NIPPON STEEL

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Welded light gauge steel H sections
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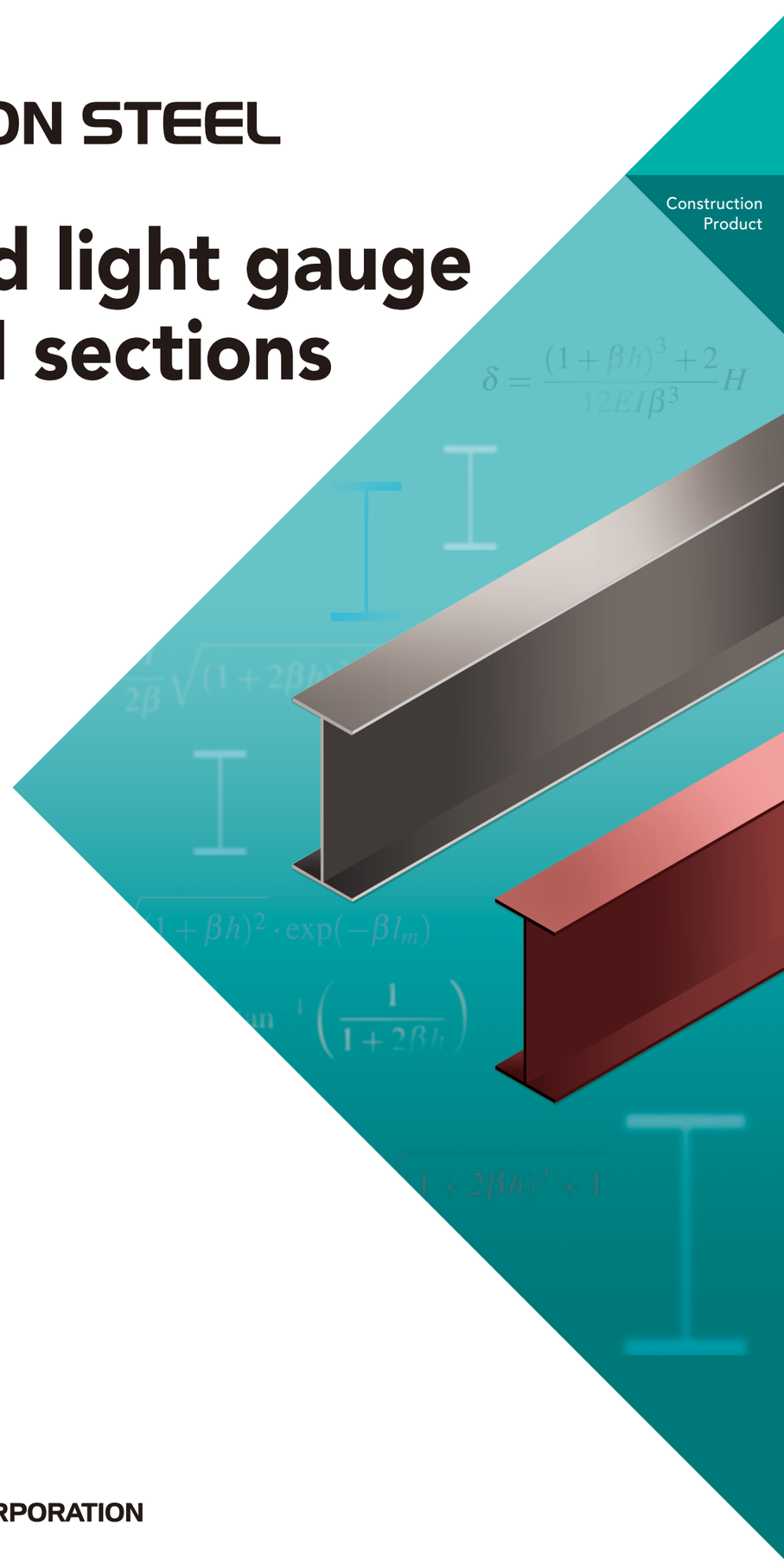
NIPPON STEEL

