

The background is a low-angle photograph of a tall building under construction, with a red color overlay. A crane is visible on the left, and a worker is seen on the building's facade. In the foreground, a worker's hand in a black glove is visible on the left side.

80

AS4100 DESIGN TABLES
**FOR BEAMS AND COLUMNS FABRICATED FROM
BISALLOY® STRUCTURAL 80 STEEL**

Bisalloy Steels has recently introduced a new product nomenclature. The following table details the grade equivalents.

Note: Only the designation has changed – not the product

Previous Name	New Name
BISPLATE® 60	BISALLOY® Structural 60 steel
BISPLATE® 70	BISALLOY® Structural 70 steel
BISPLATE® 80	BISALLOY® Structural 80 steel
BISPLATE® 100	BISALLOY® Structural 100 steel
BISPLATE® 80PV	BISALLOY® Structural 80 Pressure Vessel steel
BISPLATE® 320	BISALLOY® Wear 320 steel
BISPLATE® 400	BISALLOY® Wear 400 steel
BISPLATE® 450	BISALLOY® Wear 450 steel
BISPLATE® 500	BISALLOY® Wear 500 steel
BISPLATE® 600	BISALLOY® Wear 600 steel
BISPLATE® HIA - Class 2	BISALLOY® Armour RHA300 steel
BISPLATE® HIA - Class 1	BISALLOY® Armour RHA360 steel
BISPLATE® HTA	BISALLOY® Armour HTA400 steel
BISPLATE® UHT	BISALLOY® Armour UHT440 steel
BISPLATE® HHA	BISALLOY® Armour HHA500 steel
BISPLATE® UHH	BISALLOY® Armour UHH600 steel



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INTRODUCTION

In choosing a steel section for a particular structural application, the Designer may need to consider a wide range of factors including the applicable project loading, strength and serviceability limit states, possible restrictions on beam depth, column width and member mass (due to transport or craneage limits), and other practical and construction related aspects. Depending on the circumstances, sections fabricated from high strength steel plate may provide the ideal solution.

The tables contained in this publication have been compiled to illustrate the capability of I-sections fabricated from BISALLOY® Structural 80 steel for structural applications and to serve as a guide during preliminary design. The design tables have been prepared in accordance with AS 4100, as the 2012 amendment included quenched and tempered steels to AS 3597.

It should be noted that although BISALLOY® Structural 80 steel is a high strength steel, it has the same modulus of elasticity as structural steels of Grade 250 or Grade 350. Hence BISALLOY® Structural 80 steel is ideal for applications where high strength is required or useful, but buckling or deflection are not overly limiting factors.

BACKGROUND TO SELECTION OF TABULATED SECTIONS

BISALLOY® Structural 80 steel is manufactured as a plate product. This allows the Designer a great deal of freedom to select section dimensions and shapes to suit a project's individual requirements. For example, the section type could be I or box, the section could be symmetrical or not and the widths and thicknesses of the flange and web elements may be varied within wide limits. The numerous possibilities enhance the scope for design refinement, however particularly during the earlier stages of design, it can be useful to make reference to a list of pre-defined or suggested sections to assist preliminary selection and assessment. The tables herein are intended to fulfil this purpose, at least in relation to symmetrical I-sections fabricated from BISALLOY® Structural 80 steel.

Section ranges have been developed for beam and column applications. Beam sections range from approximately 500 to 3300 mm deep, while column sections range from 250x250 mm to 900x900 mm. Although the lists are fairly extensive, they cannot provide optimal solutions for all cases. In fact, many reasonable section proportions were skipped in order to limit options and produce a steady increment in member capacity. Designers are encouraged to proportion their sections to suit their application's individual requirements.

For **beams**, groups of sections each having the same depth of web plate are presented, as is customary with steel beam sections. The overall beam depth therefore increases slightly with increasing flange thickness and mass/m within each beam group. Also, within each group, a significant variation in section weight is presented to cater for a wide range of possible applications.

For some of the heavier sections a deeper section may be lighter (and when considered in isolation could be more economical), however the heavier options are included for cases where beam depth limits apply. Both flange area and web thickness increase for the heavier sections, providing a higher shear capacity potentially required for the more heavily loaded beams.

For **columns**, each group of sections has a fixed overall dimension (eg 500x500 mm) recognising consistency in size can be beneficial for connections and detailing of other elements. As for beams, there is a significant range of section weights per size group, since for some projects a heavier, narrower section may be preferable to a lighter, wider section. This is illustrated in column examples in section 5. The column sections could also be used in trusses as both tension and compression members. Hence design capacities in axial tension are provided.

It has been recognised that high strength steel is most advantageous for highly loaded applications, where strength tends to govern rather than serviceability. For beams, total deflection may be reduced by cambering the beam an amount typically equal to the calculated dead load deflection. This would preferably be achieved by cutting the camber into the web plate prior to welding on flanges.

Cross sections should be proportioned with due regard to provisions in design standards and the spacing of available member restraints, in order to achieve appropriate member design capacities for the practical conditions present. For the beam sections, attention was given to the moment capacity at an assumed effective length of 2 to 3 m (which is not unusual for primary members) since selecting efficient configurations for a moderate effective length satisfies the objective of achieving reasonably high bending capacities for both shorter and longer effective lengths.

This approach resulted in most sections (particularly the lighter sections in a beam group) being categorised as “Non-compact” or even “Slender” for bending about the x-axis, due to reasons discussed below.

Unless the loading and restraint arrangement allow a compact section with minimal reduction for member buckling, there will generally be a desire to proportion the web and flange plates to balance the steel distribution to avoid excessive strength reductions due to local buckling and member buckling. For a beam with a particular web plate depth and a certain maximum section mass/m say, the web plate could be made thick enough to be compact, or thinner to allow some of the steel area to be transferred to the flanges, although sufficient web plate thickness must be maintained for shear or combined shear and moment. For bending about the x-axis, the benefits of transferring steel to the flanges may override the detrimental influence of a non-compact web (although it was found for efficiency the web should not in general be much more slender relative to the applicable limits, than the flanges). The total steel area then available for the flanges could be arranged in a narrow, thick plate, ensuring the flanges are compact, or arranged in a wider, thinner non-compact or slender plate. The latter may provide higher member bending capacities for some effective lengths due to the improved lateral stiffness properties.

For columns, again it did not seem crucial to achieve a Compact section classification for bending; of more importance was the form factor k_f . When web and flange elements were arranged to be fully effective such that $k_f = 1$, the beneficial influence of $\alpha_b = -0.5$ in AS 4100 Table 6.3.3(1) was significant for practical effective lengths (refer 2012 amendment).

SECTION 1 PLATE BEAMS

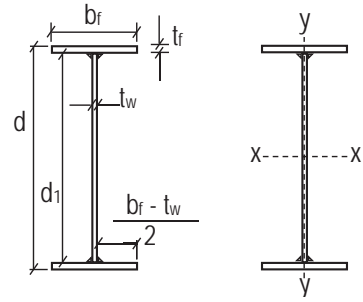


Table 1.B.1 (a) Dimensions and Properties

Designation	Mass per metre	Depth Of Section	Flange Width	Flange Thickness	Web Thickness	Depth Between Flanges	d_1	$b_f - t_w$	Gross Area of Section	About x-axis				About y-axis				Torsion Constant Note 4	Warping Constant
										I_x	Z_x	S_x	r_x	I_y	Z_y	S_y	r_y		
	kg/m	mm	mm	mm	mm	mm			mm ²	10 ⁶ mm ⁴	10 ³ mm ³	10 ³ mm ³	mm	10 ⁶ mm ⁴	10 ³ mm ³	10 ³ mm ³	mm	10 ⁶ mm ⁴	10 ⁹ mm ⁶
532x250x16x10	102	532	250	16	10	500	50.0	7.50	13000	637	2390	2690	221	41.7	334	513	56.6	849	2780
540x250x20x10	118	540	250	20	10	500	50.0	6.00	15000	781	2890	3230	228	52.1	417	638	58.9	1500	3520
540x300x20x10	133	540	300	20	10	500	50.0	7.25	17000	916	3390	3750	232	90.0	600	913	72.8	1770	6090
550x300x25x10	157	550	300	25	10	500	50.0	5.80	20000	1140	4140	4560	239	113	750	1140	75.0	3290	7750
540x300x20x12	141	540	300	20	12	500	41.7	7.20	18000	937	3470	3870	228	90.1	600	918	70.7	1890	6090
550x300x25x12	165	550	300	25	12	500	41.7	5.76	21000	1160	4220	4690	235	113	750	1140	73.2	3410	7760
564x300x32x12	198	564	300	32	12	500	41.7	4.50	25200	1490	5270	5860	243	144	960	1460	75.6	6840	10200
624x225x12x10	89.5	624	225	12	10	600	60.0	8.96	11400	686	2200	2550	245	22.8	203	319	44.8	459	2140
632x250x16x10	110	632	250	16	10	600	60.0	7.50	14000	939	2970	3360	259	41.7	334	515	54.6	883	3960
640x250x20x10	126	640	250	20	10	600	60.0	6.00	16000	1140	3570	4000	267	52.1	417	640	57.1	1530	5010
640x300x20x10	141	640	300	20	10	600	60.0	7.25	18000	1330	4170	4620	272	90.1	600	915	70.7	1800	8650
650x300x25x10	165	650	300	25	10	600	60.0	5.80	21000	1650	5060	5590	280	113	750	1140	73.2	3330	11000
640x300x20x12	151	640	300	20	12	600	50.0	7.20	19200	1370	4280	4800	267	90.1	601	922	68.5	1950	8660
650x300x25x12	174	650	300	25	12	600	50.0	5.76	22200	1680	5170	5770	275	113	751	1150	71.2	3470	11000
664x300x32x12	207	664	300	32	12	600	50.0	4.50	26400	2130	6430	7150	284	144	961	1460	73.9	6900	14400
650x300x25x16	193	650	300	25	16	600	37.5	5.68	24600	1750	5400	6130	267	113	751	1160	67.7	3940	11000
664x300x32x16	226	664	300	32	16	600	37.5	4.44	28800	2210	6650	7510	277	144	961	1480	70.8	7370	14400
680x300x40x16	264	680	300	40	16	600	37.5	3.55	33600	2750	8080	9120	286	180	1200	1840	73.2	13600	18500
724x225x12x10	97.3	724	225	12	10	700	70.0	8.96	12400	970	2680	3150	280	22.8	203	321	42.9	493	2890
732x250x16x10	118	732	250	16	10	700	70.0	7.50	15000	1310	3580	4090	296	41.7	334	518	52.7	916	5350
740x250x20x10	133	740	250	20	10	700	70.0	6.00	17000	1580	4280	4830	305	52.1	417	643	55.4	1570	6760
740x300x20x12	160	740	300	20	12	700	58.3	7.20	20400	1900	5130	5790	305	90.1	601	925	66.5	2000	11700
750x300x25x12	184	750	300	25	12	700	58.3	5.76	23400	2310	6170	6910	315	113	751	1150	69.4	3530	14800
764x300x32x12	217	764	300	32	12	700	58.3	4.50	27600	2920	7640	8500	325	144	961	1470	72.3	6960	19300
750x300x25x16	206	750	300	25	16	700	43.8	5.68	26200	2430	6480	7400	304	113	752	1170	65.6	4080	14800
764x300x32x16	239	764	300	32	16	700	43.8	4.44	30400	3030	7930	8990	316	144	962	1480	68.9	7510	19300
780x300x40x16	276	780	300	40	16	700	43.8	3.55	35200	3750	9610	10800	326	180	1200	1840	71.6	13800	24700
824x225x12x10	105	824	225	12	10	800	80.0	8.96	13400	1320	3200	3790	313	22.8	203	324	41.3	526	3770
824x225x12x12	118	824	225	12	12	800	66.7	8.88	15000	1400	3400	4110	306	22.9	204	333	39.1	720	3770
832x250x16x12	138	832	250	16	12	800	66.7	7.44	17600	1840	4430	5180	324	41.8	334	529	48.7	1140	6960
840x250x20x12	154	840	250	20	12	800	66.7	5.95	19600	2190	5220	6020	335	52.2	418	654	51.6	1790	8770
840x300x20x16	195	840	300	20	16	800	50.0	7.10	24800	2700	6430	7480	330	90.3	602	951	60.3	2690	15200
850x300x25x16	218	850	300	25	16	800	50.0	5.68	27800	3240	7610	8750	341	113	752	1180	63.7	4220	19200
864x300x32x16	251	864	300	32	16	800	50.0	4.44	32000	4010	9280	10500	354	144	962	1490	67.1	7650	25000
880x300x40x16	289	880	300	40	16	800	50.0	3.55	36800	4920	11200	12600	366	180	1200	1850	70.0	13900	31800
850x350x25x20	263	850	350	25	20	800	40.0	6.60	33500	3830	9020	10400	338	179	1020	1610	73.1	5780	30500
864x350x32x20	301	864	350	32	20	800	40.0	5.16	38400	4730	11000	12500	351	229	1310	2040	77.3	9780	39700
880x350x40x20	345	880	350	40	20	800	40.0	4.13	44000	5800	13200	15000	363	286	1640	2530	80.7	17100	50500

