub>w</sub> , in.	Corner Radius in.	Elastic Properties						Plastic Modulus		
			Width b <sub>f</sub> , in.	Thick-ness t <sub>f</sub> , in.			Axis X-X			Axis Y-Y			Z <sub>x</sub> in. <sup>3</sup>	Z <sub>y</sub> in. <sup>3</sup>	
							I <sub>x</sub> in. <sup>4</sup>	S <sub>x</sub> in. <sup>3</sup>	r <sub>x</sub> in.	I <sub>y</sub> in. <sup>4</sup>	S <sub>y</sub> in. <sup>3</sup>	r <sub>y</sub> in.			
W18 x 11	x 143LBS	42.10	19.49	11.22	1.320	0.730	0.40	2,750	282.2	8.09	311.3	55.49	2.72	322.1	85.39
	x 130LBS	38.20	19.25	11.16	1.200	0.670	0.40	2,461	255.7	8.03	278.4	49.90	2.70	290.4	76.68
	x 119LBS	35.10	18.97	11.27	1.060	0.655	0.40	2,188	230.7	7.90	253.0	44.91	2.69	261.5	69.12
	x 106LBS	31.10	18.73	11.20	0.940	0.590	0.40	1,912	204.2	7.84	220.4	39.36	2.66	230.3	60.48
	x 97LBS	28.50	18.59	11.15	0.870	0.535	0.40	1,746	187.9	7.82	201.0	36.06	2.65	210.9	55.29
	x 86LBS	25.30	18.39	11.09	0.770	0.480	0.40	1,527	166.1	7.77	175.2	31.60	2.63	185.7	48.37
W16 x 10¼	x 76LBS	22.30	18.21	11.04	0.680	0.425	0.40	1,333	146.4	7.73	152.4	27.62	2.61	162.9	42.20
	x 100LBS	29.40	16.97	10.43	0.985	0.585	0.40	1,486	175.1	7.10	186.3	35.74	2.51	198.1	54.86
	x 89LBS	26.20	16.75	10.37	0.875	0.525	0.40	1,299	155.1	7.05	162.6	31.37	2.49	174.5	48.08
	x 77LBS	22.60	16.52	10.30	0.760	0.455	0.40	1,108	134.1	7.00	138.3	26.88	2.47	149.9	41.09
W14 x 16	x 67LBS	19.70	16.33	10.24	0.665	0.395	0.40	954.2	116.9	6.96	118.9	23.24	2.46	129.9	35.46
	x 730LBS	215.0	22.42	17.89	4.910	3.070	0.60	14,342	1,279	8.17	4,717	527.3	4.69	1,662	815.9
	x 665LBS	196.0	21.64	17.65	4.520	2.830	0.60	12,446	1,150	7.98	4,167	472.1	4.62	1,480	729.7
	x 605LBS	178.0	20.92	17.42	4.160	2.595	0.60	10,828	1,035	7.80	3,681	422.7	4.55	1,319	652.5
	x 550LBS	162.0	20.24	17.20	3.820	2.380	0.60	9,426	931.4	7.63	3,254	378.4	4.49	1,175	583.3
	x 500LBS	147.0	19.60	17.01	3.500	2.190	0.60	8,214	838.2	7.48	2,882	338.9	4.43	1,047	521.8
	x 455LBS	134.0	19.02	16.84	3.210	2.015	0.60	7,194	756.5	7.33	2,562	304.3	4.38	936.3	468.0
	x 426LBS	125.0	18.67	16.70	3.035	1.875	0.60	6,595	706.5	7.26	2,361	282.8	4.34	868.5	434.4
	x 398LBS	117.0	18.29	16.59	2.845	1.770	0.60	6,000	656.1	7.16	2,171	261.7	4.31	801.1	401.7
	x 370LBS	109.0	17.92	16.48	2.660	1.655	0.60	5,442	607.3	7.07	1,988	241.3	4.27	736.3	369.9
	x 342LBS	101.0	17.54	16.36	2.470	1.540	0.60	4,898	558.5	6.98	1,807	220.9	4.24	672.0	338.3
	x 311LBS	91.40	17.12	16.23	2.260	1.410	0.60	4,328	505.6	6.88	1,613	198.8	4.20	602.9	304.2
	x 283LBS	83.30	16.74	16.11	2.070	1.290	0.60	3,839	458.7	6.79	1,445	179.4	4.17	542.3	274.1
	x 257LBS	75.60	16.38	16.00	1.890	1.175	0.60	3,399	415.0	6.71	1,291	161.4	4.13	486.6	246.3
	x 233LBS	68.50	16.04	15.89	1.720	1.070	0.60	3,006	374.8	6.63	1,152	144.9	4.10	435.8	221.0
	x 211LBS	62.00	15.72	15.80	1.560	0.980	0.60	2,656	337.9	6.55	1,027	130.0	4.07	389.8	197.9
	x 193LBS	56.80	15.48	15.71	1.440	0.890	0.60	2,398	309.8	6.50	931.4	118.6	4.05	354.8	180.4
	x 176LBS	51.80	15.22	15.65	1.310	0.830	0.60	2,139	281.1	6.43	837.6	107.0	4.02	320.0	162.8
	x 159LBS	46.70	14.98	15.57	1.190	0.745	0.60	1,901	253.9	6.38	748.4	96.17	4.00	286.9	146.0
	x 145LBS	42.70	14.78	15.50	1.090	0.680	0.60	1,712	231.6	6.33	676.9	87.34	3.98	260.2	132.5
W14 x 14½	x 132LBS	38.80	14.66	14.73	1.030	0.645	0.60	1,531	208.8	6.28	548.4	74.49	3.76	234.2	113.1
	x 120LBS	35.30	14.48	14.67	0.940	0.590	0.60	1,376	190.1	6.24	494.9	67.47	3.74	212.0	102.4
	x 109LBS	32.00	14.32	14.61	0.860	0.525	0.60	1,239	173.0	6.22	446.7	61.18	3.73	191.8	92.71
	x 99LBS	29.10	14.16	14.57	0.780	0.485	0.60	1,111	156.9	6.17	401.8	55.18	3.71	173.2	83.59
	x 90LBS	26.50	14.02	14.52	0.710	0.440	0.60	999.1	142.5	6.14	362.4	49.91	3.70	156.6	75.56
W12 x 12	x 190LBS	55.80	14.38	12.67	1.735	1.060	0.60	1,892	263.1	5.82	589.4	93.03	3.25	311.2	142.5
	x 170LBS	50.00	14.03	12.57	1.560	0.960	0.60	1,645	234.5	5.74	517.3	82.31	3.22	274.7	125.9
	x 152LBS	44.70	13.71	12.48	1.400	0.870	0.60	1,432	209.0	5.66	454.2	72.80	3.19	242.6	111.3
	x 136LBS	39.90	13.41	12.40	1.250	0.790	0.60	1,244	185.6	5.58	397.8	64.15	3.16	213.6	97.97
	x 120LBS	35.30	13.12	12.32	1.105	0.710	0.60	1,071	163.3	5.51	344.8	55.97	3.13	186.3	85.39
	x 106LBS	31.20	12.89	12.22	0.990	0.610	0.60	933.3	144.8	5.47	301.4	49.32	3.11	163.8	75.07
	x 96LBS	28.20	12.71	12.16	0.900	0.550	0.60	833.0	131.1	5.44	269.9	44.39	3.09	147.3	67.49
	x 87LBS	25.60	12.53	12.13	0.810	0.515	0.60	740.1	118.1	5.38	240.8	39.72	3.07	132.1	60.39
	x 79LBS	23.20	12.38	12.08	0.735	0.470	0.60	662.4	107.0	5.34	216.1	35.78	3.05	119.0	54.34
	x 72LBS	21.10	12.25	12.04	0.670	0.430	0.60	596.8	97.43	5.31	195.0	32.39	3.04	107.9	49.17
	x 65LBS	19.10	12.12	12.00	0.605	0.390	0.60	532.7	87.91	5.28	174.3	29.06	3.02	96.85	44.08

## mm Sizes (Reference)

Section Designation		Area A, cm²	Depth d, mm	Width b <sub>f</sub> , mm	Web Thickness t <sub>w</sub> , mm	Flange Thickness t <sub>f</sub> , mm	Corner Radius mm	Elastic Properties						Plastic Modulus		
								Axis X-X			Axis Y-Y					
Serial	Size mm	Mass Per Unit Length kg/m						I <sub>x</sub> cm⁴	S <sub>x</sub> cm³	r <sub>x</sub> cm	I <sub>y</sub> cm⁴	S <sub>y</sub> cm³	r <sub>y</sub> cm	Z <sub>x</sub> cm³	Z <sub>y</sub> cm³	
W 460 x 280		212.8	271.6	495.0	285.0	18.5	33.5	10.2	114,438	4,624	20.54	12,960	909.5	6.91	5,278	1,400
		193.5	246.5	489.0	283.5	17.0	30.5	10.2	102,493	4,192	20.39	11,594	817.9	6.86	4,761	1,257
		177.1	226.5	481.8	286.1	16.6	26.9	10.2	91,043	3,779	20.06	10,524	735.7	6.82	4,284	1,132
		157.7	200.6	475.7	284.5	15.0	23.9	10.2	79,600	3,347	19.90	9,178	645.2	6.76	3,775	991.3
		144.4	183.9	472.2	283.1	13.6	22.1	10.2	72,706	3,079	19.87	8,367	591.1	6.74	3,457	906.2
		128.0	163.2	467.1	281.7	12.2	19.6	10.2	63,580	2,722	19.73	7,295	517.9	6.68	3,043	792.7
W 410 x 260		113.1	143.9	462.5	280.3	10.8	17.3	10.2	55,458	2,398	19.63	6,344	452.7	6.64	2,669	691.6
		148.8	189.7	431.0	264.8	14.9	25.0	10.2	61,831	2,869	18.04	7,754	585.6	6.39	3,246	899.1
		132.4	169.0	425.4	263.3	13.3	22.2	10.2	54,058	2,541	17.90	6,768	514.1	6.33	2,859	787.9
		114.6	145.8	419.6	261.5	11.6	19.3	10.2	46,112	2,198	17.78	5,758	440.3	6.28	2,457	673.3
		99.7	127.1	414.8	260.0	10.0	16.9	10.2	39,726	1,915	17.69	4,951	380.9	6.25	2,128	581.1
		1,086.0	1,387.0	569.5	454.4	78.0	124.7	15.2	597,023	20,967	20.76	196,299	8,640	11.91	27,233	13,369
W 360 x 410		989.6	1,265.0	549.7	448.3	71.9	114.8	15.2	518,135	18,852	20.27	173,405	7,736	11.72	24,254	11,957
		900.3	1,148.0	531.4	442.3	65.9	105.6	15.2	450,610	16,959	19.82	153,078	6,922	11.55	21,608	10,684
		818.5	1,045.0	514.1	436.9	60.5	97.0	15.2	392,354	15,264	19.39	135,477	6,202	11.40	19,260	9,560
		744.1	948.4	497.8	432.1	55.6	88.9	15.2	341,874	13,735	18.99	120,016	5,555	11.25	17,163	8,553
		677.1	864.5	483.1	427.6	51.2	81.5	15.2	299,421	12,396	18.63	106,612	4,987	11.11	15,341	7,669
		634.0	806.5	474.2	424.1	47.6	77.1	15.2	274,516	11,578	18.43	98,309	4,636	11.03	14,233	7,120
		592.3	754.8	464.6	421.4	45.0	72.3	15.2	249,785	10,753	18.19	90,378	4,289	10.94	13,130	6,583
		550.6	703.2	455.2	418.5	42.0	67.6	15.2	226,554	9,954	17.96	82,743	3,954	10.86	12,068	6,063
		509.0	651.6	445.5	415.5	39.1	62.7	15.2	203,839	9,151	17.73	75,178	3,619	10.77	11,011	5,543
		462.8	589.7	434.8	412.2	35.8	57.4	15.2	180,062	8,283	17.47	67,133	3,257	10.67	9,877	4,983
		421.1	537.4	425.2	409.2	32.8	52.6	15.2	159,798	7,516	17.25	60,147	2,940	10.58	8,887	4,492
		382.5	487.7	416.1	406.3	29.8	48.0	15.2	141,537	6,803	17.04	53,746	2,646	10.50	7,975	4,038
		346.7	441.9	407.4	403.6	27.2	43.7	15.2	125,102	6,141	16.83	47,932	2,375	10.42	7,140	3,621
		314.0	400.0	399.3	401.3	24.9	39.6	15.2	110,549	5,537	16.63	42,721	2,129	10.34	6,387	3,243
		287.2	366.5	393.2	399.0	22.6	36.6	15.2	99,799	5,076	16.51	38,762	1,943	10.29	5,815	2,956
		261.9	334.2	386.6	397.5	21.1	33.3	15.2	89,041	4,606	16.33	34,856	1,754	10.22	5,244	2,667
		236.6	301.3	380.5	395.4	18.9	30.2	15.2	79,162	4,161	16.20	31,167	1,576	10.17	4,702	2,394
		215.8	275.5	375.4	393.7	17.3	27.7	15.2	71,244	3,796	16.09	28,179	1,431	10.12	4,264	2,172
W 360 x 370		196.4	250.3	372.4	374.0	16.4	26.2	15.2	63,720	3,422	15.96	22,823	1,220	9.55	3,838	1,853
		178.6	227.7	367.8	372.6	15.0	23.9	15.2	57,287	3,115	15.85	20,599	1,106	9.51	3,475	1,678
		162.2	206.5	363.7	371.0	13.3	21.8	15.2	51,539	2,834	15.79	18,596	1,002	9.49	3,142	1,519
		147.3	187.7	359.7	370.0	12.3	19.8	15.2	46,240	2,571	15.68	16,731	904.4	9.43	2,838	1,370
		133.9	171.0	356.1	368.8	11.2	18.0	15.2	41,575	2,335	15.60	15,079	817.7	9.40	2,565	1,238
		282.8	360.0	365.3	321.8	26.9	44.1	15.2	78,767	4,312	14.79	24,527	1,524	8.25	5,099	2,335
W 310 x 310		253.0	322.6	356.4	319.3	24.4	39.6	15.2	68,493	3,844	14.57	21,535	1,349	8.17	4,502	2,064
		226.2	288.4	348.2	317.0	22.1	35.6	15.2	59,608	3,424	14.37	18,909	1,193	8.09	3,975	1,823
		202.4	257.4	340.6	315.0	20.1	31.8	15.2	51,789	3,041	14.18	16,562	1,052	8.02	3,501	1,606
		178.6	227.7	332.2	312.9	18.0	28.1	15.2	44,560	2,675	13.99	14,349	917.1	7.94	3,053	1,399
		157.7	201.3	327.4	310.4	15.5	25.2	15.2	38,850	2,373	13.90	12,547	808.4	7.90	2,684	1,230
		142.9	181.9	322.8	308.9	14.0	22.9	15.2	34,664	2,148	13.80	11,239	727.7	7.86	2,413	1,106
		129.5	165.2	318.3	308.0	13.1	20.6	15.2	30,808	1,936	13.67	10,024	650.9	7.80	2,164	989.5
		117.6	149.7	314.5	306.8	11.9	18.7	15.2	27,578	1,754	13.58	8,992	586.2	7.75	1,951	890.4
		107.1	136.1	311.1	305.8	10.9	17.0	15.2	24,829	1,596	13.50	8,117	530.8	7.72	1,767	805.8
		96.7	123.2	307.8	304.8	9.9	15.3	15.2	22,089	1,435	13.42	7,225	474.1	7.67	1,581	719.2