Construction Product

Welded light gauge steel H sections



NIPPON STEEL CORPORATION

Welded light gauge steel H section manufactured by NIPPON STEEL smartly copes with various design and processing needs

Welded light gauge steel H section is H-steel manufactured continuously from a hot-rolled steel strip by high-frequency resistance welding. It features thinner plate thickness and more accurate cross-sectional dimensions compared to a hot-rolled H section.
NIPPON STEEL, a top manufacturer of welded light gauge steel H section, meets the needs of various fields including prefabricated housings, temporary housings, structural steel frames, pre-engineered buildings and hothouses, and supports advanced structures through our reliable quality.

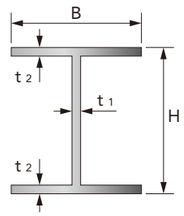
Features

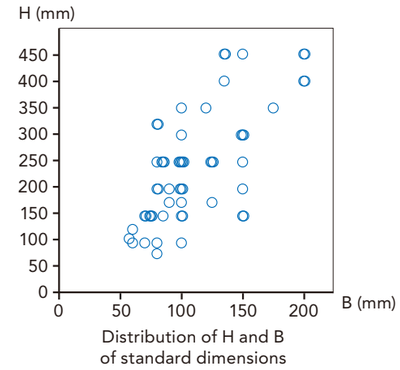
1 Freely specifiable dimension to meet various design needs.

More than 60 standard dimensions within the following manufacturing range are available, enabling a variety of design needs to be met.
We can also manufacture steel H section in dimensions other than standard dimensions.

■ Manufacturing range (mm)

H	Min. 80.0	Max. 450.0
B	Min. 40.0	Max. 200.0
t_1	Min. 2.3	Max. 6.0
t_2	Min. 2.3	Max. 12.0

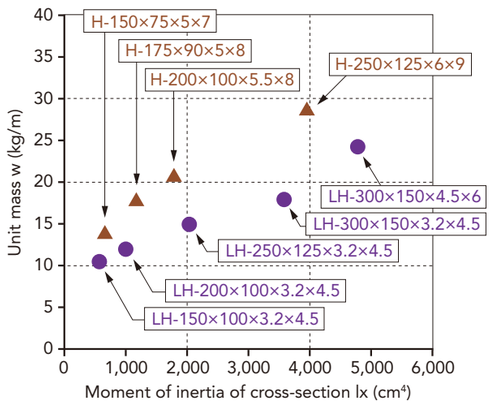




Distribution of H and B of standard dimensions

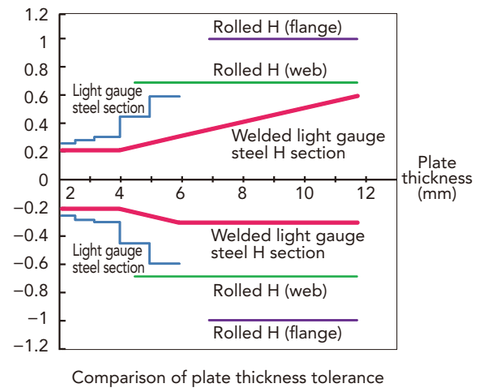
2 Excellent cross-sectional performance for realizing economical design.

Welded light gauge steel H section is between 20 and 30% lighter than hot-rolled H section (rolled H) for the same cross-sectional performance, thus realizing economical design.



3 High dimensional accuracy for reduced processing cost.

Because the plate thickness is thin and the dimensional accuracy is high, the product is suitable for shear cutting and hole punching, making it optimal for automated processing lines.



Comparison of plate thickness tolerance

4 Quality of base material and welds for ensuring high reliability.

The base material used is hot-rolled steel strip which is optimum for high-frequency resistance welding and is manufactured using the sophisticated technology of an integrated steelworks.

