Product Brochure
Welded Beams and Columns
XLERPLATE® steel

BlueScope

Welded Beams and Columns

XLerplate®

Contents

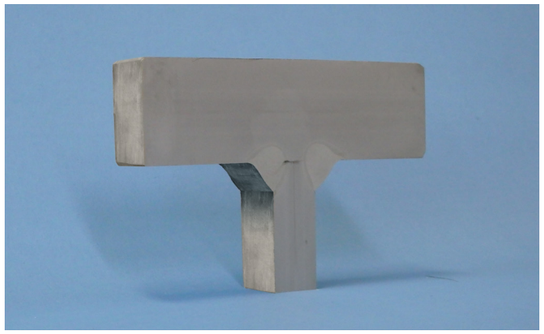
Welded beams and columns are available in a range of sizes typically for the heavier end of engineering construction, buildings, mining infrastructure and transport. Manufactured by BlueScope to Australian Standard AS/NZS 3679.2:2016 under a strict quality system to Australian Standard AS/NZS ISO 9001:2015.

Product Quality

Manufacturing Process – Welds

Welds are made using a fully automatic submerged arc welding process to AS/NZS 1554.1:2014 SP Category (deep penetration fillet weld). Welds are made simultaneously along both flange-web joints in the horizontal fillet position. A tandem arc weld system is used to make each weld; fed into both arc areas are two relatively small diameter wires. The two wires are close enough together so that they operate under a common molten pool of flux, yet are far enough apart that the metal from the first arc has solidified before the metal from the second arc is deposited on top. This technique has several benefits including:

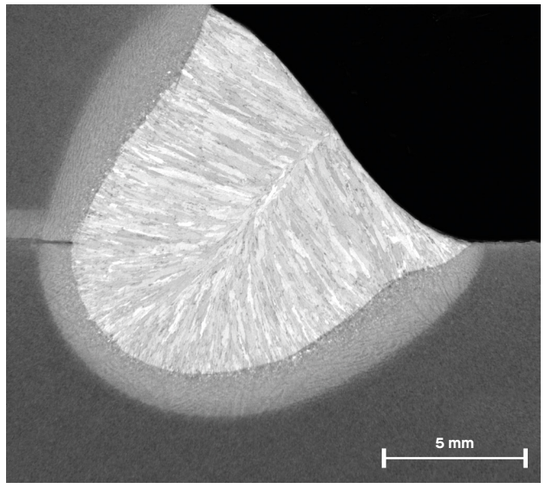
- The lead wire is designed to give deep penetration, while the second is designed to build up throat thickness and provide a consistent, uniform weld profile.
- Relatively thick joints are produced in a single pass without edge preparation and minimal heat distortion.
- Welds made under the protective layer of flux have good ductility, impact resistance and uniformity in appearance.
- Mechanical properties at least equal to those of the parent metal are consistently obtained.



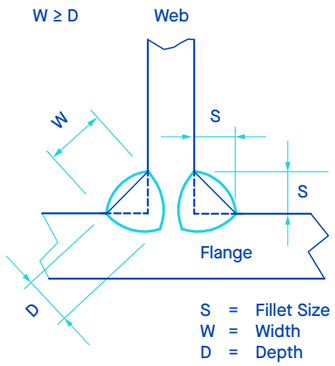
Product Testing

The quality of BlueScope's welded products is checked in NATA endorsed testing laboratories. Strict metallurgical control is maintained, from receipt of raw materials to dispatch of the final product. Testing of BlueScope's welded beams includes:

- Mechanical testing of the original plates that are used to produce the flange and web to determine the tensile properties and, where required, the Charpy impact properties.
- Web-to-flange tensile testing (T test) is carried out to determine the strength of the weld on a batch basis, as per the standard.
- Macro testing (see below), used to determine weld quality is also carried out on a batch basis, as per the standard.



Example of Macro Test



Test Certificates

All test results are available on BlueScope's test certificates (an example of which is shown here), which contain all the information as required by the AS/NZSW 3679.2:2016.

TEST CERTIFICATE BlueScope

Page 1 of 2
Certificate No. : WP94031
Transmission Date: 24/10/17

Customer:	Supplier: WELDED PRODUCTS BLUESCOPE STEEL (AIS) PTY LTD LOT 2 FIVE ISLANDS ROAD UNANDERRA N S W 2526 A.B.N. 19000019625
Cust Order No:	Sales Order No: 901423 Printed At: Supplier MWS on: 23/03/2018

NATA — Accredited for compliance with ISO/IEC 17025 - Testing.

I certify that the original records of the company show that the item(s) referred to on this certificate conform to the specification as stated.