## (2) H Bearing Piles (ASTM A 6 Inch Series)

### Inch Sizes

Section Designation in.	Area A, in. <sup>2</sup>	Depth d, in.	Flange		Web Thick- ness t <sub>w</sub> , in.	Corner Radius in.	Elastic Properties						Plastic Modulus	
			Width b <sub>f</sub> , in.	Thick- ness t <sub>f</sub> , in.			Axis X-X			Axis Y-Y				
							I <sub>x</sub> in. <sup>4</sup>	S <sub>x</sub> in. <sup>3</sup>	r <sub>x</sub> in.	I <sub>y</sub> in. <sup>4</sup>	S <sub>y</sub> in. <sup>3</sup>	r <sub>y</sub> in.	Z <sub>x</sub> in. <sup>3</sup>	Z <sub>y</sub> in. <sup>3</sup>
W14 x 14½ x 117LBS	34.40	14.21	14.89	0.805	0.805	0.60	1,224	172.2	5.96	443.1	59.54	3.59	194.5	91.39
x 102LBS	30.00	14.01	14.79	0.705	0.705	0.60	1,053	150.3	5.92	380.2	51.43	3.56	168.6	78.77
x 89LBS	26.10	13.83	14.70	0.615	0.615	0.60	904.0	130.7	5.88	325.6	44.31	3.53	145.7	67.73
x 73LBS	21.40	13.61	14.59	0.505	0.505	0.60	728.7	107.1	5.84	261.3	35.83	3.49	118.5	54.64
W12 x 12 x 74LBS	21.80	12.13	12.22	0.610	0.605	0.60	569.1	93.83	5.11	185.6	30.38	2.92	105.5	46.64
x 63LBS	18.40	11.94	12.13	0.515	0.515	0.60	472.3	79.11	5.06	153.2	25.27	2.88	88.31	38.70
x 53LBS	15.50	11.78	12.05	0.435	0.435	0.60	393.2	66.75	5.03	126.8	21.06	2.86	74.03	32.18

### mm Sizes (Reference)

Section Designation		Area A, cm <sup>2</sup>	Depth d, mm	Width b <sub>f</sub> , mm	Web Thickness t <sub>w</sub> , mm	Flange Thickness t <sub>f</sub> , mm	Corner Radius mm	Elastic Properties						Plastic Modulus	
								Axis X-X			Axis Y-Y				
Serial Size mm	Mass Per Unit Length kg/m							I <sub>x</sub> cm <sup>4</sup>	S <sub>x</sub> cm <sup>3</sup>	r <sub>x</sub> cm	I <sub>y</sub> cm <sup>4</sup>	S <sub>y</sub> cm <sup>3</sup>	r <sub>y</sub> cm	Z <sub>x</sub> cm <sup>3</sup>	Z <sub>y</sub> cm <sup>3</sup>
HP 360 x 370	174.1	221.9	360.9	378.1	20.5	20.5	15.2	50,935	2,823	15.14	18,450	975.9	9.11	3,187	1,498
	151.8	193.5	355.9	375.5	17.9	17.9	15.2	43,830	2,463	15.04	15,823	842.8	9.04	2,763	1,291
	132.4	168.4	351.3	373.3	15.6	15.6	15.2	37,630	2,142	14.94	13,555	726.3	8.97	2,388	1,110
	108.6	138.1	345.7	370.5	12.8	12.8	15.2	30,339	1,755	14.82	10,883	587.5	8.88	1,942	895.7
HP 310 x 310	110.1	140.6	308.1	310.3	15.4	15.5	15.2	23,684	1,537	12.97	7,724	497.9	7.41	1,728	764.3
	93.8	118.7	303.3	308.0	13.1	13.1	15.2	19,660	1,296	12.86	6,377	414.1	7.33	1,447	634.2
	78.9	100.0	299.2	305.9	11.1	11.1	15.2	16,361	1,094	12.78	5,277	345.0	7.26	1,213	527.2

## (3) Wide Flange Shapes (BS Inch Series)

### Inch Sizes

Section Designation in.	Area A, in. <sup>2</sup>	Depth d, in.	Flange		Web Thickness t <sub>w</sub> , in.	Corner Radius in.	Elastic Properties						Plastic Modulus	
			Width b <sub>f</sub> , in.	Thick-ness t <sub>f</sub> , in.			Axis X-X			Axis Y-Y				
							I <sub>x</sub> in. <sup>4</sup>	S <sub>x</sub> in. <sup>3</sup>	r <sub>x</sub> in.	I <sub>y</sub> in. <sup>4</sup>	S <sub>y</sub> in. <sup>3</sup>	r <sub>y</sub> in.	Z <sub>x</sub> in. <sup>3</sup>	Z <sub>y</sub> in. <sup>3</sup>
W36 x 16½ x 260LBS	76.50	36.26	16.55	1.440	0.840	0.95	17,269	952.5	15.03	1,090	131.7	3.78	1,077	203.6
x 230LBS	67.60	35.90	16.47	1.260	0.760	0.95	15,022	836.9	14.90	939.7	114.1	3.73	943.3	176.2
W36 x 12 x 194LBS	57.00	36.49	12.15	1.260	0.765	0.75	12,140	665.4	14.58	938.1	62.24	2.57	768.2	98.24
x 170LBS	50.00	36.17	12.03	1.100	0.680	0.75	10,498	580.5	14.48	320.2	53.23	2.53	668.4	83.77
x 150LBS	44.20	35.85	11.98	0.940	0.625	0.75	9,039	504.3	14.30	269.8	45.07	2.47	581.4	70.95
x 135LBS	39.70	35.55	11.95	0.790	0.600	0.75	7,801	438.9	14.01	225.4	37.73	2.38	509.4	59.69
W33 x 11½ x 152LBS	44.70	33.49	11.57	1.055	0.635	0.70	8,157	487.1	13.50	272.8	47.17	2.47	558.6	73.92
x 130LBS	38.30	33.09	11.51	0.855	0.580	0.70	6,709	405.5	13.23	217.9	37.86	2.39	466.5	59.46
x 118LBS	34.70	32.86	11.48	0.740	0.550	0.70	5,901	359.1	13.05	187.1	32.60	2.32	414.8	51.32
W30 x 10½ x 132LBS	38.90	30.31	10.55	1.000	0.615	0.65	5,765	380.4	12.18	196.1	37.18	2.25	437.4	58.44
x 116LBS	34.20	30.01	10.50	0.850	0.565	0.65	4,933	328.8	12.01	164.3	31.30	2.19	378.4	49.23
x 99LBS	29.10	29.65	10.45	0.670	0.520	0.65	3,995	269.5	11.72	127.8	24.46	2.10	312.2	38.64
W27 x 10 x 114LBS	33.50	27.29	10.07	0.930	0.570	0.60	4,085	299.4	11.04	158.7	31.53	2.18	342.9	49.35
x 102LBS	30.00	27.09	10.02	0.830	0.515	0.60	3,622	267.4	10.98	139.3	27.82	2.15	305.4	43.43
x 94LBS	27.70	26.92	9.990	0.745	0.490	0.60	3,271	243.0	10.88	124.1	24.84	2.12	277.9	38.82
x 84LBS	24.80	26.71	9.960	0.640	0.460	0.60	2,846	213.1	10.72	105.6	21.21	2.07	244.4	33.20
W24 x 9 x 94LBS	27.70	24.31	9.065	0.875	0.515	0.50	2,699	222.0	9.87	108.9	24.03	1.98	253.8	37.53
x 84LBS	24.70	24.10	9.020	0.770	0.470	0.50	2,367	196.5	9.79	94.40	20.93	1.95	224.2	32.64
x 76LBS	22.40	23.92	8.990	0.680	0.440	0.50	2,099	175.5	9.69	82.53	18.36	1.92	200.5	28.64
x 68LBS	20.10	23.73	8.965	0.585	0.415	0.50	1,829	154.1	9.55	70.41	15.71	1.87	176.6	24.55
W21 x 8¼ x 73LBS	21.50	21.24	8.295	0.740	0.455	0.50	1,603	151.0	8.64	70.57	17.02	1.81	172.3	26.55
x 68LBS	20.00	21.13	8.270	0.685	0.430	0.50	1,481	140.2	8.60	64.73	15.65	1.80	159.9	24.41
x 62LBS	18.30	20.99	8.240	0.615	0.400	0.50	1,330	126.7	8.54	57.47	13.95	1.77	144.4	21.74

### mm Sizes (Reference)

Section Designation		Area A, cm <sup>2</sup>	Depth d, mm	Width b <sub>f</sub> , mm	Web Thickness t <sub>w</sub> , mm	Flange Thickness t <sub>f</sub> , mm	Corner Radius mm	Elastic Properties						Plastic Modulus	
								Axis X-X			Axis Y-Y				
Serial Size mm	Mass Per Unit Length kg/m							I <sub>x</sub> cm <sup>4</sup>	S <sub>x</sub> cm <sup>3</sup>	r <sub>x</sub> cm	I <sub>y</sub> cm <sup>4</sup>	S <sub>y</sub> cm <sup>3</sup>	r <sub>y</sub> cm	Z <sub>x</sub> cm <sup>3</sup>	Z <sub>y</sub> cm <sup>3</sup>
914 x 419	388.0	494.2	921.0	420.5	21.4	36.6	24.1	719,634	15,627	38.16	45,438	2,161	9.59	17,665	3,341
	343.3	437.3	911.8	418.5	19.4	32.0	24.1	625,779	13,726	37.83	39,156	1,871	9.46	15,477	2,890
914 x 305	289.1	368.3	926.6	307.7	19.5	32.0	19.1	504,186	10,883	37.00	15,597	1,014	6.51	12,570	1,601
	253.4	322.8	918.4	305.5	17.3	27.9	19.1	436,304	9,501	36.76	13,301	870.8	6.42	10,942	1,371
	224.2	285.6	910.4	304.1	15.9	23.9	19.1	376,413	8,269	36.30	11,236	739.0	6.27	9,535	1,163
	200.9	255.9	903.0	303.3	15.1	20.2	19.1	325,254	7,204	35.65	9,423	621.4	6.07	8,351	982.0
838 x 292	226.5	288.6	850.9	293.8	16.1	26.8	17.8	339,703	7,985	34.31	11,360	773.3	6.27	9,155	1,212
	193.8	246.8	840.7	292.4	14.7	21.7	17.8	279,175	6,641	33.63	9,066	620.1	6.06	7,640	973.8
	175.9	224.0	834.9	291.7	14.0	18.8	17.8	246,021	5,893	33.14	7,799	534.7	5.90	6,808	841.9
762 x 267	196.8	250.6	769.8	268.0	15.6	25.4	16.5	239,956	6,234	30.94	8,175	610.1	5.71	7,167	958.6
	173.0	220.4	762.2	266.7	14.3	21.6	16.5	205,282	5,387	30.52	6,850	513.7	5.58	6,198	807.5
	146.9	187.2	754.0	265.2	12.8	17.5	16.5	168,501	4,470	30.00	5,455	411.4	5.40	5,156	647.2
686 x 254	170.2	216.8	692.9	255.8	14.5	23.7	15.2	170,326	4,916	28.03	6,630	518.4	5.53	5,631	811.4
	152.4	194.1	687.5	254.5	13.2	21.0	15.2	150,355	4,374	27.83	5,784	454.5	5.46	5,000	710.2
	140.1	178.4	683.5	253.7	12.4	19.0	15.2	136,267	3,987	27.64	5,183	408.6	5.39	4,558	638.2
	125.2	159.5	677.9	253.0	11.7	16.2	15.2	117,992	3,481	27.20	4,383	346.5	5.24	3,994	542.4
610 x 229	139.9	178.2	617.2	230.2	13.1	22.1	12.7	111,777	3,622	25.05	4,505	391.4	5.03	4,142	611.4
	125.1	159.3	612.2	229.0	11.9	19.6	12.7	98,610	3,221	24.88	3,932	343.4	4.97	3,676	535.4
	113.0	143.9	607.6	228.2	11.1	17.3	12.7	87,318	2,874	24.63	3,434	301.0	4.88	3,281	469.3
	101.2	128.9	602.6	227.6	10.5	14.8	12.7	75,780	2,515	24.24	2,915	256.1	4.75	2,881	400.2
533 x 210	109.0	138.9	539.5	210.8	11.6	18.8	12.7	66,822	2,477	21.94	2,943	279.2	4.60	2,828	435.8
	101.0	128.7	536.7	210.0	10.8	17.4	12.7	61,519	2,292	21.87	2,692	256.4	4.57	2,612	399.4
	92.1	117.4	533.1	209.3	10.1	15.6	12.7	55,227	2,072	21.69	2,389	228.3	4.51	2,360	355.6