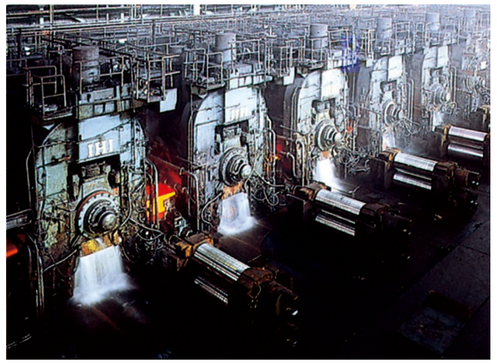
5 Highly durable welded light gauge steel H section.

We also manufacture welded light gauge steel H section which uses highly durable hot-dip zinc-coated steel strip (Z27 stipulated in JIS G 3302).

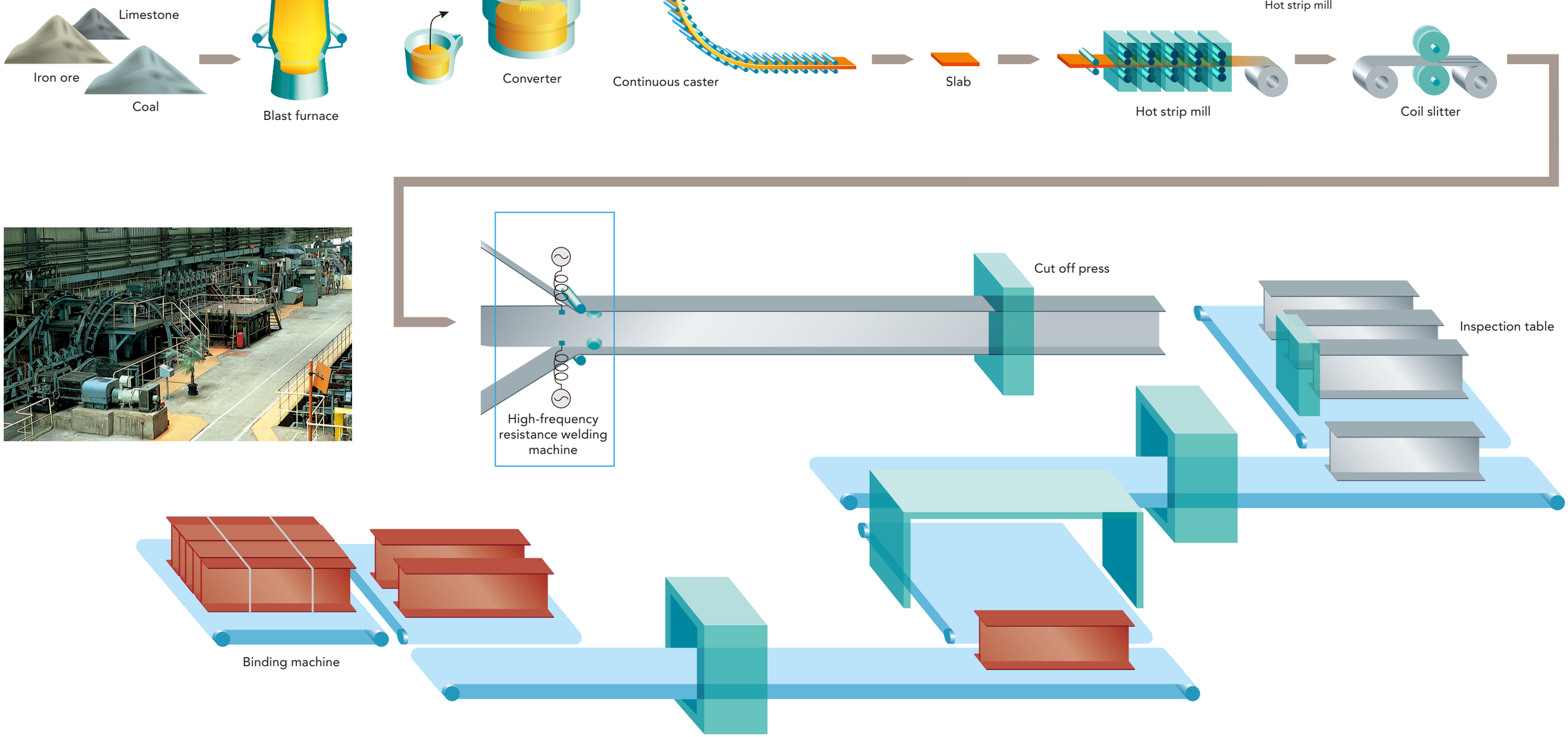
Manufacturing process

Blast furnace

NIPPON STEEL's welded light gauge steel H section is integrally produced at East Nippon works Kashima area, from the raw materials, under a thoroughgoing quality control setup.



Hot strip mill



Standards

1 Kinds of standards

Standard	JIS No.	Name	Symbol of grade	Applicable thickness (mm)
Japan Industrial Standard (JIS)	JIS G 3353:2011	Welded Light Gauge H Sections for General Structures	SWH400	2.3 mm – 12 mm
NIPPON STEEL Standards	–	490-N/mm² Grade Welded Light Gauge Steel H Sections	NSSWH490W	

2 Chemical composition and weldability

Symbol of grade	Chemical composition (%)					Carbon equivalent (%) Ceq	Composition on sensibility of weld crack (%) P_{CM}
	C	Si	Mn	P	S		