SECTION 1 PLATE BEAMS

Table 1.B.1 (b) Properties for Design

Designation	Mass per metre	Yield Stress of Flange		Form Factor	About x-axis		About y-axis		Design Section Moment Capacity		Design Section Axial Capacity		Design Shear Capacity Note 2			Surface Areas		
		Note 1	Note 1		Compactness	Effective Section Modulus	Compactness	Effective Section Modulus	About x-axis	About y-axis	Compression	Tension	Maximum	Design Shear Flow at Web-Flange	Design Throat Thickness req'd per Weld	Profile Surface Area	Profile Surface Area	Profile Surface Area Less 1 Flange Face
	kg/m	MPa	MPa	k_f		Z_{ex}		Z_{ey}	ϕM_{sx}	ϕM_{sy}	ϕN_s	ϕN_t	ϕV_v		t_f			
						10^3mm^3		10^3mm^3	kN.m	kN.m	kN	kN	kN	kN/mm	mm	m^2/m	m^2/tonne	m^2/tonne
532x250x16x10	102	690	690	0.777	N	2470	N	447	1530	278	6280	7860	1820	2.95	4.95	2.04	20.0	17.6
540x250x20x10	118	690	690	0.807	N	3210	N	596	2000	370	7520	9070	1820	3.03	5.09	2.06	17.5	15.4
540x300x20x10	133	690	690	0.830	N	3510	N	814	2180	505	8760	10300	1820	3.10	5.21	2.26	16.9	14.7
550x300x25x10	157	690	690	0.855	N	4550	N	1080	2820	672	10600	12100	1820	3.14	5.28	2.28	14.5	12.6
540x300x20x12	141	690	690	0.835	N	3610	N	816	2240	507	9340	10900	2240	3.73	6.27	2.26	16.0	13.8
550x300x25x12	165	690	690	0.859	N	4560	N	1080	2830	673	11200	12700	2240	3.80	6.39	2.28	13.8	12.0
564x300x32x12	198	690	690	0.882	C	5860	C	1440	3640	895	13800	15200	2240	3.84	6.45	2.30	11.6	10.1
624x225x12x10	89.5	690	690	0.632	S	2070	N	255	1280	158	4470	6890	1500	1.81	3.54	2.13	23.8	21.3
632x250x16x10	110	690	690	0.722	N	3070	N	447	1910	278	6280	8460	1510	1.98	4.24	2.24	20.4	18.1
640x250x20x10	126	690	690	0.757	N	3770	N	596	2340	370	7520	9670	1510	2.05	4.24	2.26	18.0	16.0
640x300x20x10	141	690	690	0.784	N	4380	N	814	2720	505	8760	10900	1510	2.11	4.24	2.46	17.4	15.3
650x300x25x10	165	690	690	0.815	N	5310	N	1080	3300	672	10600	12700	1510	2.14	4.24	2.48	15.0	13.2
640x300x20x12	151	690	690	0.783	N	4460	N	816	2770	507	9340	11600	2610	3.54	5.95	2.46	16.3	14.3
650x300x25x12	174	690	690	0.812	N	5750	N	1080	3570	673	11200	13400	2610	3.64	6.12	2.48	14.2	12.5
664x300x32x12	207	690	690	0.842	N	7120	C	1440	4420	895	13800	16000	2610	3.72	6.25	2.50	12.1	10.6
650x300x25x16	193	690	690	0.829	N	5950	N	1090	3700	676	12700	14900	3580	4.79	8.06	2.47	12.8	11.2
664x300x32x16	226	690	690	0.854	C	7510	C	1440	4660	896	15300	17400	3580	4.91	8.26	2.50	11.0	9.71
680x300x40x16	264	690	690	0.875	C	9120	C	1800	5660	1120	18300	20300	3580	5.00	8.40	2.53	9.58	8.45
724x225x12x10	97.3	690	690	0.581	S	2520	N	255	1570	158	4470	7490	1270	1.26	3.54	2.33	23.9	21.6
732x250x16x10	118	690	690	0.674	S	3540	N	448	2200	278	6280	9070	1300	1.42	4.24	2.44	20.8	18.6
740x250x20x10	133	690	690	0.712	S	4230	N	596	2630	370	7520	10300	1300	1.48	4.24	2.46	18.4	16.6
740x300x20x12	160	690	690	0.737	N	5360	N	816	3330	507	9340	12300	2240	2.55	4.28	2.66	16.6	14.7
750x300x25x12	184	690	690	0.771	N	6580	N	1080	4080	673	11200	14100	2240	2.64	4.43	2.68	14.6	12.9
764x300x32x12	217	690	690	0.806	N	8110	C	1440	5030	895	13800	16700	2240	2.70	4.53	2.70	12.5	11.1
750x300x25x16	206	690	690	0.778	N	7180	N	1090	4460	676	12700	15800	4170	4.67	7.84	2.67	13.0	11.5
764x300x32x16	239	690	690	0.809	C	8990	C	1440	5580	896	15300	18400	4170	4.84	8.12	2.70	11.3	10.0
780x300x40x16	276	690	690	0.835	C	10800	C	1800	6730	1120	18300	21300	4170	4.94	8.30	2.73	9.87	8.79
824x225x12x10	105	690	690	0.537	S	2770	N	255	1720	158	4470	8100	1110	0.922	3.54	2.53	24.0	21.9
824x225x12x12	118	690	690	0.545	S	3230	N	256	2010	159	5080	9070	1890	1.48	3.54	2.52	21.4	19.5
832x250x16x12	138	690	690	0.627	N	4530	N	449	2810	279	6850	10600	1940	1.72	4.24	2.64	19.1	17.3
840x250x20x12	154	690	690	0.665	N	5320	N	598	3310	372	8090	11800	1960	1.83	4.24	2.66	17.3	15.6
840x300x20x16	195	690	690	0.701	N	6820	N	821	4230	510	10800	15000	4630	4.22	7.09	2.85	14.6	13.1
850x300x25x16	218	690	690	0.734	N	8710	N	1090	5410	676	12700	16800	4650	4.44	7.46	2.87	13.1	11.8
864x300x32x16	251	690	690	0.769	N	10500	C	1440	6520	896	15300	19300	4650	4.63	7.78	2.90	11.5	10.3
880x300x40x16	289	690	690	0.799	N	12600	C	1800	7820	1120	18300	22200	4650	4.76	8.00	2.93	10.1	9.1
850x350x25x20	263	690	690	0.774	N	9730	N	1430	6040	886	16100	20200	5960	5.62	9.44	3.06	11.6	10.3
864x350x32x20	301	690	690	0.803	N	12400	N	1940	7680	1200	19100	23200	5960	5.87	9.86	3.09	10.2	9.08
880x350x40x20	345	690	690	0.828	C	15000	C	2450	9290	1520	22600	26600	5960	6.04	10.20	3.12	9.03	8.02

SECTION 1 PLATE BEAMS

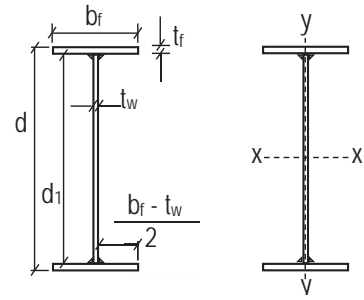


Table 1.B.2 (a) Dimensions and Properties

Designation	Mass per metre	Depth Of Section	Flange Width	Flange Thickness	Web Thickness	Depth Between Flanges	d_1	$\frac{b_r - t_w}{2}$	Gross Area of Section	About x-axis					About y-axis					Torsion Constant Note 4	Warping Constant
										A_g	I_x	Z_x	S_x	r_x	I_y	Z_y	S_y	r_y	J		
	kg/m	mm	mm	mm	mm	mm			mm ²	10 ⁶ mm ⁴	10 ³ mm ³	10 ³ mm ³	mm	10 ⁶ mm ⁴	10 ³ mm ³	10 ³ mm ³	mm	10 ⁶ mm ⁴	10 ⁹ mm ⁶		
932x250x16x12	148	932	250	16	12	900	75.0	7.44	18800	2410	5170	6090	358	41.8	334	532	47.2	1200	8770		
940x250x20x12	163	940	250	20	12	900	75.0	5.95	20800	2850	6050	7030	370	52.2	418	657	50.1	1850	11000		
932x250x16x16	176	932	250	16	16	900	56.3	7.31	22400	2650	5690	6900	344	42.0	336	558	43.3	1910	8800		
940x250x20x16	192	940	250	20	16	900	56.3	5.85	24400	3090	6570	7840	356	52.4	419	683	46.3	2560	11100		
940x300x20x16	207	940	300	20	16	900	56.3	7.10	26400	3510	7470	8760	365	90.3	602	958	58.5	2830	19100		
950x300x25x16	231	950	300	25	16	900	56.3	5.68	29400	4180	8800	10200	377	113	752	1180	61.9	4350	24100		
950x400x25x16	270	950	400	25	16	900	56.3	7.68	34400	5250	11100	12500	391	267	1330	2060	88.1	5400	57100		
964x400x32x16	314	964	400	32	16	900	56.3	6.00	40000	6530	13600	15200	404	342	1710	2620	92.4	9970	74200		
950x400x25x20	298	950	400	25	20	900	45.0	7.60	38000	5490	11600	13300	380	267	1340	2090	83.9	6570	57200		
964x400x32x20	342	964	400	32	20	900	45.0	5.94	43600	6780	14100	16000	394	342	1710	2650	88.6	11100	74300		
980x400x40x20	393	980	400	40	20	900	45.0	4.75	50000	8290	16900	19100	407	427	2140	3290	92.4	19500	94400		
1032x250x16x12	157	1032	250	16	12	1000	83.3	7.44	20000	3060	5940	7060	391	41.8	334	536	45.7	1260	10800		
1040x250x20x12	173	1040	250	20	12	1000	83.3	5.95	22000	3600	6930	8100	405	52.2	418	661	48.7	1910	13600		
1050x250x25x12	192	1050	250	25	12	1000	83.3	4.76	24500	4280	8160	9410	418	65.2	522	817	51.6	3180	17100		
1040x300x20x16	220	1040	300	20	16	1000	62.5	7.10	28000	4450	8570	10100	399	90.3	602	964	56.8	2970	23500		
1050x300x25x16	243	1050	300	25	16	1000	62.5	5.68	31000	5270	10000	11700	412	113	752	1190	60.3	4490	29600		
1050x350x25x16	263	1050	350	25	16	1000	62.5	6.68	33500	5930	11300	13000	421	179	1020	1600	73.1	5010	47000		
1050x400x25x16	283	1050	400	25	16	1000	62.5	7.68	36000	6590	12500	14300	428	267	1340	2060	86.1	5530	70100		
1064x400x32x16	327	1064	400	32	16	1000	62.5	6.00	41600	8150	15300	17200	443	342	1710	2620	90.6	10100	91000		
1050x400x25x20	314	1050	400	25	20	1000	50.0	7.60	40000	6920	13200	15300	416	267	1340	2100	81.8	6830	70200		
1064x400x32x20	358	1064	400	32	20	1000	50.0	5.94	45600	8490	15900	18200	431	342	1710	2660	86.6	11400	91100		
1080x400x40x20	408	1080	400	40	20	1000	50.0	4.75	52000	10300	19100	21600	446	427	2140	3300	90.7	19700	116000		
1050x400x25x25	353	1050	400	25	25	1000	40.0	7.50	45000	7340	14000	16500	404	268	1340	2160	77.2	9380	70400		
1064x400x32x25	397	1064	400	32	25	1000	40.0	5.86	50600	8900	16700	19500	419	343	1710	2720	82.3	13900	91200		
1080x400x40x25	447	1080	400	40	25	1000	40.0	4.69	57000	10700	19900	22900	434	428	2140	3360	86.7	22300	116000		
1240x300x20x16	245	1240	300	20	16	1200	75.0	7.10	31200	6770	10900	13100	466	90.4	603	977	53.8	3240	33600		
1250x300x25x16	268	1250	300	25	16	1200	75.0	5.68	34200	7930	12700	14900	482	113	753	1200	57.5	4760	42400		
1250x400x25x20	345	1250	400	25	20	1200	60.0	7.60	44000	10400	16600	19500	486	267	1340	2120	78.0	7370	100000		
1264x400x32x20	389	1264	400	32	20	1200	60.0	5.94	49600	12600	19900	23000	504	342	1710	2680	83.1	11900	130000		
1264x500x32x20	440	1264	500	32	20	1200	60.0	7.50	56000	15000	23800	26900	518	667	2670	4120	109	14100	253000		
1280x500x40x20	502	1280	500	40	20	1200	60.0	6.00	64000	18300	28500	32000	534	834	3340	5120	114	24500	321000		
1264x500x32x25	487	1264	500	32	25	1200	48.0	7.42	62000	15700	24900	28700	504	668	2670	4190	104	17200	254000		
1280x500x40x25	550	1280	500	40	25	1200	48.0	5.94	70000	19000	29700	33800	521	835	3340	5190	109	27600	321000		