(3) Wide Flange Shapes (BS Inch Series)

Inch Sizes

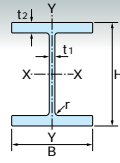
Section Designation in.	Area A, in. <sup>2</sup>	Depth d, in.	Flange		Web Thick- ness t <sub>w</sub> , in.	Corner Radius in.	Elastic Properties						Plastic Modulus		
			Width b <sub>f</sub> , in.	Thick- ness t <sub>f</sub> , in.			Axis X-X			Axis Y-Y					
							I <sub>x</sub> in. <sup>4</sup>	S <sub>x</sub> in. <sup>3</sup>	r <sub>x</sub> in.	I <sub>y</sub> in. <sup>4</sup>	S <sub>y</sub> in. <sup>3</sup>	r <sub>y</sub> in.	Z <sub>x</sub> in. <sup>3</sup>	Z <sub>y</sub> in. <sup>3</sup>	
W14 x 16	x 426LBS	125.0	18.67	16.70	3.035	1.875	0.60	6,595	706.5	7.26	2,361	282.8	4.34	868.5	434.4
	x 370LBS	109.0	17.92	16.48	2.660	1.655	0.60	5,442	607.3	7.07	1,988	241.3	4.27	736.3	369.9
	x 314LBS	92.30	17.19	16.24	2.283	1.415	0.60	4,399	511.9	6.90	1,631	201.0	4.20	610.8	307.5
	x 264LBS	77.63	16.50	16.03	1.938	1.205	0.60	3,526	427.4	6.74	1,331	166.1	4.14	502.2	253.7
	x 228LBS	67.06	16.00	15.87	1.688	1.045	0.60	2,942	367.8	6.62	1,125	141.8	4.10	426.8	216.1
	x 193LBS	56.80	15.48	15.71	1.440	0.890	0.60	2,398	309.8	6.50	931.4	118.6	4.05	354.8	180.4
	x 158LBS	46.47	15.00	15.55	1.188	0.730	0.60	1,901	253.4	6.40	745.0	95.82	4.0	286.1	145.5
W14 x 14½	x 136LBS	39.98	14.75	14.74	1.063	0.660	0.60	1,593	216.0	6.31	567.8	77.04	3.77	242.7	117.0
	x 103LBS	30.26	14.25	14.58	0.813	0.495	0.60	1,166	163.6	6.21	419.7	57.59	3.72	180.9	87.24
W12 x 12	x 190LBS	55.80	14.38	12.67	1.735	1.060	0.60	1,892	263.1	5.82	589.4	93.03	3.25	311.2	142.5
	x 161LBS	47.38	13.88	12.52	1.486	0.905	0.60	1,542	222.2	5.70	486.3	77.71	3.20	259.1	118.8
	x 133LBS	39.11	13.38	12.37	1.236	0.755	0.60	1,221	182.5	5.59	389.9	63.07	3.16	209.7	96.20
	x 106LBS	31.20	12.89	12.22	0.990	0.610	0.60	933.3	144.8	5.47	301.4	49.32	3.11	163.8	75.07
	x 92LBS	27.06	12.62	12.16	0.856	0.545	0.60	788.9	125.0	5.40	256.4	42.19	3.08	140.3	64.17
	x 79LBS	23.20	12.38	12.08	0.735	0.470	0.60	662.4	107.0	5.34	216.1	35.78	3.05	119.0	54.34
	x 65LBS	19.10	12.12	12.00	0.605	0.390	0.60	532.7	87.91	5.28	174.3	29.06	3.02	96.85	44.08
W14 x 14½	x 117LBS	34.40	14.21	14.89	0.805	0.805	0.60	1,224	172.2	5.96	443.1	59.54	3.59	194.5	91.39
	x 102LBS	30.00	14.01	14.79	0.705	0.705	0.60	1,053	150.3	5.92	380.2	51.43	3.56	168.6	78.77
	x 89LBS	26.10	13.83	14.70	0.615	0.615	0.60	904.0	130.7	5.88	325.6	44.31	3.53	145.7	67.73
	x 73LBS	21.40	13.61	14.59	0.505	0.505	0.60	728.7	107.1	5.84	261.3	35.83	3.49	118.5	54.64
W12 x 12	x 125LBS	36.78	12.93	12.62	1.009	1.009	0.60	1,024	158.5	5.28	339.0	53.73	3.04	183.4	83.31
	x 100LBS	29.45	12.54	12.43	0.815	0.815	0.60	793.8	126.6	5.19	261.1	42.03	2.98	144.6	64.89
	x 74LBS	21.80	12.13	12.22	0.610	0.605	0.60	569.1	93.83	5.11	185.6	30.38	2.92	105.5	46.64
	x 53LBS	15.50	11.78	12.05	0.435	0.435	0.60	393.2	66.75	5.03	126.8	21.06	2.86	74.03	32.18

mm Sizes (Reference)

Section Designation		Area A, cm <sup>2</sup>	Depth d, mm	Width b <sub>f</sub> , mm	Web Thickness t <sub>w</sub> , mm	Flange Thickness t <sub>f</sub> , mm	Corner Radius mm	Elastic Properties						Plastic Modulus	
								Axis X-X			Axis Y-Y				
Serial	Size mm	Mass Per Unit Length kg/m						I <sub>x</sub> cm <sup>4</sup>	S <sub>x</sub> cm <sup>3</sup>	r <sub>x</sub> cm	I <sub>y</sub> cm <sup>4</sup>	S <sub>y</sub> cm <sup>3</sup>	r <sub>y</sub> cm	Z <sub>x</sub> cm <sup>3</sup>	Z <sub>y</sub> cm <sup>3</sup>
356 x 406	633.9	807.5	474.6	424.0	47.6	77.0	15.2	274,845	11,582	18.45	98,125	4,629	11.02	14,235	7,108
	551.0	701.9	455.6	418.5	42.1	67.5	15.2	226,938	9,962	17.98	82,671	3,951	10.85	12,076	6,058
	467.0	487.5	136.6	412.2	35.8	58.0	15.2	8,729	1,278	4.23	67,719	3,286	11.79	1,884	4,938
	393.0	500.6	419.0	407.0	30.6	49.2	15.2	146,618	6,998	17.11	55,367	2,721	10.52	8,222	4,154
	339.9	433.0	406.4	403.0	26.6	42.9	15.2	122,543	6,031	16.82	46,853	2,325	10.40	6,999	3,544
	287.1	365.7	393.6	399.0	22.6	36.5	15.2	99,875	5,075	16.53	38,677	1,939	10.28	5,812	2,949
	235.1	299.4	381.0	394.8	18.4	30.2	15.2	79,085	4,151	16.25	30,993	1,570	10.17	4,687	2,383
356 x 368	201.9	257.2	374.6	374.7	16.5	27.0	15.2	66,261	3,538	16.05	23,688	1,264	9.60	3,972	1,920
	152.9	194.8	362.0	370.5	12.3	20.7	15.2	48,589	2,684	15.79	17,553	947.5	9.49	2,965	1,435
305 x 305	282.9	360.4	365.3	322.2	26.8	44.1	15.2	78,872	4,318	14.79	24,635	1,529	8.27	5,105	2,342
	240.0	305.8	352.5	318.4	23.0	37.7	15.2	64,202	3,643	14.49	20,315	1,276	8.15	4,247	1,951
	198.1	252.4	339.9	314.5	19.1	31.4	15.2	50,904	2,995	14.20	16,299	1,037	8.04	3,440	1,581
	158.1	201.4	327.1	311.2	15.8	25.0	15.2	38,747	2,369	13.87	12,569	807.8	7.90	2,680	1,230
	136.9	174.4	320.5	309.2	13.8	21.7	15.2	32,814	2,048	13.72	10,700	692.1	7.83	2,297	1,053
	117.9	150.2	314.5	307.4	12.0	18.7	15.2	27,672	1,760	13.57	9,059	589.4	7.77	1,958	895.4
	96.9	123.4	307.9	305.3	9.9	15.4	15.2	22,249	1,445	13.42	7,308	478.7	7.69	1,592	726.1
356 x 368	173.9	221.5	361.4	378.5	20.3	20.4	15.2	51,009	2,823	15.18	18,463	975.6	9.13	3,186	1,497
	152.0	193.7	356.4	376.0	17.8	17.9	15.2	43,971	2,468	15.07	15,877	844.5	9.05	2,767	1,293
	133.0	169.4	352.0	373.8	15.6	15.7	15.2	37,983	2,158	14.98	13,680	731.9	8.99	2,406	1,119
	108.9	138.7	346.4	371.0	12.8	12.9	15.2	30,631	1,769	14.86	10,987	592.3	8.90	1,956	902.9
305 x 305	186.0	236.9	328.3	320.9	25.5	25.6	15.2	42,609	2,596	13.41	14,143	881.5	7.73	3,003	1,366
	149.1	189.9	318.5	316.0	20.6	20.7	15.2	33,067	2,076	13.20	10,910	690.5	7.58	2,370	1,066
	110.0	140.1	307.9	310.7	15.3	15.4	15.2	23,562	1,531	12.97	7,709	496.2	7.42	1,720	761.7
	78.9	100.5	299.3	306.4	11.0	11.1	15.2	16,444	1,099	12.79	5,326	347.7	7.28	1,218	531.2



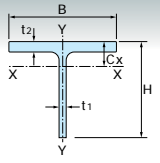
## (4) Wide Flange Shapes (JIS G 3192 Metric Series)



	Nominal Size	Section dimensions mm					Sectional area cm <sup>2</sup>	Unit weight kg/m	Moment of Inertia cm <sup>4</sup>		Radius of Gyration cm		Modulus of section cm <sup>3</sup>		Performance of section for bending stress	
		H	B	t <sub>1</sub>	t <sub>2</sub>	r			I <sub>x</sub>	I <sub>y</sub>	i <sub>x</sub>	i <sub>y</sub>	Z <sub>x</sub>	Z <sub>y</sub>	I <sub>b</sub>	η
Large width	100×100	100	100	6	8	8	21.59	16.9	378	134	4.18	2.49	75.6	26.7	2.75	3.44
	125×125	125	125	6.5	9	8	30.00	23.6	839	293	5.29	3.13	134	46.9	3.45	3.84
	150×150	150	150	7	10	8	39.65	31.1	1,620	563	6.40	3.77	216	75.1	4.15	4.15
	175×175	175	175	7.5	11	13	51.42	40.4	2,900	984	7.50	4.37	331	112	4.80	4.36
	200×200	200	200	8	12	13	63.53	49.9	4,720	1,600	8.62	5.02	472	160	5.50	4.59
	250×250	250	250	9	14	13	91.43	71.8	10,700	3,650	10.8	6.32	860	292	6.91	4.93
	300×300	300	300	10	15	13	118.4	93.0	20,200	6,750	13.1	7.55	1,350	450	8.28	5.52
	350×350	350	350	12	19	13	171.9	135	39,800	13,600	15.2	8.89	2,280	776	9.71	5.11
Medium width	400×400	400	400	13	21	22	218.7	172	66,600	22,400	17.5	10.1	3,330	1,120	11.0	5.25
		414	405	18	28	22	295.4	232	92,800	31,000	17.7	10.2	4,480	1,530	11.2	4.10
		428	407	20	35	22	360.7	283	119,000	39,400	18.2	10.4	5,570	1,930	11.4	3.42
		458	417	30	50	22	528.6	415	187,000	60,500	18.8	10.7	8,170	2,900	11.8	2.58
		498	432	45	70	22	770.1	605	298,000	94,400	19.7	11.1	12,000	4,370	12.3	2.03
	150×100	148	100	6	9	8	26.35	20.7	1,000	150	6.17	2.39	135	30.1	2.71	4.46
	200×150	194	150	6	9	8	38.11	29.9	2,630	507	8.30	3.65	271	67.6	4.09	5.87
	250×175	244	175	7	11	13	55.49	43.6	6,040	984	10.4	4.21	495	112	4.72	5.99
	300×200	294	200	8	12	13	71.05	55.8	11,100	1,600	12.5	4.75	756	160	5.38	6.59
	350×250	340	250	9	14	13	99.53	78.1	21,200	3,650	14.6	6.05	1,250	292	6.79	6.60
	400×300	390	300	10	16	13	133.2	105	37,900	7,200	16.9	7.35	1,940	480	8.19	6.66
	450×300	440	300	11	18	13	153.9	121	54,700	8,110	18.9	7.26	2,490	540	8.16	6.65
Small width	500×300	488	300	11	18	13	159.2	125	68,900	8,110	20.8	7.14	2,820	540	8.10	7.32
	600×300	588	300	12	20	13	187.2	147	114,000	9,010	24.7	6.94	3,890	601	8.01	7.85
	700×300	700	300	13	24	18	231.5	182	197,000	10,800	29.2	6.83	5,640	721	7.95	7.73
	800×300	800	300	14	26	18	263.5	207	286,000	11,700	33.0	6.67	7,160	781	7.87	8.08
	900×300	890	299	15	23	18	266.9	210	339,000	10,300	35.6	6.20	7,610	687	7.59	9.83
		900	300	16	28	18	305.8	240	404,000	12,600	36.4	6.43	8,990	842	7.75	8.31
		912	302	18	34	18	360.1	283	491,000	15,700	36.9	6.59	10,800	1,040	7.90	7.01
		*918	303	19	37	18	387.4	304	535,000	17,200	37.2	6.67	11,700	1,140	7.96	6.52
	150×75	150	75	5	7	8	17.85	14.0	666	49.5	6.11	1.66	88.8	13.2	1.96	5.60
	175×90	175	90	5	8	8	22.90	18.0	1,210	97.5	7.26	2.06	138	21.7	2.39	5.81
	200×100	200	100	5.5	8	8	26.67	20.9	1,810	134	8.23	2.24	181	26.7	2.63	6.57
	250×125	250	125	6	9	8	36.97	29.0	3,960	294	10.4	2.82	317	47.0	3.30	7.33
	300×150	300	150	6.5	9	13	46.78	36.7	7,210	508	12.4	3.29	481	67.7	3.87	8.61
	350×175	350	175	7	11	13	62.91	49.4	13,500	984	14.6	3.96	771	112	4.60	8.35