SWH400	0.20 max.	0.35 max.	1.40 max.	0.030 max.	0.015 max.	0.36 max.	0.26 max.
NSSWH490W	0.20 max.	0.55 max.	1.60 max.	0.035 max.	0.035 max.	0.44 max.	0.29 max.

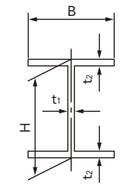
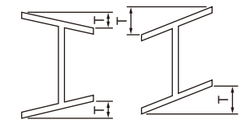
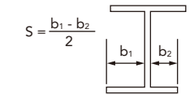
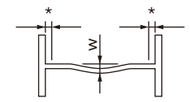
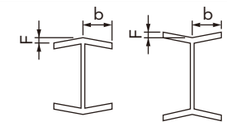
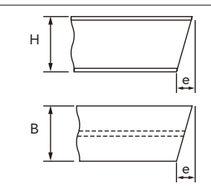
*Ceq=C+Mn/6+Si/24+Ni/40+Cr/5+Mo/4+V/14 P_{CM}=C+Si/30+Mn/20+Cu/20+Ni/60+Cr/20+Mo/15+V/10+5B
*Composition on sensibility of weld crack may be used instead of carbon equivalent, based on agreement between the delivering and receiving parties.

3 Mechanical properties

Symbol of grade	Yield point or proof stress (N/mm²)	Tensile strength (N/mm²)	Yield ratio (%)	Elongation (%)	
				5	1A
				Material thickness (mm)	
				t ≤ 5	5 < t
SWH400	245 min. (245-365)	400-510	– (80 max.)	23 min.	18 min.
NSSWH490W	325-490	490-610	95 max.	22 min.	17 min.

*The contents of the brackets are applicable when the thickness of the steel is 12 mm.