SECTION 1 PLATE BEAMS

Table 1.B.2 (b) Properties for Design

Designation	Mass per metre	Yield Stress of Flange		Form Factor	About x-axis		About y-axis		Design Section Moment Capacity		Design Section Axial Capacity		Design Shear Capacity Note 2			Surface Areas		
		Note 1	Note 1		Compactness	Effective Section Modulus	Compactness	Effective Section Modulus	About x-axis	About y-axis	Compression	Tension	Maximum	Design Shear Flow at Web-Flange	Design Throat Thickness req'd per Weld	Profile Surface Area	Profile Surface Area	Profile Surface Area Less 1 Flange Face
	kg/m	MPa	MPa	k_f	Z_{ex}	Z_{ey}	ϕM_{sx}	ϕM_{sy}	ϕN_s	ϕN_t	ϕV_v		t_f					
					10^3mm^3	10^3mm^3	kN.m	kN.m	kN	kN	kN	kN/mm	mm	m^2/m	m^2/tonne	m^2/tonne		
932x250x16x12	148	690	690	0.587	S	4770	N	450	2960	279	6850	11400	1710	1.30	4.24	2.84	19.2	17.5
940x250x20x12	163	690	690	0.627	S	5590	N	598	3470	372	8090	12600	1730	1.40	4.24	2.86	17.5	16.0
932x250x16x16	176	690	690	0.598	N	6060	N	454	3760	282	8320	13500	3990	2.76	4.63	2.83	16.1	14.7
940x250x20x16	192	690	690	0.631	N	7400	N	603	4600	374	9560	14700	4050	3.01	5.06	2.85	14.9	13.6
940x300x20x16	207	690	690	0.659	N	7940	N	821	4930	510	10800	16000	4090	3.22	5.40	3.05	14.7	13.3
950x300x25x16	231	690	690	0.694	N	9700	N	1090	6020	677	12700	17800	4130	3.43	5.76	3.07	13.3	12.0
950x400x25x16	270	690	690	0.738	N	11400	N	1780	7050	1100	15800	20800	4130	3.64	6.11	3.47	12.8	11.4
964x400x32x16	314	690	690	0.775	N	14600	N	2440	9070	1520	19200	24200	4130	3.77	6.34	3.50	11.1	9.86
950x400x25x20	298	690	690	0.748	N	12000	N	1780	7430	1110	17700	23000	6710	5.65	9.50	3.46	11.6	10.3
964x400x32x20	342	690	690	0.780	N	15400	N	2450	9550	1520	21100	26300	6710	5.90	9.92	3.49	10.2	9.02
980x400x40x20	393	690	690	0.809	C	19100	C	3200	11900	1990	25100	30200	6710	6.09	10.2	3.52	8.97	7.95
1032x250x16x12	157	690	690	0.552	S	4930	N	450	3060	279	6850	12100	1530	1.02	4.24	3.04	19.4	17.8
1040x250x20x12	173	690	690	0.592	S	5750	N	599	3570	372	8090	13300	1550	1.10	4.24	3.06	17.7	16.2
1050x250x25x12	192	690	690	0.634	S	6780	C	783	4210	486	9650	14800	1570	1.17	4.24	3.08	16.0	14.7
1040x300x20x16	220	690	690	0.621	N	9090	N	822	5650	510	10800	16900	3650	2.51	4.24	3.25	14.8	13.4
1050x300x25x16	243	690	690	0.658	N	10600	N	1090	6580	677	12700	18700	3700	2.70	4.53	3.27	13.4	12.2
1050x350x25x16	263	690	690	0.683	N	11900	N	1420	7370	882	14200	20200	3720	2.81	4.73	3.47	13.2	11.9
1050x400x25x16	283	690	690	0.705	N	12900	N	1780	8010	1100	15800	21800	3720	2.89	4.86	3.67	13.0	11.6
1064x400x32x16	327	690	690	0.745	N	16000	N	2440	9910	1520	19200	25100	3720	3.01	5.07	3.70	11.3	10.1
1050x400x25x20	314	690	690	0.711	N	13700	N	1780	8480	1110	17700	24200	7260	5.38	9.03	3.66	11.7	10.4
1064x400x32x20	358	690	690	0.746	N	18100	N	2450	11300	1520	21100	27600	7260	5.65	9.49	3.69	10.3	9.19
1080x400x40x20	408	690	690	0.777	N	21600	C	3210	13400	1990	25100	31400	7260	5.86	9.85	3.72	9.11	8.13
1050x400x25x25	353	690	690	0.737	N	14600	N	1800	9080	1120	20600	27200	9200	6.42	10.8	3.65	10.3	9.20
1064x400x32x25	397	690	690	0.766	N	18700	N	2460	11600	1530	24100	30600	9320	6.92	11.6	3.68	9.26	8.25
1080x400x40x25	447	690	690	0.792	C	22900	C	3210	14200	1990	28000	34400	9320	7.25	12.2	3.71	8.29	7.40
1240x300x20x16	245	690	690	0.557	S	10100	N	822	6260	511	10800	18900	3010	1.63	4.24	3.65	14.9	13.7
1250x300x25x16	268	690	690	0.596	S	11700	N	1090	7270	677	12700	20700	3050	1.77	4.24	3.67	13.7	12.5
1250x400x25x20	345	690	690	0.646	N	17300	N	1790	10700	1110	17700	26600	5980	3.52	5.92	4.06	11.8	10.6
1264x400x32x20	389	690	690	0.686	N	21300	N	2450	13300	1520	21100	30000	6050	3.79	6.36	4.09	10.5	9.47
1264x500x32x20	440	690	690	0.722	N	24600	N	3580	15300	2220	25100	33800	6050	3.98	6.68	4.49	10.2	9.07
1280x500x40x20	502	690	690	0.757	N	30100	N	4770	18700	2960	30100	38700	6050	4.10	6.89	4.52	9.00	8.00
1264x500x32x25	487	690	690	0.729	N	26000	N	3600	16100	2230	28000	37500	11200	7.03	11.8	4.48	9.20	8.17
1280x500x40x25	550	690	690	0.760	N	32500	N	4790	20200	2970	33000	42300	11200	7.31	12.3	4.51	8.21	7.30

SECTION 1 PLATE BEAMS

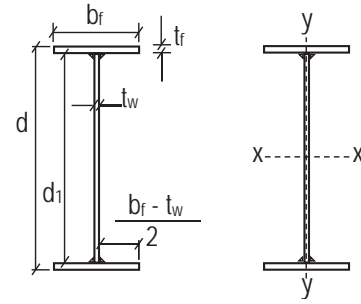


Table 1.B.3 (a) Dimensions and Properties

Designation	Mass per metre	Depth Of Section	Flange Width	Flange Thickness	Web Thickness	Depth Between Flanges	d_1	$\frac{b_f - t_w}{2}$	Gross Area of Section	About x-axis					About y-axis					Torsion Constant Note 4	Warping Constant
										A_g	I_x	Z_x	S_x	r_x	I_y	Z_y	S_y	r_y	J		
	kg/m	mm	mm	mm	mm	mm			mm ²	10 ⁶ mm ⁴	10 ³ mm ³	10 ³ mm ³	mm	10 ⁶ mm ⁴	10 ³ mm ³	10 ³ mm ³	mm	10 ⁶ mm ⁴	10 ⁹ mm ⁶		
1550x400x25x20	393	1550	400	25	20	1500	75.0	7.60	50000	17300	22300	26500	587	268	1340	2150	73.2	8170	156000		
1564x400x32x20	436	1564	400	32	20	1500	75.0	5.94	55600	20600	26400	30900	609	342	1710	2710	78.5	12700	201000		
1564x500x32x25	546	1564	500	32	25	1500	60.0	7.42	69500	25800	33000	38600	609	669	2670	4230	98.1	18700	392000		
1580x500x40x25	608	1580	500	40	25	1500	60.0	5.94	77500	30800	38900	44900	630	835	3340	5230	104	29100	495000		
1580x600x40x32	754	1580	600	40	32	1500	46.9	7.10	96000	37500	47400	55000	625	1440	4810	7580	123	42000	856000		
1600x600x50x32	848	1600	600	50	32	1500	46.9	5.68	108000	45100	56300	64500	646	1800	6010	9380	129	66400	1080000		
1864x500x32x25	604	1864	500	32	25	1800	72.0	7.42	77000	39000	41800	49600	712	669	2680	4280	93.2	20300	561000		
1880x500x40x25	667	1880	500	40	25	1800	72.0	5.94	85000	46000	48900	57100	736	836	3340	5280	99.2	30700	707000		
1880x600x40x32	829	1880	600	40	32	1800	56.3	7.10	106000	56200	59800	70100	729	1440	4820	7660	117	45300	1220000		
1900x600x50x32	923	1900	600	50	32	1800	56.3	5.68	118000	66900	70400	81400	754	1800	6020	9460	124	69700	1540000		
1900x700x50x40	1110	1900	700	50	40	1800	45.0	6.60	142000	79300	83500	97200	748	2870	8190	13000	142	96700	2450000		
1920x700x60x40	1220	1920	700	60	40	1800	45.0	5.50	156000	92100	96000	111000	768	3440	9830	15400	148	139000	2970000		
2164x500x32x25	663	2164	500	32	25	2100	84.0	7.42	84500	55700	51400	61700	812	669	2680	4330	89.0	21900	761000		
2180x500x40x25	726	2180	500	40	25	2100	84.0	5.94	92500	65100	59700	70400	839	836	3340	5330	95.1	32300	957000		
2180x600x40x32	904	2180	600	40	32	2100	65.6	7.10	115000	79700	73100	86600	832	1450	4820	7740	112	48500	1660000		
2200x600x50x32	999	2200	600	50	32	2100	65.6	5.68	127000	94000	85500	99800	860	1810	6020	9540	119	72900	2090000		
2200x700x50x40	1210	2200	700	50	40	2100	52.5	6.60	154000	112000	102000	119000	852	2870	8200	13100	137	103000	3320000		
2220x700x60x40	1320	2220	700	60	40	2100	52.5	5.50	168000	129000	116000	135000	876	3440	9830	15500	143	146000	4010000		
2220x900x60x50	1670	2220	900	60	50	2100	42.0	7.08	213000	165000	148000	172000	879	7310	16200	25600	185	217000	8530000		
2250x900x75x50	1880	2250	900	75	50	2100	42.0	5.67	240000	198000	176000	202000	909	9130	20300	31700	195	341000	10800000		
2480x600x40x32	980	2480	600	40	32	2400	75.0	7.10	125000	108000	87300	105000	932	1450	4820	7810	108	51800	2150000		
2500x600x50x32	1070	2500	600	50	32	2400	75.0	5.68	137000	127000	102000	120000	963	1810	6020	9610	115	76200	2710000		
2500x700x50x40	1300	2500	700	50	40	2400	60.0	6.60	166000	151000	121000	143000	954	2870	8200	13200	132	110000	4310000		
2520x700x60x40	1410	2520	700	60	40	2400	60.0	5.50	180000	173000	137000	161000	981	3440	9840	15700	138	152000	5210000		
2520x900x60x50	1790	2520	900	60	50	2400	48.0	7.08	228000	221000	175000	205000	985	7320	16300	25800	179	230000	11100000		
2550x900x75x50	2000	2550	900	75	50	2400	48.0	5.67	255000	264000	207000	239000	1020	9140	20300	31900	189	353000	14000000		
3220x900x60x50	2060	3220	900	60	50	3100	62.0	7.08	263000	394000	245000	291000	1220	7320	16300	26200	167	259000	18300000		
3260x900x80x50	2350	3260	900	80	50	3100	62.0	5.31	299000	488000	300000	349000	1280	9750	21700	34300	181	436000	24700000		