Note : Size marked \* is of a specially rolled steel which is not manufactured usually. If you want the product of that size, consult with us beforehand.

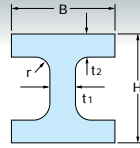
## (5) Structural Tees (JIS G 3192 Metric Series)



	Nominal Size	Section dimensions mm					Sectional area cm <sup>2</sup>	Unit weight kg/m	Moment of Inertia cm <sup>4</sup>		Radius of Gyration cm		Modulus of section cm <sup>3</sup>		Size and Section Properties C <sub>x</sub> cm
		H	B	t <sub>1</sub>	t <sub>2</sub>	r			I <sub>x</sub>	I <sub>y</sub>	i <sub>x</sub>	i <sub>y</sub>	Z <sub>x</sub>	Z <sub>y</sub>	
Large width	50×100	50	100	6	8	8	10.79	8.47	16.1	66.8	1.22	2.49	4.03	13.4	1.00
	62.5×125	62.5	125	6.5	9	8	15.00	11.8	35.0	147	1.53	3.13	6.91	23.5	1.19
	75×150	75	150	7	10	8	19.82	15.6	66.4	282	1.83	3.77	10.8	37.5	1.37
	87.5×175	87.5	175	7.5	11	13	25.71	20.2	115	492	2.11	4.37	15.9	56.2	1.55
	100×200	100	200	8	12	13	31.77	24.9	184	801	2.41	5.02	22.3	80.1	1.73
	125×250	125	250	9	14	13	45.72	35.9	412	1,820	3.00	6.32	39.5	146	2.08
	150×300	150	300	10	15	13	59.23	46.5	798	3,380	3.67	7.55	63.7	225	2.47
	175×350	175	350	12	19	13	85.95	67.5	1,520	6,790	4.20	8.89	104	388	2.87
	200×400	200	400	13	21	22	109.3	85.8	2,480	11,200	4.76	10.1	147	560	3.21
		214	407	20	35	22	180.3	142	4,380	19,700	4.93	10.4	250	967	3.90
229		417	30	50	22	264.3	207	7,470	30,300	5.32	10.7	414	1,450	4.85	
249		432	45	70	22	385.0	302	13,200	47,200	5.87	11.1	706	2,180	6.13	
Medium width	75×100	74	100	6	9	8	13.17	10.3	51.7	75.2	1.98	2.39	8.84	15.0	1.56
	100×150	97	150	6	9	8	19.05	15.0	124	253	2.56	3.65	15.8	33.8	1.80
	125×175	122	175	7	11	13	27.75	21.8	288	492	3.22	4.21	29.1	56.2	2.28
	150×200	147	200	8	12	13	35.53	27.9	571	801	4.01	4.75	48.2	80.1	2.85
	175×250	170	250	9	14	13	49.77	39.1	1,020	1,820	4.52	6.05	73.2	146	3.11
	200×300	195	300	10	16	13	66.63	52.3	1,730	3,600	5.09	7.35	108	240	3.43
	225×300	220	300	11	18	13	76.95	60.4	2,680	4,050	5.90	7.26	150	270	4.09
	250×300	244	300	11	18	13	79.59	62.4	3,610	4,050	6.74	7.14	184	270	4.72
	300×300	294	300	12	20	13	93.61	73.5	6,680	4,500	8.45	6.94	288	300	6.17
	350×300	350	300	13	24	18	115.8	90.9	12,000	5,410	10.2	6.83	438	361	7.63
	400×300	400	300	14	26	18	131.8	103	18,700	5,860	11.9	6.67	610	391	9.27
	450×300	445	299	15	23	18	133.5	105	25,900	5,140	13.9	6.20	789	344	11.7
450		300	16	28	18	152.9	120	29,100	6,320	13.8	6.43	865	421	11.4	
456		302	18	34	18	180.0	141	34,100	7,830	13.8	6.59	997	518	11.3	
*459		303	19	37	18	193.7	152	36,700	8,600	13.8	6.67	1,060	568	11.4	
Small width	75×75	75	75	5	7	8	8.925	7.01	42.6	24.7	2.18	1.66	7.46	6.60	1.79
	87.5×90	87.5	90	5	8	8	11.45	8.99	70.6	48.7	2.48	2.06	10.4	10.8	1.93
	100×100	100	100	5.5	8	8	13.33	10.5	114	66.9	2.93	2.24	14.8	13.4	2.31
	125×125	125	125	6	9	8	18.48	14.5	248	147	3.66	2.82	25.6	23.5	2.81
	150×150	150	150	6.5	9	13	23.39	18.4	464	254	4.45	3.29	40.0	33.8	3.41
	175×175	175	175	7	11	13	31.96	24.7	814	492	5.09	3.96	59.3	56.2	3.76
	200×200	200	200	8	13	13	41.69	32.7	1,390	868	5.78	4.56	88.6	86.8	4.26
	225×200	225	200	9	14	13	47.72	37.5	2,150	935	6.71	4.43	124	93.5	5.19
	250×200	250	200	10	16	13	56.13	44.1	3,200	1,070	7.55	4.36	169	107	6.03
300×200	300	200	11	17	13	65.86	51.7	5,770	1,140	9.36	4.16	262	114	7.95	

Note : Size marked \* is of a specially rolled steel which is not manufactured usually. If you want the product of that size, consult with us beforehand.

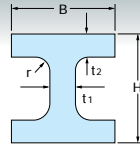
(6) Heavy Wide Flange H-Shapes (Metric Size)  
(700x500, 500x500, 400x400)



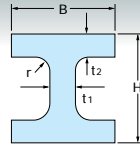
Serial Size	Designation		Area of Section, A cm²	Depth of Section, D mm	Web Thickness, t1 mm	Flange		Corner Radius r mm	Elastic Properties						Plastic Modulus	
	Mass Per Unit Length					Width, B mm	Thickness, t2 mm		Axis X-X			Axis Y-Y			X-X axis Zpx cm³	Y-Y axis Zpy cm³
									I cm⁴	S cm³	r cm	I cm⁴	S cm³	r cm		
	kg/m	lbs/ft														
700 x 500	993	667	1,265	770	70	520	80	26	1,130,000	29,400	29.9	189,000	7,280	12.2	35,400	11,600
	962	647	1,226	770	65	515	80	26	1,110,000	28,900	30.1	184,000	7,130	12.2	34,600	11,300
	933	627	1,188	770	60	510	80	26	1,090,000	28,400	30.4	178,000	6,980	12.2	33,900	11,000
	952	640	1,213	760	70	520	75	26	1,060,000	27,800	29.5	178,000	6,830	12.1	33,400	10,900
	922	620	1,175	760	65	515	75	26	1,040,000	27,300	29.7	172,000	6,690	12.1	32,700	10,600
	893	600	1,137	760	60	510	75	26	1,020,000	26,800	29.9	167,000	6,550	12.1	32,000	10,300
	863	580	1,099	760	55	505	75	26	1,000,000	26,400	30.2	162,000	6,410	12.1	31,200	10,000
	911	612	1,161	750	70	520	70	26	982,000	26,200	29.1	166,000	6,380	12.0	31,400	10,200
	882	593	1,123	750	65	515	70	26	965,000	25,700	29.3	161,000	6,250	12.0	30,700	9,950
	853	573	1,086	750	60	510	70	26	947,000	25,300	29.5	156,000	6,120	12.0	30,000	9,670
	823	553	1,048	750	55	505	70	26	929,000	24,800	29.8	151,000	5,990	12.0	29,300	9,410
	842	566	1,072	740	65	515	65	26	893,000	24,100	28.9	149,000	5,800	11.8	28,800	9,290
	812	546	1,035	740	60	510	65	26	876,000	23,700	29.1	145,000	5,680	11.8	28,100	9,020
	783	526	997.8	740	55	505	65	26	859,000	23,200	29.3	140,000	5,560	11.9	27,400	8,770
	754	507	960.8	740	50	500	65	26	842,000	22,800	29.6	136,000	5,440	11.9	26,800	8,520
	772	519	983.8	730	60	510	60	26	807,000	22,100	28.6	134,000	5,250	11.7	26,300	8,370
	744	500	947.3	730	55	505	60	26	791,000	21,700	28.9	130,000	5,140	11.7	25,600	8,130
	715	481	910.8	730	50	500	60	26	775,000	21,200	29.2	126,000	5,030	11.7	24,900	7,900
	686	461	874.3	730	45	495	60	26	759,000	20,800	29.5	122,000	4,920	11.8	24,300	7,680
	704	473	896.8	720	55	505	55	26	725,000	20,100	28.4	119,000	4,710	11.5	23,800	7,490
	676	454	860.8	720	50	500	55	26	709,000	19,700	28.7	115,000	4,610	11.6	23,100	7,270
	647	435	824.8	720	45	495	55	26	694,000	19,300	29.0	112,000	4,510	11.6	22,500	7,060
	619	416	788.8	720	40	490	55	26	678,000	18,800	29.3	108,000	4,420	11.7	21,800	6,860
	636	427	810.8	710	50	500	50	26	645,000	18,200	28.2	105,000	4,190	11.4	21,300	6,650
	609	409	775.3	710	45	495	50	26	630,000	17,800	28.5	102,000	4,100	11.4	20,700	6,450
	581	391	739.8	710	40	490	50	26	615,000	17,300	28.8	98,400	4,020	11.5	20,100	6,260
	570	383	725.8	700	45	495	45	26	569,000	16,300	28.0	91,500	3,700	11.2	18,900	5,840
	542	364	690.8	700	40	490	45	26	555,000	15,800	28.3	88,600	3,620	11.3	18,300	5,660
	515	346	655.8	700	35	485	45	26	540,000	15,400	28.7	85,800	3,540	11.4	17,700	5,490
	504	339	641.8	690	40	490	40	26	495,000	14,400	27.8	78,800	3,220	11.1	16,600	5,060
	477	321	607.3	690	35	485	40	26	482,000	14,000	28.2	76,300	3,150	11.2	16,000	4,900
	450	302	572.8	690	30	480	40	26	468,000	13,600	28.6	73,900	3,080	11.4	15,400	4,760
	439	295	558.8	680	35	485	35	26	425,000	12,500	27.6	66,800	2,750	10.9	14,400	4,320
	412	277	524.8	680	30	480	35	26	412,000	12,100	28.0	64,700	2,690	11.1	13,800	4,180
	385	259	490.8	680	25	475	35	26	399,000	11,700	28.5	62,600	2,640	11.3	13,200	4,050
	374	251	476.8	670	30	480	30	26	357,000	10,700	27.4	55,500	2,310	10.8	12,200	3,610
	348	234	443.3	670	25	475	30	26	345,000	10,300	27.9	53,700	2,260	11.0	11,600	3,490