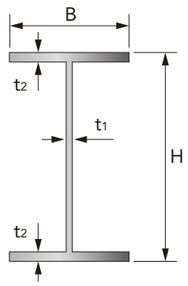
4 Tolerances of shapes and dimensions

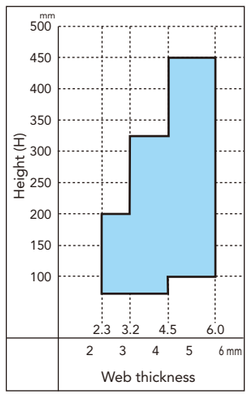
Item		JIS G 3353:2011 "Welded Light Gauge Steel H Sections for General Structures"	For reference: JIS G 3192:2008 "Dimensions, Mass and Permissible Variations of Hot Rolled H Sections" (for H ≤ 450 mm, B ≤ 200 mm)	Remarks
Height (H)		±1.0 mm	±2.0 mm	
Width (B)		±1.5 mm	±2.0 mm	
Thickness [a] (t_1, t_2)	1.6 mm or over to and excl. 4.0 mm	±0.20 mm	t_1: ±0.7 mm t_2: ±1.0 mm	
	4.0 mm or over to and excl. 6.0 mm	±5%		
	6.0 mm or over to and incl. 12.0 mm	+5% −0.30 mm		
Length [b]		+40 mm 0	+40 mm, 0	
Bend	300 mm or under in height	0.15% or under of length	0.15% or under of length	Applicable to bend such as sweep and camber
	Over 300 mm in height	0.10% or under of length	0.10% or under of length	
Squareness (T)	300 mm or under in height	1.0% or under of width (B), provided that 1.5 mm is the minimum	1.0% or under of width (B)	
	Over 300 mm in height	1.2% or under of width (B)	1.2% or under of width (B)	
Eccentricity (S)		±1.5 mm	±2.0 mm	
Concavity of web (W) [c]		2.0 mm max.	H≤350 mm: 2.0 mm max. H>350 mm: 2.5 mm max.	
Flange fold (F)		1.5% or under of b, provided that 1.5 mm is the maximum and 0.8 mm is the minimum	1.5% or under of b, provided that 1.5 mm is the maximum	
Squareness (e) of cross section		1.0% or under of height (H) or width (B), provided that 2.0 mm is the minimum	1.6% or under of height (H) or width (B), provided that 3.0 mm is the minimum	

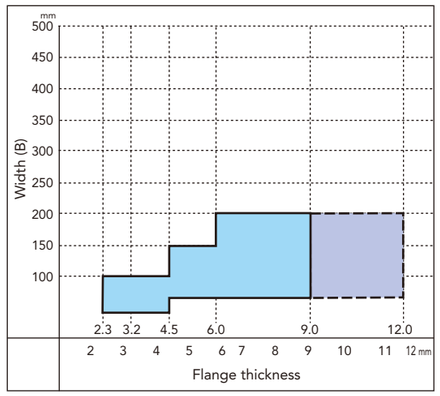
Note:
a) Particular portions such as the neighbourhood of high-frequency weld, contact part of electrode of weld are excluded.
b) Upon the agreement between the purchaser and the manufacturer, the range of total tolerances may be shifted to the minus side within the width of 40 mm. However, the upper limit of agreed tolerances shall not be below zero.
c) The measuring reference point* shall be between 5 mm and 15 mm from inner surface of flange, which shall be determined by the manufacturer for respective dimensions.
d) As for the tolerance expressed by percentage, the calculated value in millimetre shall be rounded off to the second decimal place for thickness and to the first decimal place for others according to the rule A of JIS Z 8401.
*Tolerances for welded light gauge steel H section that is not covered by JIS G 3353 are stipulated by NIPPON STEEL standards.

Specifications

1 Manufacturing range







indicates the range over which you can consult with us.

*The manufacturing range indicated here applies to material that has a lower limit value of tensile strength of 400 N/mm² and 490 N/mm².

2 Standard length

Unit: m

7.0	8.0	9.0	10.0	11.0	12.0

3 Primary antirust treatment

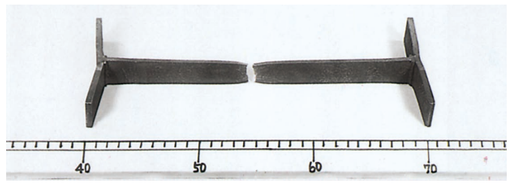
Non-treated	–
Painted red	Water-soluble alkyd resin primer
Oil-coated	Water-soluble oil