R.MATHIESSEN - BLUESCOPE STEEL APPROVED SIGNATORY
Mechanical LAB 0631
S.ANDREWS - BLUESCOPE STEEL APPROVED SIGNATORY
Chemical LAB 0632

STEEL MAKING: Basic Oxygen - Slab Cast
SPECIFICATION: **(AS/NZS 3679.2-300)**
PRODUCT: **900WB218 13500**

Item No: 0010
INSPECTION: Supplier
CERTIFICATION: Supplier

Welded Section Number	Feed Plate Serial Number		
	FLANGE	WEB	FLANGE
201721076	YW720A1	YS495B1	YW720A1
Heat	6538479	6534069	6538479

CHEMICAL ANALYSIS

Percentage of element by mass (L=Cast, P=Product, -S=Soluble, -T=Total, CF=Chemical Formula, n=Min, x=Max)

Heat / Unit No	NATA Lab	L/P	C	P	Mn	Si	S	Ni	Cr	Mo	Cu	Al-T	Ti
6534069	0632	L	.140	.019	1.11	.18	.011	.023	.036	.004	.042	.023	.018
6538479	0632	L	.151	.027	1.16	.28	.011	.020	.030	.002	.038	.024	.016

Heat / Unit No	NATA Lab	L/P	B-T	Nb	V	CF1	CF2	CF3
6534069	0632	L	<.0003	.001	.003	.34	.10	.00
6538479	0632	L	<.0003	.001	.004	.36	.09	.00

CF1=C+ (MN/6) + ((CR+MO+V)/5) + ((CU+NI)/15) CF2=NI + CR + CU + MO CF3=NB + V

MECHANICAL TESTING (FEED PLATE)

Tensile AS 1391

Heat No	Tested Unit	NATA Lab	Cat	Loc	THICK mm	ReH MPa	Rm MPa	Lo	ELONGN %
6534069	YS495	0631	B	TQF	12.00	350	470	A	35
6538479	YW728	0631	B	TQF	25.00	360	500	A	30

COMMENTS

This test certificate is issued subject to the Uncertainty of Results statement set out on BlueScope Steel's Website www.bluescopesteelconnect.com. In order to rely upon this certificate, you must read the Uncertainty of Results statement.
THIS PRODUCT IS SUPPLIED IN ACCORDANCE WITH THE REQUIREMENTS OF THE ABOVE SPECIFICATION. SAMPLING AND CHEMICAL ANALYSIS ARE PERFORMED IN ACCORDANCE WITH BLUESCOPE STEEL PROCEDURE DH-LABS-QS-00 S05.07C. MECHANICAL TESTING HAS BEEN PERFORMED ON SAMPLES SUPPLIED BY THE RELEVANT PRODUCTION DEPARTMENTS. HEAT TREATMENT - PRODUCT AS ROLLED.
All product has achieved the minimum web-to-flange tensile strength requirements as per Table 1 of AS/NZS 3679.2.
Quality management system conforms to AS/NZS ISO 9001 as assessed by BSI (Certificate Number FS 594448).
BlueScope Steel is assessed for conformity to AS/NZS 3679.2 through self-assessment and also by ACRS (160402).

Product Quality

Product Conformity

In compliance with Appendix B of the AS/NZS 3679.2:2016 standard, BlueScope welded products undergo ongoing property assessment by way of the factory production control (FPC) requirement for this standard. Inspections are conducted and properties are reviewed on a regular basis to ensure both the process and the product conform to the standard. BlueScope's FPC system is underpinned by accreditation to ISO 9001:2015.

Third Party Product Compliance Accreditation

In addition to our quality systems and NATA endorsed laboratories, BlueScope's range of AS/NZS 3679.2:2016 welded sections have independent Third Party Certification from both ACRS (Australian Certification Authority for Reinforcing and Structural Steels) and ATIC (Australian Technical Infrastructure Committee) Scheme 10 giving designers and asset owners additional confidence that the beams they are receiving are in full compliance to all relevant standards.

ACRS is an expert, industry based, third party product certifier of structural steels to Australian/New Zealand Standards. ACRS ensures compliance to standards and end-to-end supply chain traceability. ACRS is supported by peak technical bodies such as AustRoads and Engineers Australia.

ATIC Scheme 10 sets out the requirements for bodies certifying manufacturers of structural steel products. The actual certifying body for compliance to the ATIC Scheme 10 requirements is Global-Mark. The requirements were developed by the Australian Technical Infrastructure Committee (ATIC), a technical group under the umbrella of the Australasian Procurement and Construction Council (APCC). APCC is the peak council of departments responsible for procurement, construction and asset management policy for the Australian, State and Territory governments and the New Zealand Government.