SECTION 1 PLATE BEAMS

Table 1.B.3 (b) Properties for Design

Designation	Mass per metre	Yield Stress of		Form Factor	About x-axis		About y-axis		Design Section Moment Capacity		Design Section Axial Capacity		Design Shear Capacity Note 2			Surface Areas		
		Flange	Web		Compactness	Effective Section Modulus	Compactness	Effective Section Modulus	About x-axis	About y-axis	Compression	Tension	Maximum	Design Shear Flow at Web-Flange	Design Throat Thickness req'd per Weld	Profile Surface Area	Profile Surface Area	Profile Surface Area Less 1 Flange Face
		Note 1	Note 1						ϕM_{sx}	ϕM_{sy}	ϕN_s	ϕN_t	ϕV_v		t_f			
	kg/m	MPa	MPa	k_f		Z_{ex}	Z_{ey}		kN.m	kN.m	kN	kN	kN	kN/mm	mm	m ² /m	m ² /tonne	m ² /tonne
1550x400x25x20	393	690	690	0.569	S	20500	N	1790	12800	1110	17700	30200	4720	2.08	4.24	4.66	11.9	10.9
1564x400x32x20	436	690	690	0.612	S	24400	N	2450	15100	1520	21100	33600	4790	2.28	4.24	4.69	10.7	9.82
1564x500x32x25	546	690	690	0.650	N	34600	N	3600	21500	2230	28000	42000	9360	4.45	7.47	5.08	9.31	8.39
1580x500x40x25	608	690	690	0.686	N	41700	N	4790	25900	2970	33000	46800	9460	4.73	7.95	5.11	8.40	7.58
1580x600x40x32	754	690	690	0.725	N	50200	N	6570	31200	4080	43200	58000	17900	8.82	14.8	5.50	7.29	6.50
1600x600x50x32	848	690	690	0.755	C	64500	N	8710	40100	5410	50700	65300	17900	9.23	15.5	5.54	6.53	5.82
1864x500x32x25	604	690	690	0.587	S	40200	N	3600	25000	2240	28000	46500	7710	2.90	4.87	5.68	9.39	8.57
1880x500x40x25	667	690	690	0.625	S	47100	N	4790	29200	2980	33000	51400	7820	3.13	5.26	5.71	8.56	7.81
1880x600x40x32	829	690	690	0.659	N	63600	N	6570	39500	4080	43200	63800	16300	6.40	10.8	6.10	7.35	6.63
1900x600x50x32	923	690	690	0.694	N	77600	N	8720	48200	5410	50700	71100	16500	6.84	11.5	6.14	6.65	6.00
1900x700x50x40	1110	690	690	0.730	N	90400	N	11400	56100	7090	64400	85800	26800	10.9	18.4	6.52	5.85	5.22
1920x700x60x40	1220	690	690	0.755	N	108000	N	14300	66900	8910	73100	94300	26800	11.4	19.1	6.56	5.36	4.79
2164x500x32x25	663	690	690	0.535	S	42400	N	3600	26300	2240	28000	51100	6550	2.01	4.24	6.28	9.46	8.71
2180x500x40x25	726	690	690	0.575	S	49200	N	4790	30600	2980	33000	55900	6640	2.18	4.24	6.31	8.69	8.00
2180x600x40x32	904	690	690	0.604	N	75500	N	6580	46900	4080	43200	69600	13900	4.48	7.52	6.70	7.40	6.74
2200x600x50x32	999	690	690	0.641	N	88100	N	8720	54700	5420	50700	76900	14100	4.84	8.13	6.74	6.75	6.15
2200x700x50x40	1210	690	690	0.673	N	111000	N	11400	68700	7100	64400	93100	27400	9.20	15.5	7.12	5.89	5.31
2220x700x60x40	1320	690	690	0.701	N	132000	N	14300	81900	8910	73100	102000	27700	9.74	16.4	7.16	5.43	4.90
2220x900x60x50	1670	690	690	0.754	N	157000	N	22200	97500	13800	99800	129000	39100	13.8	23.2	7.94	4.75	4.21
2250x900x75x50	1880	620	690	0.794	N	198000	N	29800	110000	16600	106000	132000	39100	14.5	24.40	8.00	4.25	3.77
2480x600x40x32	980	690	690	0.557	S	80600	N	6580	50100	4090	43200	75400	12000	3.25	5.47	7.30	7.45	6.83
2500x600x50x32	1070	690	690	0.596	S	93700	N	8720	58200	5420	50700	82700	12200	3.53	5.93	7.34	6.83	6.27
2500x700x50x40	1300	690	690	0.625	N	131000	N	11400	81600	7100	64400	100000	23800	6.76	11.4	7.72	5.92	5.39
2520x700x60x40	1410	690	690	0.654	N	148000	N	14400	92100	8910	73100	109000	24000	7.17	12.0	7.76	5.49	5.00
2520x900x60x50	1790	690	690	0.705	N	186000	N	22200	116000	13800	99800	138000	44400	13.3	22.4	8.54	4.77	4.27
2550x900x75x50	2000	620	690	0.747	C	239000	N	29800	133000	16600	106000	140000	44700	14.1	23.8	8.60	4.30	3.85
3220x900x60x50	2060	690	690	0.611	N	261000	N	22200	162000	13800	99800	159000	35800	7.75	13.0	9.94	4.81	4.38
3260x900x80x50	2350	620	690	0.667	N	326000	N	32200	182000	18000	111000	165000	36500	8.56	14.4	10.0	4.27	3.89

SECTION 1 PLATE COLUMNS

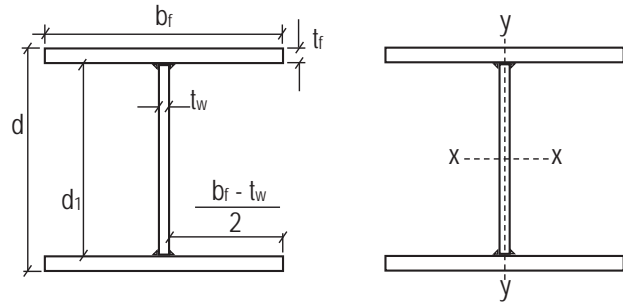


Table 1.C.1 (a) Dimensions and Properties

Designation	Mass per metre	Depth Of Section	Flange Width	Flange Thickness	Web Thickness	Depth Between Flanges	d_1	$\frac{b_f - t_w}{2}$	Gross Area of Section	About x-axis					About y-axis					Torsion Constant Note 4	Warping Constant
										$\frac{d_1}{t_w}$	$\frac{b_f - t_w}{2t_f}$	A_g	I_x	Z_x	S_x	r_x	I_y	Z_y	S_y		
	kg/m	mm	mm	mm	mm	mm			mm ²	10 ⁶ mm ⁴	10 ³ mm ³	10 ³ mm ³	mm	10 ⁶ mm ⁴	10 ³ mm ³	10 ³ mm ³	mm	10 ³ mm ⁴	10 ⁹ mm ⁶		
250x250x16x12	83.3	250	250	16	12	218	18.2	7.44	10600	120	960	1080	106	42	334	508	63	808	571		
250x250x20x12	98.3	250	250	20	12	210	17.5	5.95	12500	142	1130	1280	106	52	417	633	65	1450	689		
250x250x25x16	123	250	250	25	16	200	12.5	4.68	15700	170	1360	1570	104	65	521	794	64	2880	825		
250x250x32x20	155	250	250	32	20	186	9.3	3.59	19700	202	1620	1920	101	84	668	1020	65	5960	992		
250x250x40x25	190	250	250	40	25	170	6.8	2.81	24300	233	1870	2280	98	104	835	1280	66	11600	1150		
250x250x50x32	234	250	250	50	32	150	4.7	2.18	29800	264	2110	2680	94	131	1040	1600	66	22500	1310		
250x250x60x40	276	250	250	60	40	130	3.3	1.75	35200	287	2300	3020	90	157	1260	1930	67	38800	1420		
300x300x25x16	149	300	300	25	16	250	15.6	5.68	19000	305	2030	2310	127	113	751	1140	77	3470	2130		
300x300x32x20	188	300	300	32	20	236	11.8	4.38	23900	368	2460	2850	124	144	961	1460	78	7180	2590		
300x300x40x25	232	300	300	40	25	220	8.8	3.44	29500	431	2870	3420	121	180	1200	1830	78	13900	3050		
300x300x50x32	286	300	300	50	32	200	6.3	2.68	36400	496	3310	4070	117	226	1500	2300	79	27200	3520		
300x300x60x40	339	300	300	60	40	180	4.5	2.17	43200	549	3660	4640	113	271	1810	2770	79	47000	3900		
300x300x75x50	412	300	300	75	50	150	3.0	1.67	52500	605	4030	5340	107	339	2260	3470	80	90600	4290		
300x300x80x50	432	300	300	80	50	140	2.8	1.56	55000	618	4120	5530	106	361	2410	3690	81	108000	4370		
350x350x20x16	149	350	350	20	16	310	19.4	8.35	19000	421	2410	2690	149	143	817	1240	87	2290	3890		
350x350x25x16	175	350	350	25	16	300	18.8	6.68	22300	499	2850	3200	150	179	1020	1550	90	4060	4720		
350x350x32x20	221	350	350	32	20	286	14.3	5.16	28100	607	3470	3970	147	229	1310	1990	90	8410	5790		
350x350x40x25	273	350	350	40	25	270	10.8	4.06	34800	717	4100	4800	144	286	1640	2490	91	16300	6880		
350x350x50x32	338	350	350	50	32	250	7.8	3.18	43000	836	4780	5750	139	358	2050	3130	91	31900	8050		
350x350x60x40	402	350	350	60	40	230	5.8	2.58	51200	936	5350	6620	135	430	2460	3770	92	55300	9040		
350x350x75x50	491	350	350	75	50	200	4.0	2.00	62500	1050	6000	7720	130	538	3070	4720	93	107000	10200		
350x350x90x60	575	350	350	90	60	170	2.8	1.61	73200	1130	6470	8620	124	646	3690	5670	94	182000	10900		
350x350x100x60	620	350	350	100	60	150	2.5	1.45	79000	1170	6680	9090	122	717	4100	6260	95	244000	11200		
400x400x20x16	171	400	400	20	16	360	22.5	9.60	21800	640	3200	3560	172	213	1070	1620	99	2620	7710		
400x400x25x16	201	400	400	25	16	350	21.9	7.68	25600	761	3810	4240	172	267	1330	2020	102	4640	9380		
400x400x32x20	254	400	400	32	20	336	16.8	5.94	32300	932	4660	5270	170	342	1710	2590	103	9630	11600		
400x400x40x25	314	400	400	40	25	320	12.8	4.69	40000	1110	5550	6400	167	427	2140	3250	103	18700	13800		
400x400x50x32	389	400	400	50	32	300	9.4	3.68	49600	1310	6530	7720	162	534	2670	4080	104	36600	16400		
400x400x60x40	465	400	400	60	40	280	7.0	3.00	59200	1470	7370	8940	158	641	3210	4910	104	63600	18500		
400x400x75x50	569	400	400	75	50	250	5.0	2.33	72500	1680	8390	10500	152	803	4010	6160	105	123000	21200		
400x400x90x60	669	400	400	90	60	220	3.7	1.89	85200	1830	9160	11900	147	964	4820	7400	106	210000	23200		
400x400x100x60	722	400	400	100	60	200	3.3	1.70	92000	1910	9530	12600	144	1070	5350	8180	108	281000	24100		