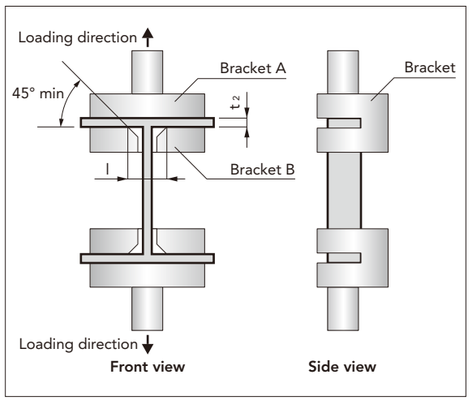
Quality of weld

The most important point concerning the quality of welded light gauge steel H section is the quality of the weld between the flange and the web. Our products are made by setting the optimum welding conditions according to the dimensions of the beam, and then welding the flange and web to each other.

1 Weld tensile strength test (JIS G 3353:2011)

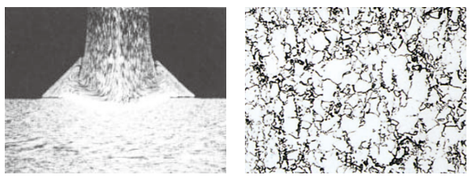
Concerning products that have equal cross-sectional dimensions, one test piece is sampled from a length of 2,500 m, then force is applied in the web direction of the weld to perform a tensile strength test, and fracturing of the base material of the web or the flange is confirmed.





2 Macro and micro structure

Macroscopic test with dilute nitric acid was performed to confirm the weld of web and flange touches on the flange side, resulting in structural fusion.



×500

Examples of applications of welded light gauge steel H section

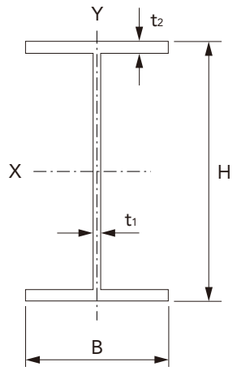
Example of use in steel frame prefabricated house

Inside view of pre-engineered buildings (type A)

Inside view of pre-engineered buildings (type B)