Product Availability

Grades

Standard

Standard Grades, as per the AS/NZS 3679.2:2016 standard:

AS/NZS 3679.2-300
AS/NZS 3679.2-400
AS/NZS 3679.2-300L15
AS/NZS 3679.2-400L15

Custom

Custom grades of welded beams are also available by enquiry. Note these beams are NOT covered by AS/NZS 3679.2, but are made utilizing the same manufacturing processes and quality control measures. The custom grades are available from plate made to the AS/NZS 3678:2016 standard and include the weathering steel grade REDCOR® steel AS/NZS 3678-WR350B (L0 and L20 options available). Customers wishing to purchase a welded beam made from AS/NZS 3678-350 grade are advised to use AS/NZS 3679.2-400 grade beams.

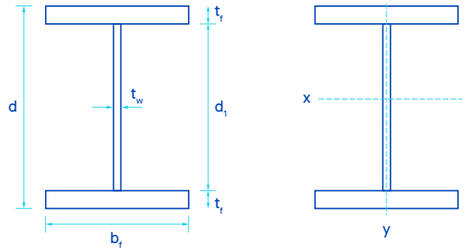
Lengths

Standard Lengths (metres)

Section	Welded Beams 700WB – 1200WB	Welded Columns 350WC – 500WC
9	✓	✓
10.5	✓	✓
12	✓	✓
13.5	✓	✓
15	✓	✓
16.5	✓	✓
18	✓	✓

> 18 m lengths available by enquiry.
Custom lengths available in 10 mm increments.
Welded beams less than 9 m (5.5 m minimum length) are available by enquiry but will be subjected to at least a minimum order quantity of 2 beams.

Western Sydney Stadium



Properties for Beams and Columns

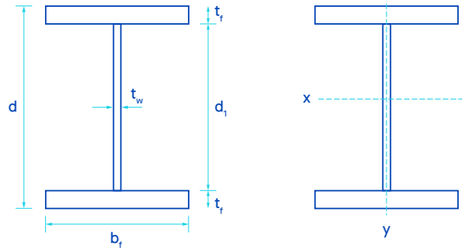
Welded Beams

Dimensions and Properties

Designation		Depth of Section	Flange		Web Thickness	Depth between flanges			Gross Area of Cross Section	About x-axis				About y-axis				Torsion Constant	Warping Constant
			Width	Thickness															
		d	b_f	t_f	t_w	d_1	d_1/t_w	$(b_f\text{-}t_w)/2t_f$	A_g	I_x	Z_x	S_x	r_x	I_y	Z_y	S_y	r_y	J	I_w
	kg/m	mm	mm	mm	mm	mm			mm^2	10^6mm^4	10^3mm^3	10^3mm^3	mm	10^6mm^4	10^3mm^3	10^3mm^3	mm	10^3mm^4	10^9mm^6
1200WB	455	1200	500	40	16	1120	70.0	6.05	57900	15300	25600	28200	515	834	3330	5070	120	22000	280000
	423	1192	500	36	16	1120	70.0	6.72	53900	13900	23300	25800	508	750	3000	4570	118	16500	251000
	392	1184	500	32	16	1120	70.0	7.56	49900	12500	21100	23400	500	667	2670	4070	116	12100	221000
	342	1184	400	32	16	1120	70.0	6.00	43500	10400	17500	19800	488	342	1710	2630	88.6	9960	113000
	317	1176	400	28	16	1120	70.0	6.86	40300	9250	15700	17900	479	299	1500	2310	86.1	7230	98500
	278	1170	350	25	16	1120	70.0	6.68	35400	7610	13000	15000	464	179	1020	1600	71.1	5090	58700
	249	1170	275	25	16	1120	70.0	5.18	31700	6380	10900	12900	449	87	633	1020	52.4	4310	28500
1000WB	322	1024	400	32	16	960	60.0	6.00	4100	7480	14600	16400	427	342	1710	2620	91.3	9740	84100
	296	1016	400	28	16	960	60.0	6.86	37800	6650	13100	14800	420	299	1490	2300	89	7010	73000
	258	1010	350	25	16	960	60.0	6.68	32900	5430	10700	12300	406	179	1020	1590	73.8	4870	43400
	215	1000	300	20	16	960	60.0	7.10	27400	4060	8120	9570	385	90.3	602	961	57.5	2890	21700
900WB	282	924	400	32	12	860	71.7	6.06	35900	5730	12400	13600	399	341	1710	2590	97.5	8870	67900
	257	916	400	28	12	860	71.7	6.93	32700	5050	11000	12200	393	299	1490	2270	95.6	6150	58900
	218	910	350	25	12	860	71.7	6.76	27800	4060	8930	9960	382	179	1020	1560	80.2	4020	35000
	175	900	300	20	12	860	71.7	7.20	22300	2960	6580	7500	364	90.1	601	931	63.5	2060	17400
800WB	192	816	300	28	10	760	76.0	5.18	24400	2970	7290	8060	349	126	840	1280	71.9	4420	19600
	168	810	275	25	10	760	76.0	5.30	21400	2480	6140	6840	341	86.7	631	964	63.7	2990	13400
	146	800	275	20	10	760	76.0	6.63	18600	2040	5100	5730	331	69.4	505	775	61.1	1670	10600
	122	792	250	16	10	760	76.0	7.50	15600	1570	3970	4550	317	41.7	334	519	51.7	921	6280
700WB	173	716	275	28	10	660	66.0	4.73	22000	2060	5760	6390	306	97.1	706	1080	66.4	4020	11500
	150	710	250	25	10	660	66.0	4.80	19100	1710	4810	5370	299	65.2	521	798	58.4	2690	7640
	130	700	250	20	10	660	66.0	6.00	16600	1400	3990	4490	290	52.1	417	642	56	1510	6030
	115	692	250	16	10	660	66.0	7.50	14600	1150	3330	3790	281	41.7	334	517	53.5	888	4770