SECTION 1 PLATE COLUMNS

Table 1.C.1 (b) Properties for Design

Designation	Mass per metre	Yield Stress of Flange	Yield Stress of Web	Form Factor	About x-axis		About y-axis		Design Section Moment Capacity		Design Section Axial Capacity		Surface Areas		
					Compactness	Effective Section Modulus	Compactness	Effective Section Modulus	About x-axis	About y-axis	Compression	Tension	Profile Surface Area	Profile Surface Area	Profile Surface Area Less 1 Flange Face
	kg/m	MPa	MPa	k_f		Z_{ex}		Z_{ey}	ϕM_{sx}	ϕM_{sy}	ϕN_s	ϕN_t	m ² /m	m ² /tonne	m ² /tonne
250x250x16x12	83.3	690	690	1.000	N	993	N	448	616	279	6590	6420	1.48	17.7	14.7
250x250x20x12	98.3	690	690	1.000	N	1240	N	597	768	371	7770	7570	1.48	15.0	12.5
250x250x25x16	123	690	690	1.000	C	1570	C	782	973	486	9750	9490	1.47	11.9	9.88
250x250x32x20	155	690	690	1.000	C	1920	C	1000	1190	622	12200	11900	1.46	9.43	7.82
250x250x40x25	190	690	690	1.000	C	2280	C	1250	1420	778	15100	14700	1.45	7.62	6.30
250x250x50x32	234	690	690	1.000	C	2680	C	1570	1660	973	18500	18000	1.44	6.14	5.07
250x250x60x40	276	690	690	1.000	C	3020	C	1880	1870	1170	21900	21300	1.42	5.14	4.23
300x300x25x16	149	690	690	1.000	N	2250	N	1090	1390	675	11800	11500	1.77	11.9	9.84
300x300x32x20	188	690	690	1.000	C	2850	C	1440	1770	895	14900	14500	1.76	9.37	7.78
300x300x40x25	232	690	690	1.000	C	3420	C	1800	2130	1120	18300	17800	1.75	7.56	6.26
300x300x50x32	286	690	690	1.000	C	4070	C	2260	2530	1400	22600	22000	1.74	6.08	5.03
300x300x60x40	339	690	690	1.000	C	4640	C	2710	2880	1680	26800	26100	1.72	5.07	4.19
300x300x75x50	412	620	690	1.000	C	5340	C	3390	2980	1890	29300	28900	1.70	4.12	3.40
300x300x80x50	432	620	690	1.000	C	5530	C	3610	3080	2020	30700	30300	1.70	3.94	3.24
350x350x20x16	149	690	690	1.000	N	2410	N	1050	1500	655	11800	11500	2.07	13.9	11.5
350x350x25x16	175	690	690	1.000	N	3020	N	1420	1880	881	13800	13500	2.07	11.8	9.81
350x350x32x20	221	690	690	1.000	N	3920	N	1940	2440	1200	17500	17000	2.06	9.33	7.75
350x350x40x25	273	690	690	1.000	C	4800	C	2450	2980	1520	21600	21000	2.05	7.52	6.23
350x350x50x32	338	690	690	1.000	C	5750	C	3070	3570	1910	26700	26000	2.04	6.03	4.99
350x350x60x40	402	690	690	1.000	C	6620	C	3690	4110	2290	31800	30900	2.02	5.03	4.16
350x350x75x50	491	620	690	1.000	C	7720	C	4610	4310	2570	34900	34400	2.00	4.08	3.36
350x350x90x60	575	620	690	1.000	C	8620	C	5540	4810	3090	40800	40300	1.98	3.45	2.84
350x350x100x60	620	620	690	1.000	C	9090	C	6150	5070	3430	44100	43500	1.98	3.19	2.63
400x400x20x16	171	690	690	0.897	S	2810	N	1300	1750	806	12100	13200	2.37	13.9	11.5
400x400x25x16	201	690	690	0.992	N	3900	N	1770	2420	1100	15800	15500	2.37	11.8	9.79
400x400x32x20	254	690	690	1.000	N	5080	N	2450	3160	1520	20100	19500	2.36	9.30	7.73
400x400x40x25	314	690	690	1.000	C	6400	C	3200	3970	1990	24800	24200	2.35	7.48	6.21
400x400x50x32	389	690	690	1.000	C	7720	C	4010	4790	2490	30800	30000	2.34	6.00	4.97
400x400x60x40	465	690	690	1.000	C	8940	C	4810	5550	2990	36800	35800	2.32	4.99	4.13
400x400x75x50	569	620	690	1.000	C	10500	C	6020	5880	3360	40500	39900	2.30	4.04	3.34
400x400x90x60	669	620	690	1.000	C	11900	C	7230	6630	4030	47500	46900	2.28	3.41	2.81
400x400x100x60	722	620	690	1.000	C	12600	C	8030	7030	4480	51300	50700	2.28	3.16	2.60

Note 3 discusses design shear capacity and the web-to-flange joint.

SECTION 1 PLATE COLUMNS

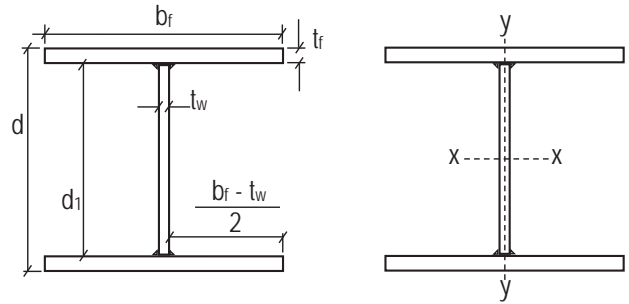


Table 1.C.2 (a) Dimensions and Properties

Designation	Mass per metre	Depth Of Section	Flange Width	Flange Thickness	Web Thickness	Depth Between Flanges	$\frac{d_1}{t_w}$	$\frac{b_f - t_w}{2t_f}$	Gross Area of Section	About x-axis					About y-axis					Torsion Constant Note 4	Warping Constant
										A_g	I_x	Z_x	S_x	r_x	I_y	Z_y	S_y	r_y	J		
	kg/m	mm	mm	mm	mm	mm			mm ²	10 ⁶ mm ⁴	10 ³ mm ³	10 ³ mm ³	mm	10 ⁶ mm ⁴	10 ³ mm ³	10 ³ mm ³	mm	10 ³ mm ⁴	10 ⁹ mm ⁶		
450x450x32x20	287	450	450	32	20	386	19.3	6.72	36500	1360	6030	6760	193	486	2160	3280	115	10900	21200		
450x450x40x25	355	450	450	40	25	370	14.8	5.31	45300	1620	7210	8240	189	608	2700	4110	116	21100	25600		
450x450x50x32	441	450	450	50	32	350	10.9	4.18	56200	1920	8550	9980	185	760	3380	5150	116	41300	30400		
450x450x60x40	528	450	450	60	40	330	8.3	3.42	67200	2190	9730	11600	180	913	4060	6210	117	71800	34700		
450x450x75x50	648	450	450	75	50	300	6.0	2.67	82500	2520	11200	13800	175	1140	5080	7780	118	139000	40200		
450x450x90x60	763	450	450	90	60	270	4.5	2.17	97200	2780	12300	15700	169	1370	6100	9360	119	238000	44400		
450x450x100x60	824	450	450	100	60	250	4.2	1.95	105000	2910	12900	16700	166	1520	6770	10400	120	318000	46600		
500x500x32x25	337	500	500	32	25	436	17.4	7.42	42900	1930	7710	8680	212	667	2670	4070	125	13200	36500		
500x500x40x25	396	500	500	40	25	420	16.8	5.94	50500	2280	9100	10300	212	834	3340	5070	129	23500	44100		
500x500x50x32	493	500	500	50	32	400	12.5	4.68	62800	2710	10800	12500	208	1040	4170	6350	129	46000	52800		
500x500x60x40	590	500	500	60	40	380	9.5	3.83	75200	3100	12400	14600	203	1250	5010	7650	129	80100	60600		
500x500x75x50	726	500	500	75	50	350	7.0	3.00	92500	3600	14400	17500	197	1570	6260	9590	130	155000	70700		
500x500x90x60	857	500	500	90	60	320	5.3	2.44	109000	4010	16000	20000	192	1880	7520	11500	131	266000	79000		
500x500x100x60	926	500	500	100	60	300	5.0	2.20	118000	4220	16900	21400	189	2090	8350	12800	133	355000	83500		
550x550x32x25	372	550	550	32	25	486	19.4	8.20	47400	2600	9470	10600	234	888	3230	4920	137	14500	59600		
550x550x40x25	438	550	550	40	25	470	18.8	6.56	55800	3080	11200	12600	235	1110	4040	6120	141	25900	72200		
550x550x50x32	545	550	550	50	32	450	14.1	5.18	69400	3690	13400	15400	231	1390	5050	7680	141	50700	86700		
550x550x60x40	653	550	550	60	40	430	10.8	4.25	83200	4250	15400	18000	226	1670	6060	9250	142	88400	100000		
550x550x75x50	805	550	550	75	50	400	8.0	3.33	103000	4960	18000	21600	220	2080	7580	11600	143	171000	118000		
550x550x90x60	951	550	550	90	60	370	6.2	2.72	121000	5560	20200	24800	214	2500	9100	13900	144	294000	132000		
550x550x100x60	1030	550	550	100	60	350	5.8	2.45	131000	5870	21400	26600	212	2780	10100	15400	146	392000	141000		
600x600x40x25	479	600	600	40	25	520	20.8	7.19	61000	4060	13500	15100	258	1440	4800	7280	154	28300	113000		
600x600x50x32	597	600	600	50	32	500	15.6	5.68	76000	4880	16300	18500	253	1800	6000	9130	154	55500	136000		
600x600x60x40	716	600	600	60	40	480	12.0	4.67	91200	5640	18800	21700	249	2160	7210	11000	154	96600	158000		
600x600x75x50	883	600	600	75	50	450	9.0	3.67	113000	6620	22100	26200	243	2700	9020	13800	155	188000	186000		
600x600x90x60	1050	600	600	90	60	420	7.0	3.00	133000	7470	24900	30200	237	3250	10800	16600	156	322000	211000		
600x600x100x60	1130	600	600	100	60	400	6.7	2.70	144000	7920	26400	32400	235	3610	12000	18400	158	429000	225000		