## (6) Heavy Wide Flange H-Shapes (Metric Size) (700x500, 500x500, 400x400)



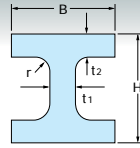
Serial Size	Designation		Area of Section, A cm²	Depth of Section, D mm	Web Thickness, t1 mm	Flange		Corner Radius r mm	Elastic Properties						Plastic Modulus	
	Mass Per Unit Length					Width, B mm	Thickness, t2 mm		Axis X-X			Axis Y-Y			X-X axis Zpx cm³	Y-Y axis Zpy cm³
									I cm⁴	S cm³	r cm	I cm⁴	S cm³	r cm		
500 x 500	kg/m	lbs/ft	cm²	mm	mm	mm	mm	mm	cm⁴	cm³	cm	cm⁴	cm³	cm	cm³	cm³
	906	609	1,154	612	70	520	80	26	650,000	21,200	23.7	189,000	7,260	12.8	25,800	11,400
	882	593	1,124	612	65	515	80	26	640,000	20,900	23.9	183,000	7,120	12.8	25,400	11,100
	858	577	1,093	612	60	510	80	26	631,000	20,600	24.0	178,000	6,970	12.8	24,900	10,800
	834	561	1,062	612	55	505	80	26	621,000	20,300	24.2	172,000	6,830	12.7	24,400	10,600
	810	544	1,032	612	50	500	80	26	612,000	20,000	24.3	167,000	6,690	12.7	24,000	10,300
	786	528	1,001	612	45	495	80	26	602,000	19,700	24.5	162,000	6,550	12.7	23,500	10,000
	762	512	970.6	612	40	490	80	26	593,000	19,400	24.7	157,000	6,410	12.7	23,000	9,800
	865	581	1,102	602	70	520	75	26	602,000	20,000	23.4	177,000	6,810	12.7	24,300	10,700
	842	566	1,072	602	65	515	75	26	593,000	19,700	23.5	172,000	6,670	12.7	23,800	10,400
	818	550	1,042	602	60	510	75	26	584,000	19,400	23.7	167,000	6,540	12.6	23,400	10,200
	794	534	1,012	602	55	505	75	26	575,000	19,100	23.8	162,000	6,400	12.6	22,900	9,920
	771	518	981.8	602	50	500	75	26	566,000	18,800	24.0	157,000	6,270	12.6	22,400	9,680
	747	502	951.7	602	45	495	75	26	556,000	18,500	24.2	152,000	6,140	12.6	22,000	9,430
	723	486	921.6	602	40	490	75	26	547,000	18,200	24.4	147,000	6,010	12.6	21,500	9,200
	824	554	1,050	592	70	520	70	26	556,000	18,800	23.0	165,000	6,360	12.6	22,700	10,000
	801	538	1,021	592	65	515	70	26	547,000	18,500	23.1	160,000	6,230	12.5	22,300	9,780
	778	523	991.0	592	60	510	70	26	538,000	18,200	23.3	156,000	6,100	12.5	21,800	9,530
	755	507	961.4	592	55	505	70	26	530,000	17,900	23.5	151,000	5,980	12.5	21,400	9,290
	731	491	931.8	592	50	500	70	26	521,000	17,600	23.6	146,000	5,850	12.5	21,000	9,050
	708	476	902.2	592	45	495	70	26	512,000	17,300	23.8	142,000	5,730	12.5	20,500	8,820
	685	460	872.6	592	40	490	70	26	504,000	17,000	24.0	138,000	5,610	12.6	20,100	8,600
	761	511	969.1	582	65	515	65	26	503,000	17,300	22.8	149,000	5,790	12.4	20,800	9,120
	738	496	940.0	582	60	510	65	26	494,000	17,000	22.9	145,000	5,670	12.4	20,300	8,880
	715	481	910.9	582	55	505	65	26	486,000	16,700	23.1	140,000	5,550	12.4	19,900	8,650
	692	465	881.8	582	50	500	65	26	478,000	16,400	23.3	136,000	5,440	12.4	19,500	8,430
	669	450	852.7	582	45	495	65	26	470,000	16,100	23.5	132,000	5,320	12.4	19,100	8,210
	647	435	823.6	582	40	490	65	26	461,000	15,900	23.7	128,000	5,210	12.5	18,600	8,000
	698	469	889.0	572	60	510	60	26	452,000	15,800	22.5	134,000	5,240	12.3	18,900	8,230
	675	454	860.4	572	55	505	60	26	444,000	15,500	22.7	129,000	5,130	12.3	18,500	8,010
	653	439	831.8	572	50	500	60	26	436,000	15,300	22.9	126,000	5,020	12.3	18,000	7,800
	631	424	803.2	572	45	495	60	26	429,000	15,000	23.1	122,000	4,920	12.3	17,600	7,600
	608	409	774.6	572	40	490	60	26	421,000	14,700	23.3	118,000	4,810	12.3	17,200	7,400
	586	394	746.0	572	35	485	60	26	413,000	14,400	23.5	114,000	4,710	12.4	16,800	7,210
	563	378	717.4	572	30	480	60	26	405,000	14,200	23.8	111,000	4,610	12.4	16,400	7,030
	636	427	809.9	562	55	505	55	26	404,000	14,400	22.3	119,000	4,700	12.1	17,000	7,370
	614	413	781.8	562	50	500	55	26	396,000	14,100	22.5	115,000	4,600	12.1	16,600	7,180
	592	398	753.7	562	45	495	55	26	389,000	13,800	22.7	112,000	4,510	12.2	16,200	6,980
	570	383	725.6	562	40	490	55	26	381,000	13,600	22.9	108,000	4,410	12.2	15,800	6,800
	548	368	697.5	562	35	485	55	26	374,000	13,300	23.2	105,000	4,320	12.3	15,400	6,620
	525	353	669.4	562	30	480	55	26	367,000	13,000	23.4	102,000	4,230	12.3	15,000	6,450
	574	386	731.8	552	50	500	50	26	357,000	12,900	22.1	105,000	4,190	12.0	15,200	6,550
	553	372	704.2	552	45	495	50	26	350,000	12,700	22.3	101,000	4,100	12.0	14,900	6,370
	531	357	676.6	552	40	490	50	26	343,000	12,400	22.5	98,300	4,010	12.1	14,500	6,200
509	342	649.0	552	35	485	50	26	336,000	12,200	22.8	95,300	3,930	12.1	14,100	6,030	



(6) Heavy Wide Flange H-Shapes (Metric Size)  
(700x500, 500x500, 400x400)

Serial Size	Designation		Area of Section, A cm²	Depth of Section, D mm	Web Thickness, t <sub>1</sub> mm	Flange		Corner Radius r mm	Elastic Properties						Plastic Modulus	
	Mass Per Unit Length					Width, B mm	Thickness, t <sub>2</sub> mm		Axis X-X			Axis Y-Y			X-X axis Z <sub>px</sub> cm³	Y-Y axis Z <sub>py</sub> cm³
									I cm⁴	S cm³	r cm	I cm⁴	S cm³	r cm		
500 x 500	488	328	621.4	552	30	480	50	26	329,000	11,900	23.0	92,300	3,850	12.2	13,700	5,870
	466	313	593.8	552	25	475	50	26	322,000	11,700	23.3	89,400	3,760	12.3	13,300	5,720
	514	345	654.7	542	45	495	45	26	313,000	11,600	21.9	91,400	3,690	11.8	13,500	5,760
	493	331	627.6	542	40	490	45	26	307,000	11,300	22.1	88,500	3,610	11.9	13,100	5,600
	471	317	600.5	542	35	485	45	26	300,000	11,100	22.4	85,800	3,540	12.0	12,800	5,440
	450	302	573.4	542	30	480	45	26	293,000	10,800	22.6	83,100	3,460	12.0	12,400	5,300
	429	288	546.3	542	25	475	45	26	287,000	10,600	22.9	80,500	3,390	12.1	12,000	5,160
	454	305	578.6	532	40	490	40	26	271,000	10,200	21.7	78,700	3,210	11.7	11,800	5,000
	433	291	552.0	532	35	485	40	26	265,000	9,960	21.9	76,300	3,140	11.8	11,500	4,860
	412	277	525.4	532	30	480	40	26	259,000	9,730	22.2	73,900	3,080	11.9	11,100	4,720
	392	263	498.8	532	25	475	40	26	253,000	9,490	22.5	71,500	3,010	12.0	10,800	4,590
	371	249	472.2	532	20	470	40	26	246,000	9,260	22.8	69,300	2,950	12.1	10,400	4,470
	395	265	503.5	522	35	485	35	26	231,000	8,870	21.4	66,700	2,750	11.5	10,200	4,270
	375	252	477.4	522	30	480	35	26	225,000	8,640	21.7	64,600	2,690	11.6	9,840	4,150
	354	238	451.3	522	25	475	35	26	220,000	8,410	22.1	62,600	2,640	11.8	9,500	4,030
	334	224	425.2	522	20	470	35	26	214,000	8,180	22.4	60,600	2,580	11.9	9,160	3,920
	337	227	429.4	512	30	480	30	26	193,000	7,550	21.2	55,400	2,310	11.4	8,600	3,570
	317	213	403.8	512	25	475	30	26	188,000	7,340	21.6	53,700	2,260	11.5	8,270	3,470
	297	200	378.2	512	20	470	30	26	182,000	7,120	21.9	52,000	2,210	11.7	7,950	3,370
	277	186	352.6	512	15	465	30	26	177,000	6,900	22.4	50,300	2,160	11.9	7,620	3,280
	280	188	356.3	502	25	475	25	26	157,000	6,270	21.0	44,700	1,880	11.2	7,070	2,900
	260	175	331.2	502	20	470	25	26	152,000	6,060	21.4	43,300	1,840	11.4	6,750	2,820
	240	161	306.1	502	15	465	25	26	147,000	5,850	21.9	41,900	1,800	11.7	6,440	2,740
	204	137	259.6	492	15	465	20	26	118,000	4,800	21.3	33,500	1,440	11.4	5,280	2,200

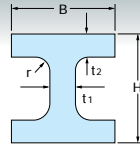
(6) Heavy Wide Flange H-Shapes (Metric Size)  
(700x500, 500x500, 400x400)



Serial Size	Designation		Area of Section, A cm²	Depth of Section, D mm	Web Thickness, t1 mm	Flange		Corner Radius r mm	Elastic Properties						Plastic Modulus	
	Mass Per Unit Length					Width, B mm	Thickness, t2 mm		Axis X-X			Axis Y-Y			X-X axis Zpx cm³	Y-Y axis Zpy cm³
									I cm⁴	S cm³	r cm	I cm⁴	S cm³	r cm		
400 x 400	1,192	801	1,519	608	90	477	125	22	747,000	24,600	22.2	228,000	9,580	12.3	31,800	15,000
	1,168	785	1,488	608	85	472	125	22	737,000	24,300	22.3	221,000	9,360	12.2	31,300	14,600
	1,145	770	1,458	608	80	467	125	22	728,000	23,900	22.3	214,000	9,160	12.1	30,800	14,200
	1,155	776	1,471	598	90	477	120	22	703,000	23,500	21.9	219,000	9,200	12.2	30,300	14,400
	1,131	760	1,441	598	85	472	120	22	694,000	23,200	22.0	212,000	8,990	12.1	29,900	14,000
	1,108	745	1,411	598	80	467	120	22	686,000	22,900	22.0	205,000	8,790	12.1	29,400	13,700
	1,084	729	1,381	598	75	462	120	22	677,000	22,600	22.1	199,000	8,600	12.0	29,000	13,300
	1,117	751	1,423	588	90	477	115	22	661,000	22,500	21.6	210,000	8,820	12.2	28,900	13,800
	1,094	735	1,394	588	85	472	115	22	653,000	22,200	21.6	203,000	8,620	12.1	28,500	13,500
	1,072	721	1,365	588	80	467	115	22	644,000	21,900	21.7	197,000	8,430	12.0	28,000	13,100
	1,048	704	1,335	588	75	462	115	22	636,000	21,600	21.8	190,000	8,240	11.9	27,600	12,800
	1,025	698	1,306	588	70	457	115	22	628,000	21,300	21.9	184,000	8,050	11.9	27,200	12,500
	1,080	726	1,376	578	90	477	110	22	621,000	21,500	21.2	201,000	8,440	12.1	27,500	13,300
	1,057	710	1,347	578	85	472	110	22	613,000	21,200	21.3	195,000	8,250	12.0	27,100	12,900
	1,035	696	1,318	578	80	467	110	22	605,000	20,900	21.4	188,000	8,070	12.0	26,700	12,600
	1,012	680	1,289	578	75	462	110	22	597,000	20,600	21.5	182,000	7,880	11.9	26,300	12,300
	989	665	1,260	578	70	457	110	22	589,000	20,400	21.6	176,000	7,710	11.8	25,800	11,900
	966	649	1,231	578	65	452	110	22	581,000	20,100	21.7	170,000	7,530	11.8	25,400	11,600
	1,042	700	1,328	568	90	477	105	22	582,000	20,500	20.9	192,000	8,060	12.0	26,100	12,700
	1,020	686	1,300	568	85	472	105	22	574,000	20,200	21.0	186,000	7,880	12.0	25,700	12,400
	998	671	1,271	568	80	467	105	22	566,000	19,900	21.1	180,000	7,700	11.9	25,300	12,000
	976	656	1,243	568	75	462	105	22	559,000	19,700	21.2	174,000	7,530	11.8	24,900	11,700
	953	641	1,214	568	70	457	105	22	551,000	19,400	21.3	168,000	7,360	11.8	24,500	11,400
	931	626	1,186	568	65	452	105	22	544,000	19,100	21.4	162,000	7,190	11.7	24,100	11,100
	909	611	1,158	568	60	447	105	22	536,000	18,900	21.5	157,000	7,020	11.6	23,700	10,800
	1,005	675	1,280	558	90	477	100	22	544,000	19,500	20.6	183,000	7,680	12.0	24,800	12,100
	983	661	1,252	558	85	472	100	22	537,000	19,200	20.7	177,000	7,510	11.9	24,400	11,800
	962	647	1,225	558	80	467	100	22	529,000	19,000	20.8	171,000	7,340	11.8	24,000	11,500
	940	632	1,197	558	75	462	100	22	522,000	18,700	20.9	166,000	7,170	11.8	23,600	11,200
	918	617	1,169	558	70	457	100	22	515,000	18,500	21.0	160,000	7,010	11.7	23,200	10,900
	896	602	1,141	558	65	452	100	22	508,000	18,200	21.1	155,000	6,850	11.6	22,900	10,600
	874	587	1,113	558	60	447	100	22	500,000	17,900	21.2	150,000	6,690	11.6	22,500	10,300
	852	573	1,085	558	55	442	100	22	493,000	17,700	21.3	144,000	6,540	11.5	22,100	10,100
	968	651	1,233	548	90	477	95	22	507,000	18,500	20.3	174,000	7,300	11.9	23,500	11,600
	946	636	1,205	548	85	472	95	22	501,000	18,300	20.4	168,000	7,140	11.8	23,100	11,200
	925	622	1,178	548	80	467	95	22	494,000	18,000	20.5	163,000	6,980	11.8	22,700	11,000
	903	607	1,150	548	75	462	95	22	487,000	17,800	20.6	157,000	6,820	11.7	22,400	10,700
	882	593	1,123	548	70	457	95	22	480,000	17,500	20.7	152,000	6,660	11.6	22,000	10,400
	860	578	1,096	548	65	452	95	22	473,000	17,300	20.8	147,000	6,510	11.6	21,600	10,100
	838	563	1,068	548	60	447	95	22	466,000	17,000	20.9	142,000	6,360	11.5	21,200	9,830
	817	549	1,041	548	55	442	95	22	459,000	16,800	21.0	137,000	6,210	11.5	20,900	9,560
	795	534	1,013	548	50	437	95	22	453,000	16,500	21.1	133,000	6,070	11.4	20,500	9,310
	930	625	1,185	538	90	477	90	22	472,000	17,600	20.0	165,000	6,920	11.8	22,200	11,000
	909	611	1,158	538	85	472	90	22	466,000	17,300	20.1	160,000	6,770	11.7	21,800	10,700