Notes

i. All welds to AS/NZS 1554.1:2014 Category SP (deep penetration).
ii. Web to flange joints develop the minimum tensile strength of a 16 mm web.
iii. Flame cut surfaces not incorporated in welds have a minimum surface roughness of Class 2, as defines in Weld Australia's Technical Note 5.
iv. Compactness nomenclature: C – Compact Section, N – Non-compact Section, S – Slender Section.



Properties for Beams and Columns

Welded Beams

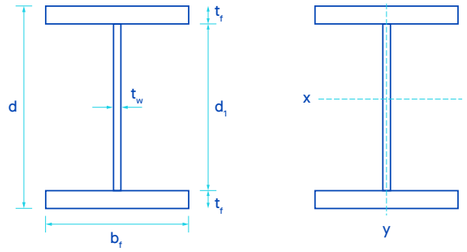
Properties for Assessing Section Capacity

Designation		Grade 300								Grade 400							
		Yield Stress		Design Capacity of Joint	Form Factor	About x-axis		About y-axis		Yield Stress		Design Capacity of Joint	Form Factor	About x-axis		About y-axis	
		Flange	Web			Compactness		Compactness		Flange	Web			Compactness		Compactness	
		f_y	f_y	Øvwj	k_f		Z_{ex}		Z_{ey}	f_y	f_y	Øvwj	k_f		Z_{ex}		Z_{ey}
	kg/m	MPa	MPa	kN/mm			10^3mm^3		10^3mm^3	MPa	MPa	kN/mm			10^3mm^3		10^3mm^3
1200WB	455	280	300	5.5	0.837	C	28200	C	5000	360	380	6.14	0.820	N	28100	C	5000
	423	280	310	5.5	0.825	C	25800	C	4500	360	380	6.14	0.806	N	25700	N	4500
	392	280	300	5.5	0.811	C	23400	N	4000	360	380	6.14	0.791	N	23300	N	3900
	342	280	310	5.5	0.783	C	19800	C	2560	360	380	6.14	0.760	N	19600	C	2560
	317	280	300	5.5	0.766	C	17900	C	2240	360	380	6.14	0.741	N	17700	N	2230
	278	280	310	5.5	0.733	C	15000	C	1530	360	380	6.14	0.705	N	14900	N	1530
	249	280	300	5.5	0.701	C	12900	C	949	360	380	6.14	0.670	N	12800	C	949
1000WB	322	280	300	5.5	0.832	C	16400	C	2560	360	380	6.14	0.807	C	16400	C	2560
	296	280	300	5.5	0.817	C	14800	C	2240	360	380	6.14	0.791	C	14800	N	2230
	258	280	310	5.5	0.790	C	12300	C	1530	360	380	6.14	0.760	C	12300	N	1530
	215	300	300	5.5	0.738	C	9570	C	903	380	380	6.14	0.704	C	9570	N	887
900WB	282	280	310	4.13	0.845	C	13600	C	2560	360	400	4.61	0.830	N	13500	C	2560
	257	280	310	4.13	0.830	C	12200	C	2240	360	400	4.61	0.813	N	12000	N	2220
	218	280	310	4.13	0.800	C	9960	C	1530	360	400	4.61	0.780	N	9840	N	1530
	175	300	310	4.13	0.744	C	7500	C	901	380	400	4.61	0.721	N	7320	N	882
800WB	192	280	310	3.44	0.824	C	8060	C	1260	360	400	3.84	0.808	N	7850	C	1260
	168	280	310	3.44	0.799	C	6840	C	946	360	400	3.84	0.781	N	6640	C	946
	146	300	310	3.44	0.763	N	5710	C	757	380	400	3.84	0.744	N	5510	N	754
	122	300	310	3.44	0.718	N	4530	N	498	380	400	3.84	0.695	N	4340	N	486
700WB	173	280	310	3.44	0.850	C	6390	C	1060	360	400	3.84	0.833	C	6390	C	1060
	150	280	310	3.44	0.828	C	5370	C	782	360	400	3.84	0.807	C	5370	C	782
	130	300	310	3.44	0.795	C	4490	C	626	380	400	3.84	0.773	C	4490	C	626
	115	300	310	3.44	0.767	C	3790	N	498	380	400	3.84	0.742	C	3790	N	486