SECTION 1 PLATE COLUMNS

Table 1.C.2 (b) Properties for Design

Designation	Mass per metre	Yield Stress of Flange	Yield Stress of Web	Form Factor	About x-axis		About y-axis		Design Section Moment Capacity		Design Section Axial Capacity		Surface Areas		
					Compactness	Effective Section Modulus	Compactness	Effective Section Modulus	About x-axis	About y-axis	Compression	Tension	Profile Surface Area	Profile Surface Area	Profile Surface Area Less 1 Flange Face
	kg/m	MPa	MPa	k_f		Z_{ex}		Z_{ey}	ϕM_{sx}	ϕM_{sy}	ϕN_s	ϕN_t	m ² /m	m ² /tonne	m ² /tonne
450x450x32x20	287	690	690	1.000	N	6380	N	3000	3960	1860	22700	22100	2.66	9.28	7.71
450x450x40x25	355	690	690	1.000	N	8100	N	3970	5030	2470	28100	27300	2.65	7.46	6.19
450x450x50x32	441	690	690	1.000	C	9980	C	5070	6200	3150	34900	34000	2.64	5.98	4.96
450x450x60x40	528	690	690	1.000	C	11600	C	6090	7220	3780	41700	40600	2.62	4.97	4.11
450x450x75x50	648	620	690	1.000	C	13800	C	7610	7690	4250	46000	45400	2.60	4.01	3.32
450x450x90x60	763	620	690	1.000	C	15700	C	9140	8750	5100	54200	53500	2.58	3.38	2.79
450x450x100x60	824	620	690	1.000	C	16700	C	10200	9310	5670	58600	57800	2.58	3.13	2.58
500x500x32x25	337	690	690	1.000	N	7980	N	3590	4960	2230	26600	25900	2.95	8.76	7.28
500x500x40x25	396	690	690	1.000	N	9930	N	4780	6170	2970	31400	30500	2.95	7.44	6.18
500x500x50x32	493	690	690	1.000	C	12500	C	6260	7780	3890	39000	38000	2.94	5.96	4.94
500x500x60x40	590	690	690	1.000	C	14600	C	7510	9090	4670	46700	45400	2.92	4.95	4.10
500x500x75x50	726	620	690	1.000	C	17500	C	9400	9750	5240	51600	50900	2.90	3.99	3.31
500x500x90x60	857	620	690	1.000	C	20000	C	11300	11200	6300	60900	60100	2.88	3.36	2.78
500x500x100x60	926	620	690	1.000	C	21400	C	12500	11900	6990	65800	65000	2.88	3.11	2.57
550x550x32x25	372	690	690	1.000	N	9540	N	4190	5920	2600	29400	28600	3.25	8.74	7.26
550x550x40x25	438	690	690	1.000	N	11900	N	5640	7410	3500	34600	33700	3.25	7.43	6.17
550x550x50x32	545	690	690	1.000	N	15200	N	7460	9420	4630	43100	41900	3.24	5.94	4.93
550x550x60x40	653	690	690	1.000	C	18000	C	9090	11200	5640	51700	50300	3.22	4.93	4.09
550x550x75x50	805	620	690	1.000	C	21600	C	11400	12000	6340	57200	56500	3.20	3.98	3.29
550x550x90x60	951	620	690	1.000	C	24800	C	13600	13900	7620	67600	66800	3.18	3.34	2.76
550x550x100x60	1030	620	690	1.000	C	26600	C	15200	14800	8460	73100	72200	3.18	3.09	2.56
600x600x40x25	479	690	690	1.000	N	14100	N	6530	8750	4050	37900	36900	3.55	7.41	6.16
600x600x50x32	597	690	690	1.000	N	18000	N	8700	11200	5400	47200	45900	3.54	5.93	4.92
600x600x60x40	716	690	690	1.000	C	21700	C	10800	13500	6710	56600	55100	3.52	4.92	4.08
600x600x75x50	883	620	690	1.000	C	26200	C	13500	14600	7550	62800	62000	3.50	3.96	3.28
600x600x90x60	1050	620	690	1.000	C	30200	C	16200	16800	9060	74300	73400	3.48	3.33	2.75
600x600x100x60	1130	620	690	1.000	C	32400	C	18000	18100	10100	80400	79300	3.48	3.08	2.55

Note 3 discusses design shear capacity and the web-to-flange joint.

SECTION 1 PLATE COLUMNS

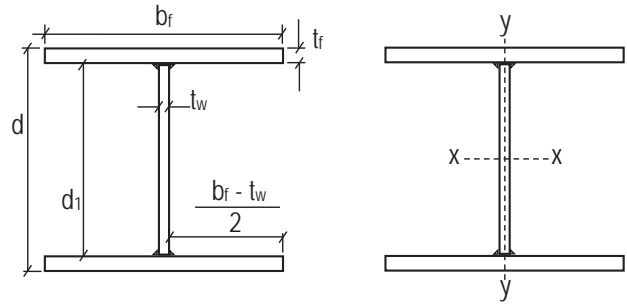


Table 1.C.3 (a) Dimensions and Properties

Designation	Mass per metre	Depth Of Section	Flange Width	Flange Thickness	Web Thickness	Depth Between Flanges	$d_f - t_w$	$b_f - t_w$	Gross Area of Section	About x-axis					About y-axis					Torsion Constant Note 4	Warping Constant
										I_x	Z_x	S_x	r_x	I_y	Z_y	S_y	r_y	J	I_w		
	kg/m	d	b_f	t_f	t_w	d_1			A_g	I_x	Z_x	S_x	r_x	I_y	Z_y	S_y	r_y	J	I_w		
		mm	mm	mm	mm	mm			mm ²	10 ⁶ mm ⁴	10 ³ mm ³	10 ³ mm ³	mm	10 ⁶ mm ⁴	10 ³ mm ³	10 ³ mm ³	mm	10 ⁶ mm ⁴	10 ⁹ mm ⁶		
650x650x40x32	551	650	650	40	32	570	17.8	7.73	70200	5340	16400	18500	276	1830	5640	8600	162	34000	170000		
650x650x50x32	648	650	650	50	32	550	17.2	6.18	82600	6310	19400	21900	276	2290	7050	10700	167	60200	206000		
650x650x60x40	779	650	650	60	40	530	13.3	5.08	99200	7310	22500	25800	271	2750	8460	12900	166	105000	239000		
650x650x75x50	962	650	650	75	50	500	10.0	4.00	123000	8630	26500	31200	265	3440	10600	16200	168	204000	284000		
650x650x90x60	1140	650	650	90	60	470	7.8	3.28	145000	9770	30100	36100	259	4130	12700	19400	169	350000	324000		
650x650x100x60	1230	650	650	100	60	450	7.5	2.95	157000	10400	32000	38800	257	4590	14100	21500	171	466000	347000		
700x700x40x32	595	700	700	40	32	620	19.4	8.35	75800	6740	19300	21600	298	2290	6540	9960	174	36600	249000		
700x700x50x32	700	700	700	50	32	600	18.8	6.68	89200	7980	22800	25600	299	2860	8170	12400	179	64900	302000		
700x700x60x40	842	700	700	60	40	580	14.5	5.50	107000	9280	26500	30200	294	3430	9810	14900	179	113000	352000		
700x700x75x50	1040	700	700	75	50	550	11.0	4.33	133000	11000	31400	36600	288	4290	12300	18700	180	220000	419000		
700x700x90x60	1230	700	700	90	60	520	8.7	3.56	157000	12500	35700	42500	282	5150	14700	22500	181	378000	479000		
700x700x100x60	1330	700	700	100	60	500	8.3	3.20	170000	13300	38100	45800	280	5730	16400	25000	184	503000	515000		
750x750x50x32	752	750	750	50	32	650	20.3	7.18	95800	9940	26500	29600	322	3520	9380	14200	192	69600	431000		
750x750x60x40	904	750	750	60	40	630	15.8	5.92	115000	11600	30900	35000	317	4220	11300	17100	191	121000	503000		
750x750x75x50	1120	750	750	75	50	600	12.0	4.67	143000	13800	36700	42500	311	5280	14100	21500	192	236000	601000		
750x750x90x60	1330	750	750	90	60	570	9.5	3.83	169000	15700	41900	49400	305	6340	16900	25800	194	406000	690000		
750x750x100x60	1440	750	750	100	60	550	9.2	3.45	183000	16800	44800	53300	303	7040	18800	28600	196	540000	744000		
800x800x50x40	848	800	800	50	40	700	17.5	7.60	108000	12400	31000	34900	339	4270	10700	16300	199	81600	601000		
800x800x60x40	967	800	800	60	40	680	17.0	6.33	123000	14200	35500	40100	340	5120	12800	19500	204	130000	701000		
800x800x75x50	1200	800	800	75	50	650	13.0	5.00	153000	17000	42400	48800	334	6410	16000	24400	205	252000	842000		
800x800x90x60	1420	800	800	90	60	620	10.3	4.11	181000	19400	48600	56900	328	7690	19200	29400	206	433000	969000		
800x800x100x60	1540	800	800	100	60	600	10.0	3.70	196000	20800	52000	61400	326	8540	21400	32500	209	577000	1050000		
850x850x50x40	903	850	850	50	40	750	18.8	8.10	115000	15000	35400	39600	361	5120	12100	18400	211	86800	819000		
850x850x60x40	1030	850	850	60	40	730	18.3	6.75	131000	17200	40600	45600	363	6150	14500	22000	216	138000	959000		
850x850x75x50	1280	850	850	75	50	700	14.0	5.33	163000	20600	48600	55500	356	7680	18100	27500	217	268000	1150000		
850x850x90x60	1520	850	850	90	60	670	11.2	4.39	193000	23700	55800	64900	350	9220	21700	33100	219	461000	1330000		
850x850x100x60	1640	850	850	100	60	650	10.8	3.95	209000	25400	59800	70100	349	10200	24100	36700	221	613000	1440000		
900x900x60x40	1090	900	900	60	40	780	19.5	7.17	139000	20700	45900	51400	385	7290	16200	24600	229	146000	1290000		
900x900x75x50	1350	900	900	75	50	750	15.0	5.67	173000	24800	55100	62700	379	9120	20300	30800	230	284000	1550000		
900x900x90x60	1610	900	900	90	60	720	12.0	4.67	205000	28500	63400	73400	373	10900	24300	37100	231	489000	1800000		
900x900x100x60	1740	900	900	100	60	700	11.7	4.20	222000	30700	68100	79400	372	12200	27000	41100	234	650000	1950000		

SECTION 1

PLATE COLUMNS

Table 1.C.3 (b) Properties for Design

Designation	Mass per metre	Yield Stress of Flange		Yield Stress of Web	Form Factor	About x-axis		About y-axis		Design Section Moment Capacity		Design Section Axial Capacity		Surface Areas		
		Note 1	Note 1			Compactness	Effective Section Modulus	Compactness	Effective Section Modulus	About x-axis	About y-axis	Compression	Tension	Profile Surface Area	Profile Surface Area	Profile Surface Area Less 1 Flange Face
	kg/m	MPa	MPa		k_f	Z_{ex} 10 ³ mm ³		Z_{ey} 10 ³ mm ³	ϕM_{sx} kN.m	ϕM_{sy} kN.m	ϕN_s kN	ϕN_t kN	m ² /m	m ² /tonne	m ² /tonne	
650x650x40x32	551	690	690	1.000	N	16800	N	7480	10400	4650	43600	42400	3.84	6.96	5.78	
650x650x50x32	648	690	690	1.000	N	21000	N	10000	13000	6210	51300	49900	3.84	5.92	4.91	
650x650x60x40	779	690	690	1.000	N	25600	N	12600	15900	7800	61600	60000	3.82	4.91	4.07	
650x650x75x50	962	620	690	1.000	C	31200	C	15900	17400	8850	68400	67500	3.80	3.95	3.28	
650x650x90x60	1140	620	690	1.000	C	36100	C	19100	20100	10600	81000	80000	3.78	3.32	2.75	
650x650x100x60	1230	620	690	1.000	C	38800	C	21200	21600	11800	87600	86500	3.78	3.07	2.54	
700x700x40x32	595	690	690	1.000	N	19300	N	8440	12000	5240	47100	45800	4.14	6.95	5.77	
700x700x50x32	700	690	690	1.000	N	24200	N	11400	15000	7050	55400	53900	4.14	5.91	4.91	
700x700x60x40	842	690	690	1.000	N	29500	N	14300	18300	8890	66600	64800	4.12	4.90	4.06	
700x700x75x50	1040	620	690	1.000	C	36600	C	18400	20400	10300	73900	73000	4.10	3.94	3.27	
700x700x90x60	1230	620	690	1.000	C	42500	C	22100	23700	12300	87700	86600	4.08	3.31	2.74	
700x700x100x60	1330	620	690	1.000	C	45800	C	24500	25500	13700	94900	93600	4.08	3.06	2.53	
750x750x50x32	752	690	690	1.000	N	27600	N	12800	17100	7920	59500	57900	4.44	5.90	4.90	
750x750x60x40	904	690	690	1.000	N	33800	N	16200	21000	10000	71500	69600	4.42	4.89	4.06	
750x750x75x50	1120	620	690	1.000	C	42500	C	21100	23700	11800	79500	78500	4.40	3.93	3.26	
750x750x90x60	1330	620	690	1.000	C	49400	C	25400	27600	14100	94400	93200	4.38	3.30	2.73	
750x750x100x60	1440	620	690	1.000	C	53300	C	28200	29700	15700	102000	101000	4.38	3.05	2.53	
800x800x50x40	848	690	690	1.000	N	31900	N	14300	19800	8850	67100	65300	4.72	5.57	4.62	
800x800x60x40	967	690	690	1.000	N	38200	N	18100	23700	11200	76500	74500	4.72	4.88	4.05	
800x800x75x50	1200	620	690	1.000	C	48800	C	24000	27200	13400	85100	84000	4.70	3.93	3.26	
800x800x90x60	1420	620	690	1.000	C	56900	C	28800	31700	16100	101000	99800	4.68	3.29	2.73	
800x800x100x60	1540	620	690	1.000	C	61400	C	32000	34300	17900	109000	108000	4.68	3.04	2.52	
850x850x50x40	903	690	690	1.000	N	35700	N	15700	22200	9770	71400	69500	5.02	5.56	4.62	
850x850x60x40	1030	690	690	1.000	N	42900	N	20000	26600	12400	81500	79300	5.02	4.87	4.05	
850x850x75x50	1280	620	690	1.000	N	55100	N	26900	30700	15000	90700	89500	5.00	3.92	3.25	
850x850x90x60	1520	620	690	1.000	C	64900	C	32600	36200	18200	108000	106000	4.98	3.28	2.72	
850x850x100x60	1640	620	690	1.000	C	70100	C	36200	39100	20200	117000	115000	4.98	3.04	2.52	
900x900x60x40	1090	690	690	1.000	N	47800	N	22100	29700	13700	86400	84100	5.32	4.87	4.04	
900x900x75x50	1350	620	690	1.000	N	61500	N	29700	34300	16600	96300	95000	5.30	3.91	3.25	
900x900x90x60	1610	620	690	1.000	C	73400	C	36500	40900	20400	115000	113000	5.28	3.28	2.72	
900x900x100x60	1740	620	690	1.000	C	79400	C	40500	44300	22600	124000	122000	5.28	3.03	2.51	

Note 3 discusses design shear capacity and the web-to-flange joint.