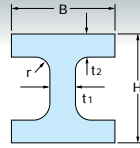


(6) Heavy Wide Flange H-Shapes (Metric Size)  
(700x500, 500x500, 400x400)



Serial Size	Designation		Area of Section, A cm²	Depth of Section, D mm	Web Thickness, t1 mm	Flange		Corner Radius r mm	Elastic Properties						Plastic Modulus	
	Mass Per Unit Length					Width, B mm	Thickness, t2 mm		Axis X-X			Axis Y-Y			X-X axis Zpx cm³	Y-Y axis Zpy cm³
									I cm⁴	S cm³	r cm	I cm⁴	S cm³	r cm		
400 x 400	kg/m	lbs/ft														
	888	597	1,131	538	80	467	90	22	459,000	17,100	20.2	154,000	6,610	11.7	21,500	10,400
	867	583	1,104	538	75	462	90	22	453,000	16,800	20.2	149,000	6,460	11.6	21,100	10,100
	845	568	1,077	538	70	457	90	22	446,000	16,600	20.4	144,000	6,310	11.6	20,700	9,850
	824	554	1,050	538	65	452	90	22	440,000	16,400	20.5	139,000	6,170	11.5	20,400	9,590
	804	540	1,024	538	60	447	90	22	433,000	16,100	20.6	135,000	6,030	11.5	20,000	9,330
	782	526	996.7	538	55	442	90	22	427,000	15,900	20.7	130,000	5,890	11.4	19,700	9,080
	761	511	969.8	538	50	437	90	22	420,000	15,600	20.8	126,000	5,750	11.4	19,300	8,830
	740	497	942.9	538	45	432	90	22	414,000	15,400	21.0	121,000	5,610	11.3	18,900	8,590
	872	586	1,111	528	85	472	85	22	432,000	16,400	19.7	151,000	6,390	11.7	20,600	10,100
	851	572	1,084	528	80	467	85	22	426,000	16,100	19.8	146,000	6,250	11.6	20,200	9,860
	831	559	1,058	528	75	462	85	22	420,000	15,900	19.9	141,000	6,110	11.5	19,900	9,590
	810	544	1,032	528	70	457	85	22	414,000	15,700	20.0	136,000	5,970	11.5	19,500	9,330
	789	530	1,005	528	65	452	85	22	408,000	15,400	20.1	132,000	5,830	11.4	19,200	9,080
	768	516	978.9	528	60	447	85	22	402,000	15,200	20.3	127,000	5,690	11.4	18,800	8,830
	748	503	952.5	528	55	442	85	22	395,000	15,000	20.4	123,000	5,560	11.4	18,500	8,590
	727	489	926.1	528	50	437	85	22	389,000	14,700	20.5	119,000	5,430	11.3	18,100	8,350
	706	475	899.7	528	45	432	85	22	383,000	14,500	20.6	115,000	5,300	11.3	17,800	8,120
	815	548	1,038	518	80	467	80	22	394,000	15,200	19.5	137,000	5,880	11.5	19,000	9,320
	794	534	1,012	518	75	462	80	22	388,000	15,000	19.6	133,000	5,750	11.5	18,700	9,060
	774	520	986.0	518	70	457	80	22	383,000	14,800	19.7	128,000	5,620	11.4	18,300	8,810
	754	507	960.1	518	65	452	80	22	377,000	14,500	19.8	124,000	5,490	11.4	18,000	8,570
	733	493	934.2	518	60	447	80	22	371,000	14,300	19.9	120,000	5,360	11.3	17,700	8,330
	713	479	908.3	518	55	442	80	22	365,000	14,100	20.1	116,000	5,230	11.3	17,300	8,100
	693	466	882.4	518	50	437	80	22	359,000	13,900	20.2	112,000	5,110	11.3	17,000	7,870
	672	452	856.5	518	45	432	80	22	354,000	13,700	20.3	108,000	4,990	11.2	16,700	7,660
	752	438	830.6	518	40	427	80	22	348,000	13,400	20.5	104,000	4,870	11.2	16,300	7,450
	758	509	965.7	508	75	462	75	22	358,000	14,100	19.3	125,000	5,390	11.4	17,500	8,530
	738	496	940.3	508	70	457	75	22	353,000	13,900	19.4	120,000	5,270	11.3	17,200	8,290
	718	483	914.9	508	65	452	75	22	347,000	13,700	19.5	116,000	5,150	11.3	16,800	8,060
	698	469	889.5	508	60	447	75	22	342,000	13,400	19.6	112,000	5,030	11.2	16,500	7,830
	678	456	864.1	508	55	442	75	22	336,000	13,200	19.7	108,000	4,910	11.2	16,200	7,610
	658	442	838.7	508	50	437	75	22	331,000	13,000	19.9	105,000	4,790	11.2	15,900	7,400
	638	429	813.3	508	45	432	75	22	325,000	12,800	20.0	101,000	4,680	11.1	15,500	7,190
	619	416	787.9	508	40	427	75	22	320,000	12,600	20.1	97,500	4,570	11.1	15,200	6,990
	702	472	894.6	498	70	457	70	22	324,000	13,000	19.0	112,000	4,920	11.2	16,000	7,760
	683	459	869.7	498	65	452	70	22	318,000	12,800	19.1	109,000	4,810	11.2	15,700	7,540
	663	446	844.8	498	60	447	70	22	313,000	12,600	19.3	105,000	4,690	11.1	15,400	7,330
	644	433	819.9	498	55	442	70	22	308,000	12,400	19.4	101,000	4,580	11.1	15,100	7,120
	624	419	795.0	498	50	437	70	22	303,000	12,200	19.5	97,800	4,470	11.1	14,800	6,920
	605	407	770.1	498	45	432	70	22	298,000	12,000	19.7	94,400	4,370	11.1	14,500	6,720
	585	393	745.2	498	40	427	70	22	293,000	11,800	19.8	91,000	4,260	11.1	14,100	6,540
	565	380	720.3	498	35	422	70	22	288,000	11,600	20.0	87,800	4,160	11.0	13,800	6,350
	647	435	824.5	488	65	452	65	22	291,000	11,900	18.8	101,000	4,470	11.1	14,600	7,030
628	422	800.1	488	60	447	65	22	286,000	11,700	18.9	97,500	4,360	11.0	14,300	6,830	

(6) Heavy Wide Flange H-Shapes (Metric Size)  
(700x500, 500x500, 400x400)



Serial Size	Designation		Area of Section, A cm²	Depth of Section, D mm	Web Thickness, t1 mm	Flange		Corner Radius r mm	Elastic Properties						Plastic Modulus	
	Mass Per Unit Length					Width, B mm	Thickness, t2 mm		Axis X-X			Axis Y-Y			X-X axis Zpx cm³	Y-Y axis Zpy cm³
									I cm⁴	S cm³	r cm	I cm⁴	S cm³	r cm		
400 x 400	kg/m	lbs/ft														
	609	409	775.7	488	55	442	65	22	281,000	11,500	19.0	94,100	4,260	11.0	14,000	6,630
	590	397	751.3	488	50	437	65	22	277,000	11,300	19.2	90,800	4,160	11.0	13,700	6,440
	571	384	726.9	488	45	432	65	22	272,000	11,100	19.3	87,600	4,060	11.0	13,400	6,260
	551	370	702.5	488	40	427	65	22	267,000	10,900	19.5	84,600	3,960	11.0	13,100	6,080
	532	358	678.1	488	35	422	65	22	262,000	10,700	19.7	81,600	3,870	11.0	12,800	5,910
	593	399	755.4	478	60	447	60	22	260,000	10,900	18.6	90,000	4,030	10.9	13,200	6,330
	574	386	731.5	478	55	442	60	22	256,000	10,700	18.7	86,900	3,930	10.9	12,900	6,150
	555	373	707.6	478	50	437	60	22	251,000	10,500	18.8	83,900	3,840	10.9	12,600	5,970
	537	361	683.7	478	45	432	60	22	246,000	10,300	19.0	80,900	3,750	10.9	12,300	5,790
	518	348	659.8	478	40	427	60	22	242,000	10,100	19.1	78,100	3,660	10.9	12,100	5,620
	499	335	635.9	478	35	422	60	22	237,000	9,930	19.3	75,300	3,570	10.9	11,800	5,460
	480	323	612.0	478	30	417	60	22	233,000	9,740	19.5	72,600	3,480	10.9	11,500	5,310
	540	363	687.3	468	55	442	55	22	231,000	9,860	18.3	79,700	3,610	10.8	11,900	5,660
	521	350	663.9	468	50	437	55	22	227,000	9,680	18.5	76,900	3,520	10.8	11,600	5,490
	503	338	640.5	468	45	432	55	22	222,000	9,500	18.6	74,200	3,440	10.8	11,300	5,320
	484	325	617.1	468	40	427	55	22	218,000	9,320	18.8	71,600	3,350	10.8	11,100	5,170
	466	313	593.7	468	35	422	55	22	214,000	9,130	19.0	69,000	3,270	10.8	10,800	5,020
	448	301	570.3	468	30	417	55	22	209,000	8,950	19.2	66,600	3,190	10.8	10,500	4,870
	487	327	620.2	458	50	437	50	22	203,000	8,870	18.1	70,000	3,200	10.6	10,600	5,010
	469	315	597.3	458	45	432	50	22	199,000	8,700	18.3	67,500	3,120	10.6	10,300	4,860
	451	303	574.4	458	40	427	50	22	195,000	8,520	18.4	65,100	3,050	10.6	10,100	4,710
	433	291	551.5	458	35	422	50	22	191,000	8,350	18.6	62,800	2,980	10.7	9,800	4,570
	415	279	528.6	458	30	417	50	22	187,000	8,170	18.8	60,500	2,900	10.7	9,540	4,440
	397	267	505.7	458	25	412	50	22	183,000	8,000	19.0	58,300	2,830	10.7	9,280	4,310
	435	292	554.1	448	45	432	45	22	177,000	7,900	17.9	60,800	2,810	10.5	9,350	4,390
	417	280	531.7	448	40	427	45	22	173,000	7,730	18.1	58,600	2,750	10.5	9,100	4,260
	400	269	509.3	448	35	422	45	22	169,000	7,570	18.2	56,500	2,680	10.5	8,850	4,130
	382	257	486.9	448	30	417	45	22	166,000	7,400	18.5	54,500	2,610	10.6	8,600	4,000
	365	245	464.5	448	25	412	45	22	162,000	7,230	18.7	52,500	2,550	10.6	8,340	3,880
	384	258	489.0	438	40	427	40	22	152,000	6,950	17.6	52,100	2,440	10.3	8,150	3,800
	367	247	467.1	438	35	422	40	22	149,000	6,790	17.8	50,300	2,380	10.4	7,910	3,680
	349	235	445.2	438	30	417	40	22	145,000	6,630	18.1	48,400	2,320	10.4	7,670	3,570
	332	223	423.3	438	25	412	40	22	142,000	6,470	18.3	46,700	2,270	10.5	7,430	3,460
	315	212	401.4	438	20	407	40	22	138,000	6,310	18.6	45,000	2,210	10.6	7,190	3,350
	334	224	424.9	428	35	422	35	22	129,000	6,030	17.4	44,000	2,080	10.2	7,000	3,240
	317	213	403.5	428	30	417	35	22	126,000	5,880	17.7	42,400	2,030	10.3	6,770	3,130
	300	202	382.1	428	25	412	35	22	122,000	5,720	17.9	40,900	1,980	10.3	6,540	3,030
	283	190	360.7	428	20	407	35	22	119,000	5,570	18.2	39,400	1,930	10.4	6,310	2,940
	284	191	361.8	418	30	417	30	22	107,000	5,120	17.2	36,400	1,740	10.0	5,890	2,700
	268	180	340.9	418	25	412	30	22	104,000	4,980	17.5	35,000	1,700	10.1	5,670	2,610
	251	169	320.0	418	20	407	30	22	101,000	4,830	17.8	33,700	1,660	10.3	5,450	2,530
235	158	299.1	418	15	402	30	22	98,000	4,690	18.1	32,500	1,620	10.4	5,230	2,450	

## (1) Features of Heavy Wide Flange H-Shapes.

1.HBL-JH450 is patent registered as TCP (Thermos Mechanical Precipitation Control Process) by JFE Steel.