Notes

i. All welds to AS/NZS 1554.1:2014 Category SP (deep penetration).
ii. Web to flange joints develop the minimum tensile strength of a 16 mm web.
iii. Flame cut surfaces not incorporated in welds have a minimum surface roughness of Class 2, as defines in Weld Australia's Technical Note 5.
iv. Compactness nomenclature: C – Compact Section, N – Non-compact Section, S – Slender Section.

Welded Beams and Columns
XLERPLATE® steel



Properties for Beams and Columns

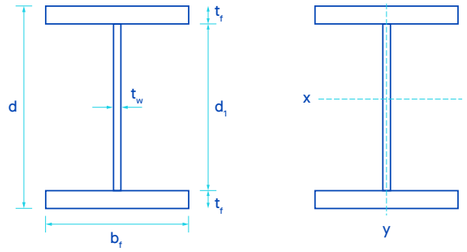
Welded Columns

Dimensions and Properties

Designation		Depth of Section	Flange		Web Thickness	Depth between flanges			Gross Area of Cross Section	About x-axis				About y-axis				Torsion Constant	Warping Constant
			Width	Thickness															
		d	b_f	t_f	t_w	d_1	d_1/t_w	$(b_f-t_w)/2t_f$	A_g	I_x	Z_x	S_x	r_x	I_y	Z_y	S_y	r_y	J	I_w
	kg/m	mm	mm	mm	mm	mm			mm^2	10^6mm^4	10^3mm^3	10^3mm^3	mm	10^6mm^4	10^3mm^3	10^3mm^3	mm	10^3mm^4	10^9mm^6
500WC	440	480	500	40	40	400	10.0	5.75	56000	2150	8980	10400	196	835	3340	5160	122	30100	40400
	414	480	500	40	32	400	12.5	5.85	52800	2110	8800	10100	200	834	3340	5100	126	25400	40400
	383	472	500	36	32	400	12.5	6.50	48800	1890	7990	9130	197	751	3000	4600	124	19900	35700
	340	514	500	32	25	450	18.0	7.42	43200	2050	7980	8980	218	667	2670	4070	124	13100	3880
	290	506	500	28	20	450	22.5	8.57	37000	1750	6930	7700	218	584	2330	3550	126	8420	33300
	267	500	500	25	20	450	22.5	9.60	34000	1560	6250	6950	214	521	2080	3170	124	6370	29400
	228	490	500	20	20	450	22.5	12.0	29000	1260	5130	5710	208	417	1670	2550	120	3880	23000
400WC	361	430	400	40	40	350	8.75	4.50	46000	1360	6340	7470	172	429	2140	3340	96.5	24800	16300
	328	430	400	40	28	350	12.5	4.65	41800	1320	6140	7100	178	427	2140	3270	101	19200	16200
	303	422	400	36	28	350	12.5	5.17	38600	1180	5570	6420	175	385	1920	2950	99.8	14800	14300
	270	414	400	32	25	350	14.0	5.86	34400	1030	4950	5660	173	342	1710	2610	99.8	10400	12500
	212	400	400	25	20	350	17.5	7.60	27000	776	3880	4360	169	267	1330	2040	99.4	5060	9380
	181	390	400	20	20	350	17.5	9.50	23000	620	3180	3570	164	214	1070	1640	96.4	3080	7310
	144	382	400	16	16	350	21.9	12.0	18400	486	2550	2830	163	171	854	1300	96.3	1580	5720
350WC	280	355	350	40	28	275	9.82	4.03	35700	757	4210	4940	145	286	1640	2500	89.6	16500	7100
	258	347	350	36	28	275	9.82	4.47	32900	661	3810	4450	142	258	1470	2260	88.5	12700	6230
	230	339	350	32	25	275	11.0	5.08	29300	573	3380	3910	140	229	1310	2000	88.4	8960	5400
	197	331	350	28	20	275	13.8	5.09	25100	486	2940	3350	139	200	1140	1740	89.3	5750	4600

Notes

i. All welds to AS/NZS 1554.1:2014 Category SP (deep penetration).
ii. Web to flange joints develop the minimum tensile strength of a 16 mm web only.
iii. Flame cut surfaces not incorporated in welds have a minimum surface roughness of Class 2, as defines in Weld Australia's Technical Note 5.
iv. Compactness nomenclature: C – Compact Section, N – Non-compact Section, S – Slender Section.