Hothouse

Standard cross-sectional dimensions and cross-sectional properties



Standard cross-sectional dimensions and cross-sectional properties

Standard cross-sectional dimension (mm)				Cross-sectional area (cm^2)	Unit mass (kg/m)	Moment of inertia of cross-section (cm^4)		Radius of gyration of cross-section (cm)		Modulus of cross-section (cm^3)		Plastic Modulus of cross-section (cm^3)		Number of beam per bundle
H	B	t1	t2	A	w	Ix	Iy	ix	iy	Zx	Zy	Zpx	Zpy	
80	80	2.3	2.3	5.414	4.25	63.8	19.6	3.43	1.90	15.9	4.91	17.6	7.46	13
100	60	3.2	4.5	8.312	6.52	143	16.2	4.15	1.40	28.7	5.41	32.4	8.33	15
100	70	2.3	3.3	6.768	5.31	124	18.9	4.27	1.67	24.7	5.39	27.4	8.21	11
100	80	2.3	3.2	7.273	5.71	136	27.3	4.32	1.94	27.1	6.83	29.8	10.4	13
100	100	3.2	4.5	11.91	9.35	225	75.0	4.35	2.51	45.1	15.0	49.6	22.7	11
108	57.2	2.3	3.3	6.107	4.79	123	10.3	4.50	1.30	22.9	3.60	25.7	5.53	15
125	60	3.2	4.5	9.112	7.15	238	16.2	5.11	1.33	38.0	5.41	43.3	8.40	15
150	70	3.2	4.0	10.14	7.96	375	22.9	6.08	1.50	50.0	6.54	57.0	10.2	13
150	70	3.2	4.5	10.81	8.49	408	25.8	6.15	1.54	54.4	7.36	61.7	11.4	11
150	75	2.3	2.3	6.794	5.33	247	16.2	6.03	1.54	32.9	4.32	37.6	6.66	13
150	75	3.2	3.2	9.395	7.38	338	22.5	5.99	1.55	45.0	6.01	51.7	9.37	11
150	75	3.2	4.5	11.26	8.84	432	31.7	6.19	1.68	57.6	8.45	65.0	13.0	13
150	85	3.2	9.0	19.52	15.3	823	92.2	6.49	2.17	110	21.7	122	32.9	11
150	100	3.2	4.5	13.51	10.6	551	75.0	6.39	2.36	73.5	15.0	81.4	22.9	11
150	100	3.2	6.0	16.42	12.9	693	100	6.50	2.47	92.3	20.0	102	30.4	11
150	150	3.2	4.5	18.01	14.1	789	253	6.62	3.75	105	33.8	114	51.0	7
150	150	4.5	6.0	24.21	19.0	1030	338	6.53	3.73	138	45.0	151	68.2	7
175	90	3.2	4.5	13.41	10.5	711	54.7	7.28	2.02	81.2	12.2	91.1	18.6	11
175	100	4.5	6.0	19.34	15.2	1020	100	7.26	2.28	117	20.0	131	30.8	11
175	125	3.2	4.5	16.56	13.0	940	147	7.53	2.97	107	23.4	118	35.6	9
200	80	3.2	3.2	11.32	8.89	689	27.4	7.80	1.55	68.9	6.84	80.4	10.7	13
200	80	3.2	4.5	13.31	10.4	874	38.5	8.10	1.70	87.4	9.61	99.6	14.9	13
200	100	3.2	3.2	12.60	9.89	813	53.4	8.04	2.06	81.3	10.7	93.0	16.5	11
200	100	3.2	4.5	15.11	11.9	1050	75.1	8.32	2.23	105	15.0	117	23.0	11
200	100	3.2	6.0	18.02	14.1	1310	100	8.52	2.36	131	20.0	145	30.5	11
200	100	6.0	12.0	34.56	27.1	2400	200	8.33	2.41	240	40.1	272	61.6	7
200	150	3.2	4.5	19.61	15.4	1480	253	8.68	3.59	148	33.8	161	51.1	7
250	80	3.2	8.0	20.29	15.9	2220	68.3	10.5	1.84	177	17.1	199	26.2	11
250	85	3.2	4.5	15.36	12.1	1530	46.1	9.97	1.73	122	10.9	140	16.9	11
250	85	3.2	6.0	17.82	14.0	1880	61.5	10.3	1.86	150	14.5	170	22.3	11
250	85	3.2	9.0	22.72	17.8	2560	92.2	10.6	2.01	204	21.7	227	33.1	11