### 2. Material Properties

- Extremely low carbon bainitic mono-phase
- High Strength and high toughness without heat treatment or accelerated control cooling.
- Low yield to tensile ratio.
- Controlled in fine grain.

### 3. Excellent welding

- Maximum hardness does not exceed 300HV even under arc-strike condition.
- Low pre-heating required
- Less welding materials consumed

## (2) Extremely low carbon bainitic mono-phase.

•The target chemical compositions of HBL-JH450 (mass%) & Maximum

	C	Si	Mn	P	S	Cu	Ni	Cr	Mo	V	Nb	Ti	B	Ceq.
HBL-JH450 (Gr.65)	0.020	0.30	1.25	0.010	0.003	1.10	0.55	Tr.	Tr.	Tr.	0.045	0.015	0.002	0.338

$$Ceq.=C+Mn/6+(Cu+Ni)/15+(Cr+Mo+V)/5$$

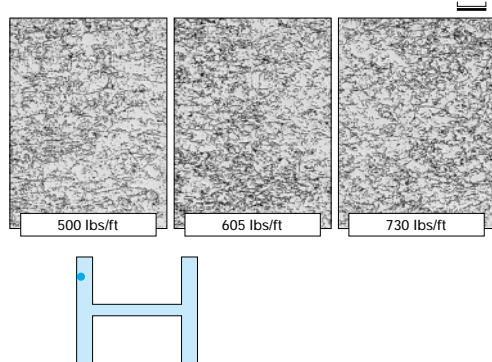
•Extremely low carbon bainitic mono-phase

High strength and high toughness.  
Low Ceq. producing Pre / Post heat benefit.

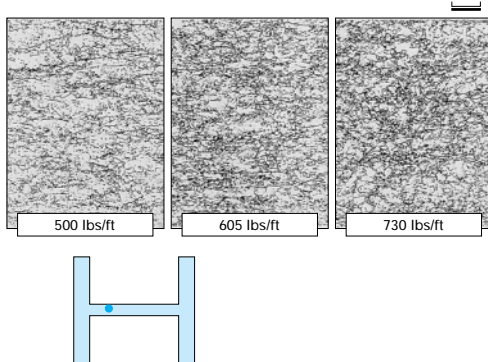
## (3) Microstructures.

•The microstructures of various heavy wide flange H-shapes

(W14 14"×16") flange 1/6 -1/4 t portion



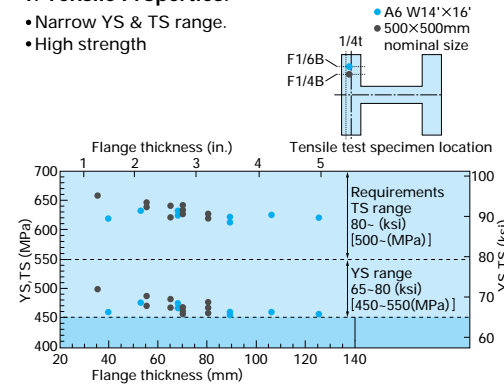
(W14 14"×16") Web 1/4 -1/4 t portion



## (4) Mechanical Property.

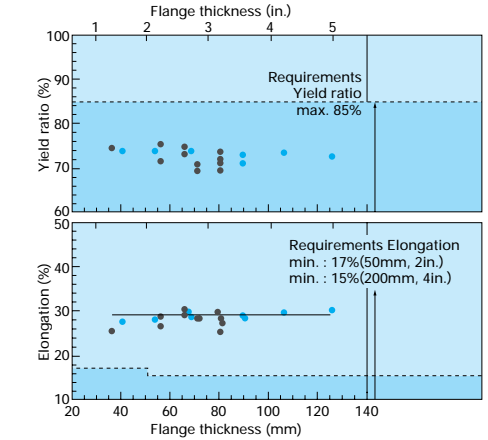
### 1. Tensile Properties.

- Narrow YS & TS range.
- High strength



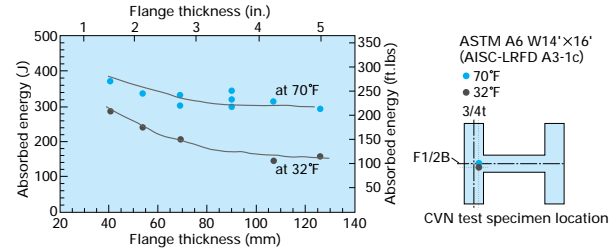
### 2. Yield Ratio.

- Low yield ratio (YS/TS×100 [%])
- High elongation



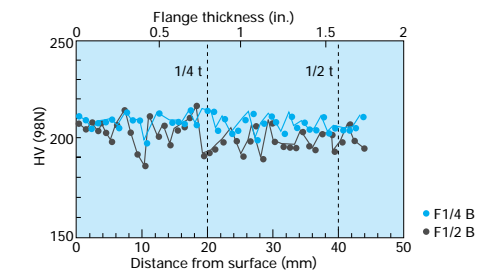
### 3. Toughness Properties.

- High toughness (Charpy V-notch absorbed energy) at 70 & 32°F



## (5) Hardness Distributions

•Hardness through thickness

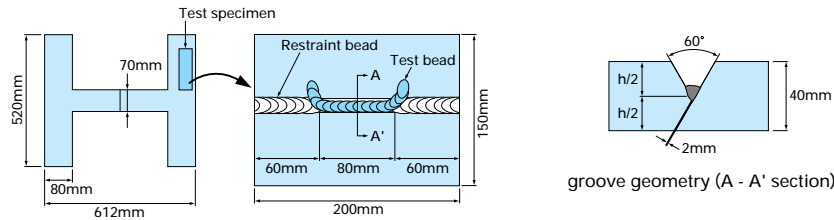


HBL-JH450 (Flange thickness at 80mm ; 500×500mm nominal size)



## (6) Weldability (Susceptibility of cold cracking)

### 1. y-groove weld cracking test (JIS Z 3158)

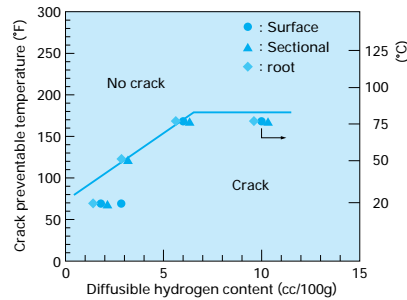


Diffusible hydrogen content : three levels

Diffusible hydrogen Content * cc/100g	Welding conditions				Rod
	Current A	Voltage V	Speed mm/s	Heat input kJ/mm	
< 3	160	24	2.5	1.5	KSA 86 (4mm#) AWS A5.5 E9016-G
3					
6					
> 10					

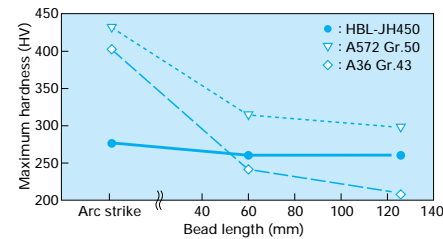
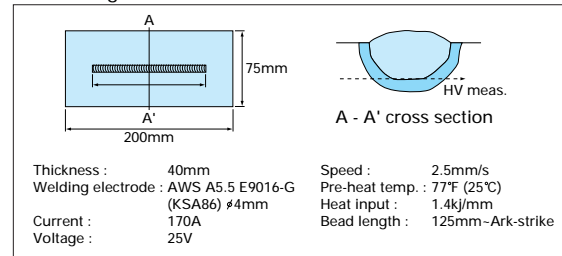
\* : Gas chromatographic method

Effect of diffusible hydrogen content on crack preventable temperature of weld metal (AWS A5.5 E9016-G : KSA86).



### 2. The maximum hardness observed for non-steady-state welding of short bead length and arc-strike.

• According to JIS-Z3101

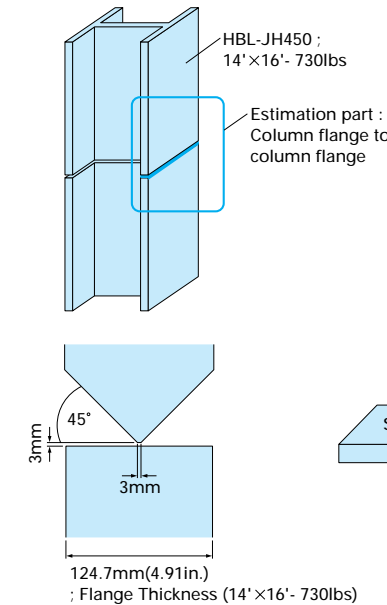


• Test results  
Maximum hardness of HBL-JH450 does not exceed 300HV even under arc-strike condition.

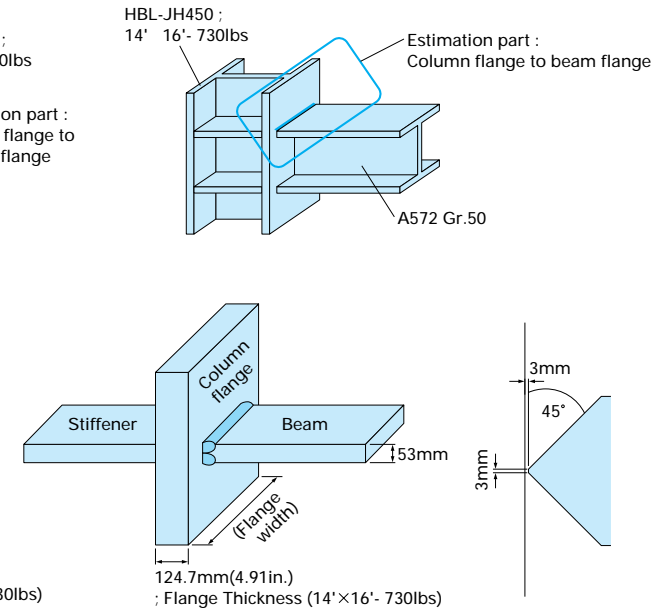
## 3. Welded joint performances of FCW

### (1) Detail of welded joint

#### 1) Column to column

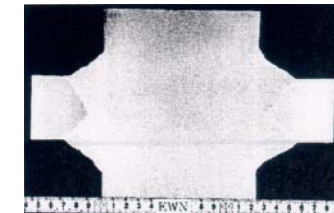
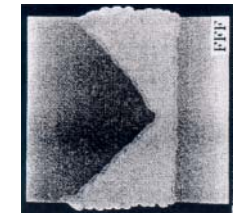


#### 2) Column to beam



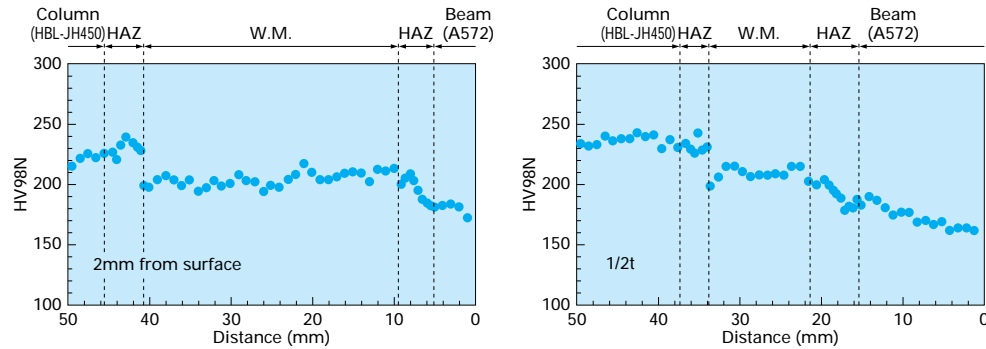
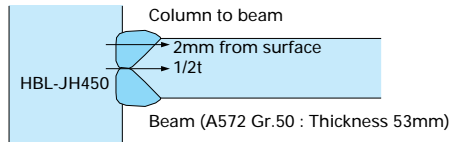
### (2) Welding conditions