Properties for Beams and Columns

Welded Columns

Properties for Assessing Section Capacity

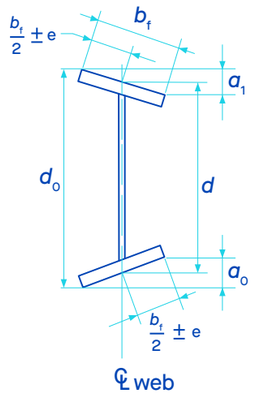
Designation		Grade 300								Grade 400							
		Yield Stress		Design Capacity of Joint	Form Factor	About x-axis		About y-axis		Yield Stress		Design Capacity of Joint	Form Factor	About x-axis		About y-axis	
		Flange	Web			Compactness		Compactness		Flange	Web			Compactness		Compactness	
		f_y	f_y	Øvwj	k_f		Z_{ex}		Z_{ey}	f_y	f_y	Øvwj	k_f		Z_{ex}		Z_{ey}
	kg/m	MPa	MPa	kN/mm			10^3mm^3		10^3mm^3	MPa	MPa	kN/mm			10^3mm^3		10^3mm^3
500WC	440	280	280	5.5	1.00	C	10400	C	5010	360	360	6.14	1.00	C	10400	C	5010
	414	280	280	5.5	1.00	C	10100	C	5010	360	360	6.14	1.00	C	10100	C	5010
	383	280	280	5.5	1.00	C	9130	C	4510	360	360	6.14	1.00	C	9130	C	4510
	340	280	280	5.5	1.00	C	8980	C	4000	360	360	6.14	1.00	N	8830	N	3920
	290	280	300	5.5	1.00	N	7570	N	3410	360	380	6.14	1.00	N	7410	N	3310
	267	280	300	5.5	1.00	N	6700	N	2970	360	380	6.14	1.00	N	6540	N	2860
	228	300	300	5.5	1.00	N	5210	N	2200	380	380	6.14	0.964	S	4900	N	2100
400WC	361	280	280	5.5	1.00	C	7470	C	3210	360	360	6.14	1.00	C	7470	C	3210
	328	280	280	5.5	1.00	C	7100	C	3200	360	360	6.14	1.00	C	7100	C	3200
	303	280	280	5.5	1.00	C	6420	C	2880	360	360	6.14	1.00	C	6420	C	2880
	270	280	280	5.5	1.00	C	5660	C	2560	360	360	6.14	1.00	C	5660	C	2560
	212	280	300	5.5	1.00	N	4360	N	2000	360	380	6.14	1.00	N	4270	N	1950
	181	300	300	5.5	1.00	N	3410	N	1510	380	380	6.14	1.00	N	3330	N	1460
	144	300	300	5.5	1.00	N	2590	N	1120	380	380	6.14	0.964	S	2430	N	1070
350WC	280	280	280	5.5	1.00	C	4940	C	2450	360	360	6.14	1.00	C	4940	C	2450
	258	280	280	5.5	1.00	C	4450	C	2210	360	360	6.14	1.00	C	4450	C	2210
	230	280	280	5.5	1.00	C	3910	C	1960	360	360	6.14	1.00	C	3910	C	1960
	197	280	300	5.5	1.00	C	3350	C	1720	360	380	6.14	1.00	C	3350	C	1720

Notes

i. All welds to AS/NZS 1554.1:2014 Category SP (deep penetration).
ii. Web to flange joints develop the minimum tensile strength of a 16 mm web.
iii. Flame cut surfaces not incorporated in welds have a minimum surface roughness of Class 2, as defines in Weld Australia's Technical Note 5.
iv. Compactness nomenclature: C – Compact Section, N – Non-compact Section, S – Slender Section.