SECTION 1

PLATE COLUMNS

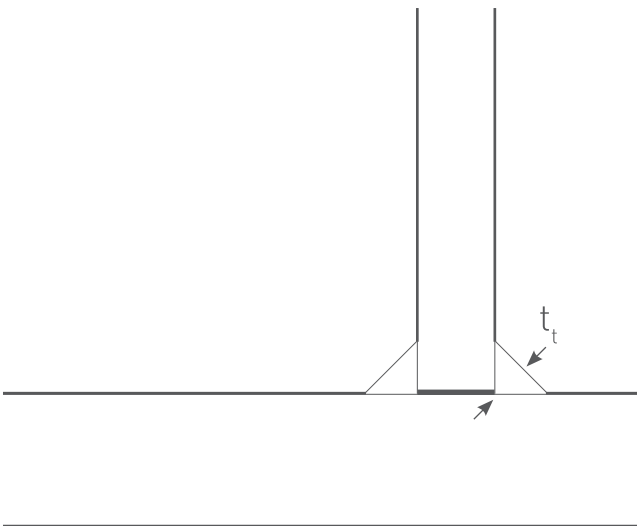
Strength of Grade 700 Steel
Complying with AS 3597

Thickness of Material t mm	Yield Stress f_y MPa	Tensile Strength f_u MPa
$t \leq 5$	650	750
$5 < t \leq 65$	690	790
$65 < t \leq 110$	620	720

NOTES TO SECTION 1 TABLES

1. In the calculation of member moment and axial capacities, the lower yield stress of either the flange or the web has been used for the full section. Similarly, for axial tension capacities, the lower tensile strength (f_u) of either the flange or the web has been used for the full section. The design yield stress and tensile strength of BISALLOY® Structural 80 steel vary with thickness as per the table to the left.

2. The Maximum Design Shear Capacity tabulated is based on having sufficient design capacity in the web-to-flange welded joint such that the welded joint does not govern the design shear capacity of the section. The Design Shear Flow tabulated is associated with this maximum shear condition, i.e. the design shear force is assumed to equal ϕV_v . The Design Weld Throat t_t tabulated is calculated based on the tabulated Design Shear Flow for f_{uw} assumed to equal 620MPa. (f_{uw} is the nominal tensile strength of weld metal.) t_t is the value per fillet weld, assuming a fillet weld each side of the web, at each flange – a total of 4 fillet welds per cross section. While fillet welds have been assumed, the Design Weld Throat required applies equally to alternative weld types such as compound welds or deep penetration welds (refer AS4100 9.7.3.4 and 9.7.2.7). If the design shear in the section is less than ϕV_v , the strength of the welded joint may be reduced by reducing t_t or f_{uw} or both. In some cases the minimum fillet weld size governs (AS4100 Table 9.7.3.2) and this should be taken into account when considering a reduction in the welded joint design capacity. Designers should consider the minimum calculated weld throat required and round this up or use this to determine a fillet weld leg length as appropriate to achieve a practical weld specification. Weld category SP (Structural Purpose) has been assumed.





SECTION 1 PLATE COLUMNS

3. For plate columns, the section design shear capacity and welded-joint details are not tabulated. Columns typically have relatively thick web plates. Therefore, if the design shear capacity of the section is calculated assuming the web-to-flange joint strength does not govern, the design shear capacity will generally be quite high. Accordingly, the weld throat thickness required to achieve that capacity will be high. In contrast, the shear in many column situations is generally significantly lower than this maximum shear capacity. Therefore, for economy, the web-to-flange joint strength is best designed to suit the loading, rather than adopting the maximum strength possible. However it is recognised that in some cases, a high strength web-to-flange joint will be required in plate columns. For example in local areas where large loads are applied to one part of the plate column, or if the plate columns are used as truss chords, depending on details, shear forces may be very large close to nodes. For these various reasons, a specific consideration of the welded web-to-flange joint is suggested.

4. The torsion constant J has been calculated based on a simplified method; summing $bt^3/3$ for each web and flange element. For the web, b has been taken to be the net width (equal to d_1 in the section 1 tables). It is noted this method is typically conservative, however alternative methods may in some cases lead to slightly lower J values. For bending members without full lateral restraint and where member buckling is critical, Designers are encouraged to review the torsion constant and the associated member design moment capacities.

MAXIMUM DESIGN LOADS FOR BEAMS WITH FULL LATERAL RESTRAINT

Tables 2.1.1 to 2.1.3 provide values of the maximum design loads for single span simply-supported beams with full lateral restraint subject to uniformly distributed loads.

Designers should assess the maximum design loads for the strength and serviceability limit states separately, as different load combinations apply to these cases. The self weight of the beam should be taken into account (or a reasonable allowance made) when calculating the maximum design loading, as the tabulated values are based on total loads.

These tables are intended to assist with preliminary design. Where loading is other than uniformly distributed, an approach typically used for such tables is to apply suitable multiplying factors. However in this case great care must be taken to ensure appropriate factors for moment, shear and deflection are correctly applied. It is suggested instead other tables in this publication or alternative methods are used if the loading is not uniformly distributed.

In relation the maximum serviceability load W_s^* , the tabulated values do not take camber into account. The tabulated values may be governed by deflection or first yield. Beam camber may be used to reduce total deflections (and thereby allow a higher serviceability load in relation to the total deflection limit), however the first yield serviceability load should not be exceeded, as beyond this load level the load-deflection relationship may not remain essentially linear. For these beams, a check (eg using Z_x from Section 1 tables) to ensure bending stresses do not exceed yield stress for serviceability loading is recommended.

SECTION 2 PLATE BEAMS

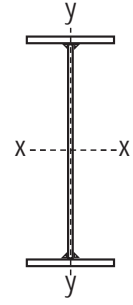


Table 2.B.1 Maximum Design Loads for Beams - With Full Lateral Restraint

Bending about X-axis

Designation	Mass per metre kg/m	Span (m)														W* _{Lz} (kN)
		W* _{L1} (kN) / W* _s (kN)														
		3	4	5	6	7	8	9	10	12	14	16	18	20	22	
532x250x16x10	102	4090	3070	2450	2050	1750	1530	1360	1230	1020	876	767	682	614	558	3630
		4350	2450	1570	1090	799	611	483	391	272	200	153	121	98	81	
540x250x20x10	118	5320	3990	3190	2660	2280	2000	1770	1600	1330	1140	998	887	798	726	3630
		5320	3000	1920	1330	979	749	592	480	333	245	187	148	120	99	
540x300x20x10	133	5810	4360	3480	2900	2490	2180	1940	1740	1450	1240	1090	968	871	792	3630
		6240	3520	2250	1560	1150	879	695	563	391	287	220	174	141	116	
550x300x25x10	157	7530	5650	4520	3770	3230	2820	2510	2260	1880	1610	1410	1260	1130	1030	3630
		7620	4370	2800	1940	1430	1090	864	700	486	357	273	216	175	145	
540x300x20x12	141	5970	4480	3580	2990	2560	2240	1990	1790	1490	1280	1120	995	896	814	4470
		6380	3600	2300	1600	1170	899	710	575	400	294	225	178	144	119	
550x300x25x12	165	7560	5670	4530	3780	3240	2830	2520	2270	1890	1620	1420	1260	1130	1030	4470
		7760	4450	2850	1980	1450	1110	879	712	495	363	278	220	178	147	
564x300x32x12	198	9700	7270	5820	4850	4160	3640	3230	2910	2420	2080	1820	1620	1450	1320	4470
		9690	5700	3650	2530	1860	1430	1130	912	634	466	356	282	228	189	
624x225x12x10	89.5	3420	2570	2050	1710	1470	1280	1140	1030	856	734	642	571	514	467	3000
		4040	2630	1690	1170	860	658	520	421	293	215	165	130	105	87	
632x250x16x10	110	5090	3820	3050	2540	2180	1910	1700	1530	1270	1090	954	848	763	694	3030
		5470	3610	2310	1600	1180	902	712	577	401	294	225	178	144	119	
640x250x20x10	126	6240	4680	3740	3120	2670	2340	2080	1870	1560	1340	1170	1040	936	851	3030
		6560	4380	2800	1950	1430	1100	866	701	487	358	274	216	175	145	
640x300x20x10	141	7250	5440	4350	3620	3110	2720	2420	2170	1810	1550	1360	1210	1090	989	3030
		7670	5120	3280	2280	1670	1280	1010	819	569	418	320	253	205	169	
650x300x25x10	165	8790	6590	5270	4390	3770	3300	2930	2640	2200	1880	1650	1460	1320	1200	3030
		9320	6320	4040	2810	2060	1580	1250	1010	702	516	395	312	253	209	
640x300x20x12	151	7380	5540	4430	3690	3160	2770	2460	2210	1850	1580	1380	1230	1110	1010	5230
		7880	5260	3370	2340	1720	1310	1040	841	584	429	329	260	210	174	
650x300x25x12	174	9520	7140	5710	4760	4080	3570	3170	2860	2380	2040	1780	1590	1430	1300	5230
		9520	6460	4130	2870	2110	1610	1280	1030	717	527	404	319	258	213	
664x300x32x12	207	11800	8850	7080	5900	5060	4420	3930	3540	2950	2530	2210	1970	1770	1610	5230
		11800	8200	5250	3640	2680	2050	1620	1310	911	669	512	405	328	271	
650x300x25x16	193	9860	7390	5910	4930	4220	3700	3290	2960	2460	2110	1850	1640	1480	1340	7150
		9930	6730	4310	2990	2200	1680	1330	1080	748	550	421	333	269	223	
664x300x32x16	226	12400	9320	7460	6220	5330	4660	4140	3730	3110	2660	2330	2070	1860	1700	7150
		12200	8470	5420	3770	2770	2120	1670	1360	942	692	530	418	339	280	
680x300x40x16	264	15100	11300	9060	7550	6470	5660	5030	4530	3780	3240	2830	2520	2270	2060	7150
		14900	10600	6760	4690	3450	2640	2090	1690	1170	862	660	521	422	349	
724x225x12x10	97.3	4180	3130	2510	2090	1790	1570	1390	1250	1040	895	783	696	626	569	2550
		4930	3700	2380	1660	1220	931	736	596	414	304	233	184	149	123	
732x250x16x10	118	5870	4400	3520	2930	2510	2200	1960	1760	1470	1260	1100	978	880	800	2590
		6590	4940	3220	2240	1640	1260	995	806	559	411	315	249	201	166	
740x250x20x10	133	7000	5250	4200	3500	3000	2630	2330	2100	1750	1500	1310	1170	1050	955	2590
		7870	5900	3890	2700	1980	1520	1200	972	675	496	380	300	243	201	
740x300x20x12	160	8870	6650	5320	4430	3800	3330	2960	2660	2220	1900	1660	1480	1330	1210	4480
		9440	7080	4670	3240	2380	1820	1440	1170	810	595	456	360	292	241	
750x300x25x12	184	10900	8170	6530	5440	4670	4080	3630	3270	2720	2330	2040	1810	1630	1480	4480
		11400	8520	5690	3950	2900	2220	1760	1420	988	726	556	439	356	294	
764x300x32x12	217	13400	10100	8060	6710	5750	5030	4480	4030	3360	2880	2520	2240	2010	1830	4480
		14000	10500	7170	4980	3660	2800	2210	1790	1240	914	700	553	448	370	
750x300x25x16	206	11900	8910	7130	5940	5090	4460	3960	3570	2970	2550	2230	1980	1780	1620	8350
		11900	8940	5970	4150	3050	2330	1840	1490	1040	761	583	461	373	308	
764x300x32x16	239	14900	11200	8930	7440	6380	5580	4960	4460	3720	3190	2790	2480	2230	2030	8350
		14600	10900	7450	5170	3800	2910	2300	1860	1290	950	727	575	466	385	
780x300x40x16	276	18000	13500	10800	8980	7690	6730	5980	5390	4490	3850	3370	2990	2690	2450	8350
		17700	13300	9210	6390	4700	3600	2840	2300	1600	1170	899	710	575	476	