Item	Welding	Method	Welding electrode	Preheating temp.	Inter-pass temp.	Current (A)	Voltage (V)	Travel speed (mm/s)	Heat input (kJ/mm)
Column to column	Outer shield FCW (20%Ar-80%CO <sub>2</sub> )	Multipass	AWS E81T1-Ni1 81Ni1-H	212°F (100°C)	Max 410°F (210°C)	300-350	26-29	3.2-5.3	1.6-3.8
Column to beam & stiffener	Inner shield FCW (Non gas)	Multipass	AWS E71T-8 NR232	212°F (100°C)	Max 347°F (175°C)	290-330	22	1.9-3.3	2.3-3.5



### (3) Welded joints performances

#### 1) Hardness distributions



#### 2) Tensile test results (According to JIS Z 3121 [ISO 4136])

Item	TS ksi (MPa)	Fracture position
Column to column	Upper layer of welded joint 83.5 (576)	Weld metal
	Lower layer of welded joint 83.4 (576)	
Column to beam	78.0 (510)	Base metal (Beam)
	75.0 (517)	

#### 3) Charpy impact test results of column to column welded joint

Position	Direction	V-notch position	vE 32°F [0°C] ft.lbs (J)	vE 70°F [21°C] ft.lbs (J)	
Surface (2mm)	L	HAZ	265 (359)	266 (360)	
	L	F.L.	89 (121)	114 (154)	
	L	W.M.	154 (209)	138 (187)	
1/2t (Root)	L	HAZ	253 (343)	200 (271)	
	L	F.L.	71 (96)	78 (106)	
	L	W.M.	100 (136)	117 (158)	

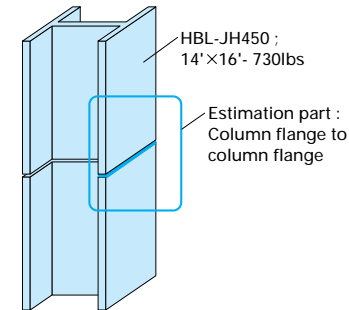
#### 4) Charpy impact test results of column to beam welded joint

Position	Direction	V-notch position	vE 32°F [0°C] ft.lbs (J)	vE 70°F [21°C] ft.lbs (J)	
Surface (2mm)	Z	HAZ 1mm	—	162 (220)	
	Z	F.L.	—	84 (114)	
	Z	W.M.	—	76 (104)	
1/2t (Root)	Z	HAZ 1mm	—	174 (236)	
	Z	F.L.	—	85 (115)	
	Z	W.M.	—	67 (91)	

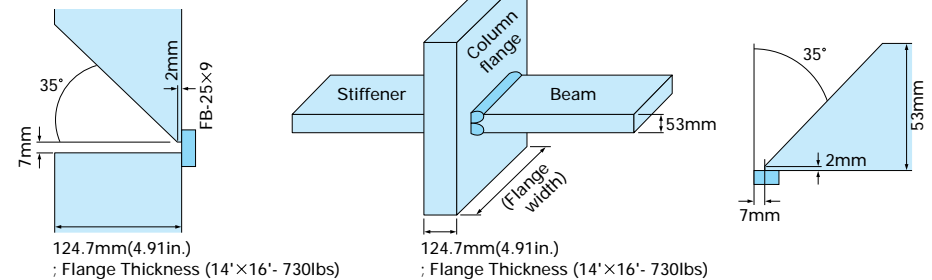
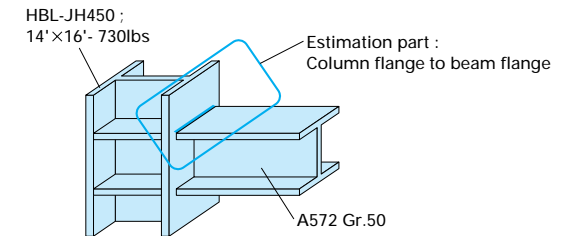
### 4. Welded joint performances of MAG (Non preheating condition)

#### (1) Detail of welded joint

##### 1) Column to column



##### 2) Column to beam

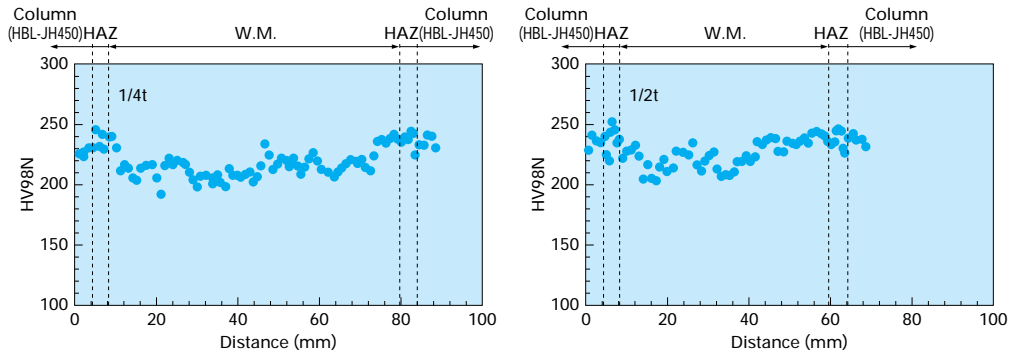
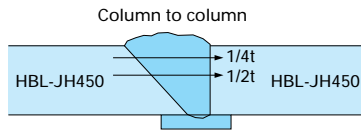


## (2) Welding conditions

Item	Welding	Method	Welding electrode	Preheating temp.	Inter-pass temp.	Current (A)	Voltage (V)	Travel speed (mm/s)	Heat input (kJ/mm)
Column to column	CO <sub>2</sub> gas arc welding	Multipass	ASTM ER90S-G KC-60	73°F (23°C)	Max 420°F (216°C)	300~345	33~35	4.2	2.4~2.9
Column to beam & stiffener	CO <sub>2</sub> gas arc welding	Multipass	ASTM ER70S-G KC-50	73°F (23°C)	Max 361°F (183°C)	300~350	32~34	4.2~5	1.9~2.8

## (3) Performance of Welded joints

### 1) Hardness distributions



### 2) Tensile test results (According to JIS Z 3121 [ISO 4136])

Item	TS ksi (MPa)	Fracture position
Column to column	Upper layer of welded joint 91.1 (628) 90.8 (626)	Weld metal
	Lower layer of welded joint 95.3 (657) 95.0 (655)	Base metal
Column to beam	73.4 (506)	Base metal (Beam)
	74.3 (512)	

## 3) Charpy impact test results

Item	Position	Direction	V-notch position	vE 32°F [0°C] ft. lbs (J)	vE 70°F [21°C] ft. lbs (J)	Illustration of welded joints
Column to column	1/4t	L	HAZ	199 (270)	208 (282)	
		L	F.L.	104 (141)	132 (178)	
		L	W.M.	67 (91)	109 (148)	
Column to beam	1/4t	Z	HAZ	103 (139)	165 (223)	
		Z	F.L.	84 (112)	147 (200)	
		Z	W.M.	66 (90)	117 (159)	

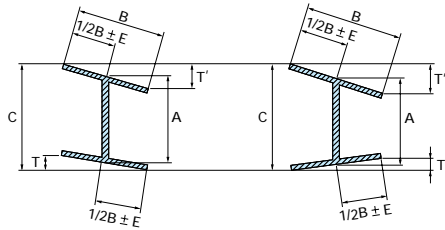
HAZ : 1mm from F.L.  
I : Notch position



# 7 Tolerances

## (1) ASTM A 6 (1994) Tolerance on Dimension and Shape of Wide Flange Shapes

### • Permissible Variations in Cross Section for W and HP Shapes



A is measured at center line of web for W and HP shapes.  
C is measured parallel to web.

Shape	Section Nominal Sizes in.	A, Depth, in.		B, Flange Width, in.		T + T' Flanges Out-of-Square, max, in.*	E, Web off Center, max, in.*	C, Maximum Depth at any Cross Section over Theoretical Depth, in.
		Over Theoretical	Under Theoretical	Over Theoretical	Under Theoretical			
W and HP	Up to 12, incl.	1/8	1/8	1/4	3/16	1/4	3/16	1/4
	Over 12	1/8	1/8	1/4	3/16	5/16	3/16	1/4

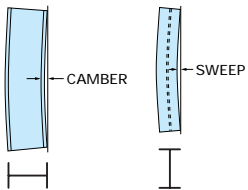
\*Variation of 5/16 in. max for sections over 426 lb/ft.

### • Permissible Variations in Ends Out-of-Square for W and HP Shapes

The ends out-of-square tolerance for W and HP shapes shall be 1/64 in./in. of depth, or of flange width if it is greater than the depth.

### • Permissible Variations in Straightness for W and HP Shapes

Positions for Measuring Camber and Sweep of W and HP Shapes



	Permissible Variation
Camber and sweep When certain sections <sup>B</sup> with a flange width approximately equal to depth are specified, order as columns: Lengths of 45 ft and under Lengths over 45 ft	1/8 in. × (number of feet of total length <sup>A</sup> / 10)  1/8 in. × (number of feet of total length / 10) but not over 3/8 in. 3/8 in. + (1/8 in. × (number of feet of total length - 45) / 10)

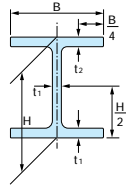
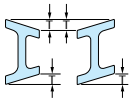
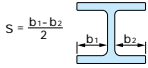


<sup>A</sup> Sections with a flange width less than 6 in., tolerance for sweep = 1/8 in. × (number of feet of total length / 5).

<sup>B</sup> Applies only to:

8-in. deep section 31 lb/ft and heavier,  
10-in. deep sections 49 lb/ft and heavier,  
12-in. deep sections 65 lb/ft and heavier, and  
14-in. deep sections 90 lb/ft and heavier.

If other sections are specified on the order as columns, the tolerance will be subject to negotiation with the manufacturer.

## (2) JIS G 3192 (2000) Tolerance on Dimension and Shape of Wide Flange Shapes

JIS G 3136 Hot rolled Wide Flange shapes for building structure			Remarks	
		Range	Tolerance	
Width (B)	B < 100mm		± 2.0mm	
	100mm ≤ B < 200mm		± 2.5mm	
	200mm ≤ B		± 3.0mm	
Depth (H)	H < 400mm		± 2.0mm	
	400mm ≤ H < 600mm		± 3.0mm	
	600mm ≤ H		± 4.0mm	
Thickness	Flange (t <sub>2</sub> )*	t <sub>2</sub> < 16mm	± 1.0mm	
		16mm ≤ t <sub>2</sub> < 25mm	± 1.5mm	
		25mm ≤ t <sub>2</sub> < 40mm	± 1.7mm	
		40mm ≤ t <sub>2</sub>	± 2.0mm	
	Web (t <sub>1</sub> )	t <sub>1</sub> < 16mm	± 0.7mm	
		16mm ≤ t <sub>1</sub> < 25mm	± 1.0mm	
		25mm ≤ t <sub>1</sub> < 40mm	± 1.5mm	
		40mm ≤ t <sub>1</sub> < 100mm	± 2.0mm	
Length (L)	L ≤ 7m	+40mm -0mm		
	7m < L	+ tolerance increases 5mm for the increment of every 1m or fraction thereof.		
Flange Out-of-squareness (T)	H ≤ 300mm	≤ B × 0.01 The minimum tolerance shall be 1.5mm.		
	300mm < H	≤ B × 0.012 The minimum tolerance shall be 1.5mm.		
Bend	H ≤ 300mm	≤ L × 0.0015	Applies to both vertical and horizontal deviations.	
	300mm < H	≤ L × 0.001		
Web off Center (S)	H ≤ 300mm and B ≤ 200mm	± 2.5mm		
	300mm < H or 200mm < B	± 3.5mm		
Ends Out-of-square (e)	—	≤ B or H × 0.016 The minimum tolerance shall be 3.0mm.		
Camber of Web (δ)	H < 400mm	≤ 2.0		
	40mm ≤ H < 600mm	≤ 2.5		
	600mm ≤ H	≤ 3.0		


\*For the hot rolled Wide Flange shapes of JIS G3136, the below table should be used.

6mm ≤ t <sub>2</sub> < 16mm	+1.7mm -0.3mm
16mm ≤ t <sub>2</sub> < 40mm	+2.3mm -0.7mm
40mm ≤ t <sub>2</sub> ≤ 100mm	+2.5mm -1.5mm

# 8 I Label

A label is attached to the web center at the end of the Wide Flange Shape.  
The description of the label is as follows.

## ●Senior Size

1 JFE 2 WK	SPEC. 規格		BS4360-50B 3	
	DIMENSION 断面寸法		36"×12"×210LBS 4	
HEAT No.		1-32019 5	LENGTH 長さ	12.0 M 6 1
LOT No.	K533 8	CONTRACT 契約 No.	6-83021-01 9	2-15 7
PRODUCT 製品 No.		W0341-100 10	7 Y3901-L	C914
11 			W0341-100	

- |                             |                                 |
|-----------------------------|---------------------------------|
| 1 Corporate insignia        | 7 Codes for production control  |
| 2 Works code                | 8 Lot No.                       |
| 3 Standard designation      | 9 Contract No. – Order item No. |
| 4 Cross-sectional dimension | 10 Product No.                  |
| 5 Heat No.                  | 11 Bar code                     |
| 6 Length                    |                                 |

●For further information, please contact our nearest office or send your inquiries to :

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Export Dept. Plate & Structural Sec.

Phone : (03) 3597-4132 Fax : (03) 3597-4159



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