Tolerances

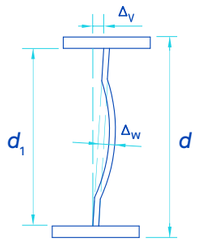
Dimensional Tolerances					
Designation	**Permissible variation of depth (d) mm**	**Permissible variation of flange width (b_f) mm**	**Permissible out-of-square on each flange (a_1 or a_0) mm**	**Permissible Total out-of-square (a_1+ a_0) mm**	**Permissible web off-centre (e) mm**
Beams					
1200WB	± 4.0	+6.0 to -5.0	± 5.0	± 8.0	± 5.0
1000WB	± 3.3				
900WB, 800WB, 700WB	± 3.0				
Columns					
500WC, 400WC, 350WC	± 3.0	+6.0 to -5.0	± 5.0	± 8.0	± 5.0



Notes

i. Dimensions d_o, d, a_1 and a_o are measured parallel with the centreline of the web.
ii. Dimensions b_f and b_f /2 ± e are measured parallel with the plane of the flange.
iii. Dimension d is measured at the centreline of the web.

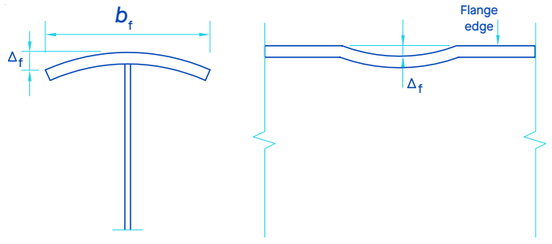
Tolerances on a Web



Tolerance on a Web		
Out of Flatness (Δ_w)	**Permissible deviation from verticality of a web (Δ_v) mm**	
d_1/150	d ≤ 900	± 3
	d > 900	± (d/300)

Straightness Tolerances	
Nominal Size	**Sweep or Camber (mm)**
Beams	Length/1000
≤ 14 m Column	Length/1000, but not more than 10 mm
> 14 m Column	10 mm + (Length – 14000/1000)

Tolerances on a Flange



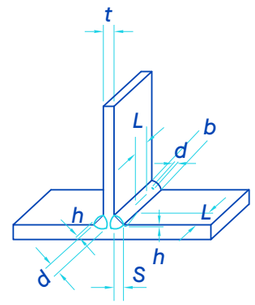
Tolerance on a Flange	
Out of Flatness (Δ_f) mm	
b_f ≤ 450	± (b_f/150)
b_f > 450	± 3

Length Tolerances		
Specified Length	**Permissible variation from specified length (mm)**	
	Under	Over
All lengths	Nil	+50

Standards referenced: AS/NZS 3679:2:2016

Weld Tolerances

L = Length or maximum dimension of individual imperfection measured parallel to axis of weld
ΣL = sum of lengths of imperfections in stated weld length
h = height (depth) of imperfection
t = thickness of (thinner) parent material
b = width of weld face
d = size of pore
S = size of fillet weld



Imperfection (see Note 1)			Maximum allowable dimension or number of imperfections
Type	**Parameter**	**Symbol**	**SP**
Cracks	Length	*L*	No cracks allowed
	Cumulative length	*ΣL*	No cracks allowed
Lack of fusion or incomplete penetration	Length	*L*	Where located more than 3*t* from end of weld, 2*t*/3 but not more than 20 mm.
	Cumulative length	*ΣL*	Where located within 3*t* of end of weld, 3 mm *t* in 6*t* length but proportionally less for shorter length
Undercut-continuous (see Note 2)	Depth	*h*	*t*/20 but not more than 1 mm
Undercut-intermittent (see Note 2)	Depth	*h*	*t*/10 but not more than 1.5 mm
Shrinkage grooves Root concavity	–	–	As for undercut
Overlap (see Note 3)	Length	*L*	*t*, but not more than 10 mm
	Cumulative length	*ΣL*	30 mm in 300 mm but proportionally less for shorter lengths
Toe shape, other than above	–	–	Suitable to permit required in NDE report
Surface pores (see Note 3)	Size of pore	*d*	*t*/3, but not more than 5 mm
	No. of pores	–	2 per 12*t* length
Loss of cross-sectional area (see Note 2)	Loss of area	–	≤ 5%
Reinforcement	Height	*h*	For *S* ≤ 12 mm, 2 mm
Undersize-intermittent (see Note 6)	Leg length	–	*S*/10, but not more than 3 mm

Standards referenced: AS/NZS 1554.1:2014

Notes

1. For adjacent imperfections, see Clause 6.2.3 of AS/NZS 1554.1:2014.
2. Undercut less than 0.5 mm in depth should be disregarded.
3. Where these allowances for overlap and surface pores are detrimental to any surface treatment, they may not be acceptable.
4. For a welding procedure qualification, the assessment of the test piece for compliance with the permissible levels of imperfections should be done with the aid of the macro test specimen. For calculation of the loss of cross-sectional area, internal imperfections are estimated from the macro test specimen.
5. For the calculation of the loss of cross-sectional area, all relevant surface imperfections shall be included. Where lack of root fusion is evident, the inspector is required to assess the approximate depth of the imperfection. The macro test specimen from the welding procedure qualification may need examination for this purpose.
6. The cumulative length of intermittent undersize fillet welds shall not exceed 10% of the length of the weld.