Standard cross-sectional dimensions and cross-sectional properties

Standard cross-sectional dimension (mm)				Cross-sectional area (cm^2)	Unit mass (kg/m)	Moment of inertia of cross-section (cm^4)		Radius of gyration of cross-section (cm)		Modulus of cross-section (cm^3)		Plastic Modulus of cross-section (cm^3)		Number of beam per bundle
H	B	t1	t2	A	w	Ix	Iy	ix	iy	Zx	Zy	Zpx	Zpy	
250	100	3.2	3.2	14.20	11.1	1360	53.4	9.79	1.94	109	10.7	126	16.6	11
250	100	3.2	4.5	16.71	13.1	1730	75.1	10.2	2.12	138	15.0	157	23.1	11
250	100	3.2	6.0	19.62	15.4	2150	100	10.5	2.26	172	20.0	192	30.6	11
250	100	4.5	6.0	22.71	17.8	2290	100	10.0	2.10	183	20.0	210	31.2	9
250	100	4.5	9.0	28.44	22.3	3080	150	10.4	2.30	247	30.0	277	46.2	7
250	125	3.2	4.5	18.96	14.9	2070	147	10.4	2.78	165	23.4	185	35.8	7
250	125	4.5	6.0	25.71	20.2	2740	195	10.3	2.76	219	31.3	247	48.1	7
250	125	4.5	9.0	32.94	25.9	3740	293	10.7	2.98	299	46.9	332	71.5	7
250	150	3.2	4.5	21.21	16.6	2410	253	10.7	3.45	193	33.8	212	51.2	7
300	100	4.5	6.0	24.96	19.6	3490	100	11.8	2.00	233	20.0	270	31.5	9
300	150	3.2	4.5	22.81	17.9	3600	253	12.6	3.33	240	33.8	267	51.4	7
300	150	4.5	6.0	30.96	24.3	4790	338	12.4	3.30	319	45.0	358	69.0	7
300	150	4.5	9.0	39.69	31.2	6560	506	12.9	3.57	437	67.5	482	103	5
320	80	3.2	3.2	15.16	11.9	2110	27.4	11.8	1.34	132	6.85	160	11.0	11
320	80	4.5	4.5	21.20	16.6	2920	38.6	11.7	1.35	182	9.66	222	16.0	11
350	100	4.5	6.0	27.21	21.4	5000	100	13.6	1.92	286	20.1	335	31.7	5
350	175	4.5	6.0	36.21	28.4	7660	536	14.5	3.85	438	61.3	490	93.6	5
400	135	4.5	6.0	33.66	26.4	8480	246	15.9	2.71	424	36.5	489	56.6	5
400	200	4.5	6.0	41.46	32.5	11500	800	16.7	4.39	575	80.0	642	122	5
400	200	6.0	9.0	58.92	46.3	16500	1200	16.8	4.51	827	120	923	183	5
450	135	4.5	6.0	35.91	28.2	11100	246	17.6	2.62	495	36.5	575	56.9	5
450	135	4.5	8.0	41.13	32.3	13600	328	18.2	2.83	605	48.6	689	75.1	5
450	150	4.5	9.0	46.44	36.5	16200	507	18.6	3.30	718	67.5	805	103	5
450	200	4.5	9.0	55.44	43.5	20500	1200	19.2	4.65	912	120	1000	182	5
450	200	6.0	9.0	61.92	48.6	21500	1200	18.6	4.40	957	120	1070	184	5

Standard cross-sectional dimensions and cross-sectional properties (hot-dip zinc-coated steel strip Z27 stipulated in JIS G 3302)

Standard cross-sectional dimension (mm)				Cross-sectional area (cm^2)	Unit mass (kg/m)	Moment of inertia of cross-section (cm^4)		Radius of gyration of cross-section (cm)		Modulus of cross-section (cm^3)		Plastic Modulus of cross-section (cm^3)		Number of beam per bundle
H	B	t1	t2	A	w	Ix	Iy	ix	iy	Zx	Zy	Zpx	Zpy	
100	100	3.2	4.5	11.91	9.46	225	75.0	4.35	2.51	45.1	15.0	49.6	22.7	11
150	75	3.2	4.5	11.26	8.95	432	31.7	6.19	1.68	57.6	8.45	65.0	13.0	13
150	100	3.2	4.5	13.51	10.7	551	75.0	6.39	2.36	73.5	15.0	81.4	22.9	11
200	100	3.2	3.2	12.60	10.0	813	53.4	8.04	2.06	81.3	10.7	93.0	16.5	11
200	100	3.2	4.5	15.11	12.0	1050	75.1	8.32	2.23	105	15.0	117	23.0	11
200	100	3.2	6.0	18.02	14.3	1310	100	8.52	2.36	131	20.0	145	30.5	11
250	100	3.2	4.5	16.71	13.3	1730	75.1	10.2	2.12	138	15.0	157	23.1	11
250	125	3.2	4.5	18.96	15.1	2070	147	10.4	2.78	165	23.4	185	35.8	7
250	125	4.5	6.0	25.71	20.4	2740	195	10.3	2.76	219	31.3	247	48.1	7
300	100	3.2	4.5	18.31	14.6	2620	75.1	12.0	2.02	175	15.0	201	23.2	11