Pre Camber

Pre camber sections are available by enquiry in 5 mm increments from 20 mm up to the maximums listed below. Pre camber is achieved by cutting the required camber into the web prior to welding and eliminates the potential for increased stresses as a result of cambering post the welding process. The tolerances achieved are ±10 mm.

Section	Maximum Camber (mm)	
	12 – 15 m	15.1 – 18 m
700WB (115, 130, 150, 173) 800WB (122, 146, 168, 192) 900WB (175, 218, 257)	60	60
900WB (282) 1000WB (215, 258, 296)	50	60
1000WB (322)	40	50
1200WB (249, 278, 317)	40	40
1200WB (342, 392, 423, 455)	30	40
350WC (197, 230)	50	60
350WC (258, 280)	40	40
400WC (144, 181, 212, 270)	50	60
400WC (303, 328, 361)	40	40
500WC (228, 267, 290, 340)	50	60
500WC (383, 414, 440)	40	40

Plate Properties

Welded Sections – Base Plate Properties

Welded Sections manufactured to AS/NZS 3679.2:2016 are required to use base plates manufactured to the AS/NZS 3678:2016 standard. Following are the properties of the base plate grades.

Structural Steel – Welded Sections – Standard: AS/NZS 3679.2

Chemical Composition - Welded Sections Base Plate

Cast or Product Analysis, Percent													
Grade (see Note 1)	C	Si	Mn	P	S	Cr (see Note 2)	Ni (see Note 2)	Cu (see Note 2)	Mo (see Note 2)	Al (see Note 3)	Ti	Micro-alloying Elements	CE (see Note 4)
AS/NZS 3678	Max.	Max.	Max.	Max.	Max.	Max.	Max.	Max.	Max.	Max.	Max.	Max.	Max.
300 & 300L15	0.22	0.5	1.70	0.040	0.030	0.25	0.30	0.40	0.08	0.10	0.040	(see Note 5)	0.44
400 & 400L15	0.22	0.55	1.70	0.040	0.030	0.25	0.50	0.40	0.35	0.10	0.040	(see Note 6)	0.48

Notes

1. The use of sulphide modification steelmaking techniques for listed grades is permitted.
2. Cr + Ni + Cu + Mo = 100% maximum apply.
3. Limits specified are for both acid soluble and total aluminium.
4. Carbon equivalent (CE) is calculated from the equation based on actual cast or product analysis.
   $CE = C + \frac{Mn}{6} + \frac{Cr + Mo + V}{5} + \frac{Ni + Cu}{15}$
5. Niobium plus vanadium: 0.030% maximum.
6. Vanadium: 0.10% maximum. Niobium plus vanadium plus titanium: 0.15% maximum.

Tensile Properties – Welded Sections Base Plate

Property	Grade - AS/NZS 3678	
Minimum Yield Strength - MPa for thickness of:	300, 300L15	400, 400L15
> 8 ≤ 12	310	400
> 12 ≤ 20	300	380
> 20 ≤ 50	280	360
Minimum Tensile Strength - MPa	430	480
Minimum Elongation % of Gauge Length of $5.65\sqrt{S_o}$	21	18

Notes

i. S_o is the cross-sectional area of the test piece before testing.

Charpy V-Notch Impact Test Requirements – Welded Sections Base Plate

Grade	Test Temperature	Minimum Absorbed Energy, J Size of Test Piece					
AS/NZS 3678		10 mm x 10 mm		10 mm x 7.5 mm		10 mm x 5 mm	
Plate Thickness		≥ 12 mm		< 12, ≥ 9.5 mm		< 9.5 mm, ≥ 6 mm	
	C°	Average of 3 Tests	Individual Test	Average of 3 Tests	Individual Test	Average of 3 Tests	Individual Test
300L15	-15	27	20	22	16	18	13
400L15	-15	27	20	22	16	18	13

Standards referenced: AS/NZS 3678:2016
For Plate Thickness <6 mm contact BlueScope.

BlueScope

For further information call 1800 024 402 or visit steel.com.au

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Australian Standards referenced in this Product Brochure:
AS/NZS 1554.1:2014 – Structural steel welding
AS/NZS 3678:2016 – Structural steel – Hot-rolled plates, floorplates and slabs
AS/NZS 3679.2:2016 – Structural steel – Welded I sections
ISO 9001:2015 – Quality management systems – Requirements

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