Table 2.B.2 Maximum Design Loads for Beams - With Full Lateral Restraint

Bending about X-axis



Designation	Mass per metre kg/m	Span (m) W^*_{L1} (kN) / W^*_{L2} (kN)														W^*_{L2} (kN)
		3	4	5	6	7	8	9	10	12	14	16	18	20	22	
824x225x12x10	105	4580	3430	2750	2290	1960	1720	1530	1370	1140	981	859	763	687	625	2210
		5880	4410	3240	2250	1650	1260	999	809	562	413	316	250	202	167	
824x225x12x12	118	5350	4010	3210	2680	2290	2010	1780	1610	1340	1150	1000	892	803	730	3780
		6260	4700	3450	2390	1760	1350	1060	861	598	440	337	266	215	178	
832x250x16x12	138	7500	5630	4500	3750	3210	2810	2500	2250	1880	1610	1410	1250	1130	1020	3870
		8160	6120	4530	3150	2310	1770	1400	1130	787	578	443	350	283	234	
840x250x20x12	154	8820	6610	5290	4410	3780	3310	2940	2650	2200	1890	1650	1470	1320	1200	3920
		9610	7210	5390	3740	2750	2110	1660	1350	936	688	526	416	337	278	
840x300x20x16	195	11300	8460	6770	5640	4840	4230	3760	3390	2820	2420	2120	1880	1690	1540	9260
		11800	8870	6640	4610	3390	2590	2050	1660	1150	846	648	512	415	343	
850x300x25x16	218	14400	10800	8660	7210	6180	5410	4810	4330	3610	3090	2700	2400	2160	1970	9300
		14000	10500	7950	5520	4060	3110	2450	1990	1380	1010	777	614	497	411	
864x300x32x16	251	17400	13000	10400	8700	7460	6520	5800	5220	4350	3730	3260	2900	2610	2370	9300
		17100	12800	9850	6840	5020	3850	3040	2460	1710	1260	962	760	615	509	
880x300x40x16	289	20900	15600	12500	10400	8940	7820	6950	6260	5210	4470	3910	3480	3130	2840	9300
		20600	15400	12100	8400	6170	4720	3730	3020	2100	1540	1180	933	756	624	
850x350x25x20	263	16100	12100	9660	8050	6900	6040	5370	4830	4030	3450	3020	2680	2420	2200	11900
		16600	12400	9420	6540	4800	3680	2910	2350	1630	1200	920	727	589	486	
864x350x32x20	301	20500	15400	12300	10200	8780	7680	6830	6150	5120	4390	3840	3410	3070	2790	11900
		20200	15100	11600	8080	5930	4540	3590	2910	2020	1480	1140	897	727	601	
880x350x40x20	345	24800	18600	14900	12400	10600	9290	8260	7430	6190	5310	4650	4130	3720	3380	11900
		24200	18200	14200	9890	7270	5560	4400	3560	2470	1820	1390	1100	890	736	
932x250x16x12	148	7900	5920	4740	3950	3380	2960	2630	2370	1970	1690	1480	1320	1180	1080	3420
		9510	7130	5700	4110	3020	2310	1830	1480	1030	755	578	456	370	306	
940x250x20x12	163	9250	6940	5550	4630	3970	3470	3080	2780	2310	1980	1730	1540	1390	1260	3470
		11100	8350	6680	4860	3570	2730	2160	1750	1210	892	683	540	437	361	
932x250x16x16	176	10000	7530	6020	5020	4300	3760	3350	3010	2510	2150	1880	1670	1510	1370	7970
		10500	7850	6280	4520	3320	2540	2010	1630	1130	831	636	503	407	336	
940x250x20x16	192	12300	9190	7350	6130	5250	4600	4080	3680	3060	2630	2300	2040	1840	1670	8090
		12100	9070	7250	5270	3870	2960	2340	1900	1320	968	741	586	474	392	
940x300x20x16	207	13200	9870	7890	6580	5640	4930	4390	3950	3290	2820	2470	2190	1970	1790	8170
		13700	10300	8250	5990	4400	3370	2660	2160	1500	1100	843	666	539	446	
950x300x25x16	231	16100	12000	9640	8030	6880	6020	5350	4820	4020	3440	3010	2680	2410	2190	8260
		16200	12100	9720	7140	5240	4010	3170	2570	1780	1310	1000	793	642	531	
950x400x25x16	270	18800	14100	11300	9400	8060	7050	6270	5640	4700	4030	3520	3130	2820	2560	8260
		20300	15300	12200	8960	6580	5040	3980	3230	2240	1650	1260	996	807	667	
964x400x32x16	314	24200	18100	14500	12100	10400	9070	8060	7260	6050	5180	4540	4030	3630	3300	8260
		24900	18700	15000	11200	8190	6270	4960	4010	2790	2050	1570	1240	1000	829	
950x400x25x20	298	19800	14900	11900	9910	8490	7430	6600	5940	4950	4250	3710	3300	2970	2700	13400
		21300	16000	12800	9380	6890	5270	4170	3380	2340	1720	1320	1040	844	697	
964x400x32x20	342	25500	19100	15300	12700	10900	9550	8490	7640	6370	5460	4780	4250	3820	3470	13400
		25900	19400	15500	11600	8500	6510	5140	4160	2890	2120	1630	1290	1040	860	
980x400x40x20	393	31600	23700	19000	15800	13500	11900	10500	9480	7900	6770	5930	5270	4740	4310	13400
		31100	23300	18700	14100	10400	7960	6290	5090	3540	2600	1990	1570	1270	1050	
1032x250x16x12	157	6130	4900	4080	3500	3060	2720	2450	2040	1750	1530	1360	1230	1110	3060	
		8200	6560	5230	3840	2940	2320	1880	1310	961	736	581	471	389		
1040x250x20x12	173	7150	5720	4760	4080	3570	3180	2860	2380	2040	1790	1590	1430	1300	3100	
		9560	7650	6150	4520	3460	2730	2210	1540	1130	864	683	553	457		
1050x250x25x12	192	8420	6730	5610	4810	4210	3740	3370	2810	2410	2100	1870	1680	1530	3140	
		11300	9010	7310	5370	4110	3250	2630	1830	1340	1030	812	658	544		
1040x300x20x16	220	11300	9030	7530	6450	5650	5020	4520	3760	3230	2820	2510	2260	2050	7310	
		11800	9460	7600	5590	4280	3380	2740	1900	1400	1070	845	684	566		
1050x300x25x16	243	13200	10500	8780	7520	6580	5850	5270	4390	3760	3290	2930	2630	2390	7410	
		13900	11100	9000	6610	5060	4000	3240	2250	1650	1270	1000	810	669		
1050x350x25x16	263	14700	11800	9820	8420	7370	6550	5890	4910	4210	3680	3270	2950	2680	7440	
		15600	12500	10100	7440	5690	4500	3640	2530	1860	1420	1120	911	753		
1050x400x25x16	283	16000	12800	10700	9160	8010	7120	6410	5340	4580	4010	3560	3200	2910	7440	
		17300	13900	11200	8260	6320	5000	4050	2810	2060	1580	1250	1010	836		
1064x400x32x16	327	19800	15900	13200	11300	9910	8810	7930	6610	5660	4960	4410	3960	3600	7440	
		21100	16900	13900	10200	7830	6180	5010	3480	2560	1960	1550	1250	1030		
1050x400x25x20	314	17000	13600	11300	9690	8480	7540	6780	5650	4850	4240	3770	3390	3080	14500	
		18200	14600	11800	8680	6640	5250	4250	2950	2170	1660	1310	1060	879		
1064x400x32x20	358	22500	18000	15000	12900	11300	10000	9010	7510	6440	5630	5010	4510	4100	14500	
		22000	17600	14500	10600	8150	6440	5210	3620	2660	2040	1610	1300	1080		
1080x400x40x20	408	26800	21400	17900	15300	13400	11900	10700	8930	7650	6690	5950	5360	4870	14500	
		26400	21100	17600	12900	9910	7830	6340	4400							

SECTION 2 PLATE BEAMS

Notes to Section 2 tables

W^*_{L1} = Maximum Design Load based on Moment.

W^*_{L2} = Maximum Design Load based on Shear.

W^*_s = Maximum Serviceability Load based on Deflection Limit of Span/250 or First Yield.

Table 2.B.3 Maximum Design Loads for Beams - With Full Lateral Restraint

Bending about X-AXIS

Designation	Mass per metre kg/m	Span (m)														W^*_{L2} (kN)
		W^*_{L1} (kN) / W^*_s (kN)														
		3	4	5	6	7	8	9	10	12	14	16	18	20	22	
1240x300x20x16	245		12500	10000	8340	7150	6260	5560	5010	4170	3580	3130	2780	2500	2280	6020
			15100	12100	10000	8490	6500	5130	4160	2890	2120	1620	1280	1040	859	
1250x300x25x16	268		14500	11600	9700	8310	7270	6470	5820	4850	4160	3640	3230	2910	2650	6100
			17500	14000	11700	9950	7610	6020	4870	3380	2490	1900	1500	1220	1010	
1250x400x25x20	345		21400	17200	14300	12300	10700	9530	8580	7150	6130	5360	4760	4290	3900	12000
			22900	18300	15300	13000	9970	7880	6380	4430	3260	2490	1970	1600	1320	
1264x400x32x20	389		26500	21200	17700	15100	13300	11800	10600	8840	7570	6630	5890	5300	4820	12100
			27500	22000	18300	15700	12100	9550	7740	5370	3950	3020	2390	1930	1600	
1264x500x32x20	440		30500	24400	20400	17400	15300	13600	12200	10200	8720	7630	6780	6110	5550	12100
			32800	26200	21900	18700	14400	11400	9230	6410	4710	3610	2850	2310	1910	
1280x500x40x20	502		37400	29900	25000	21400	18700	16600	15000	12500	10700	9360	8320	7490	6810	12100
			39400	31500	26300	22500	17500	13900	11200	7790	5720	4380	3460	2800	2320	
1264x500x32x25	487		32300	25800	21500	18400	16100	14300	12900	10800	9220	8060	7170	6450	5860	22400
			34400	27500	22900	19600	15100	11900	9670	6720	4940	3780	2990	2420	2000	
1280x500x40x25	550		40400	32300	26900	23100	20200	17900	16200	13500	11500	10100	8970	8080	7340	22400
			40900	32700	27300	23400	18200	14400	11700	8100	5950	4560	3600	2920	2410	
1550x400x25x20	393			20400	17000	14600	12800	11300	10200	8510	7290	6380	5670	5100	4640	9440
				24600	20500	17600	15400	13100	10600	7360	5410	4140	3270	2650	2190	
1564x400x32x20	436			24200	20200	17300	15100	13500	12100	10100	8650	7570	6730	6050	5500	9580
				29200	24300	20800	18200	15700	12700	8810	6470	4960	3920	3170	2620	
1564x500x32x25	546			34300	28600	24500	21500	19100	17200	14300	12300	10700	9540	8580	7800	18700
				36400	30400	26000	22800	19600	15900	11000	8090	6190	4890	3960	3280	
1580x500x40x25	608			41400	34500	29600	25900	23000	20700	17300	14800	12900	11500	10400	9410	18900
				43000	35800	30700	26900	23300	18900	13100	9640	7380	5830	4720	3900	
1580x600x40x32	754			49900	41600	35600	31200	27700	24900	20800	17800	15600	13900	12500	11300	35800
				52400	43600	37400	32700	28400	23000	16000	11700	8990	7100	5750	4760	
1600x600x50x32	848			64100	53400	45800	40100	35600	32000	26700	22900	20000	17800	16000	14600	35800
				62200	51800	44400	38900	34200	27700	19200	14100	10800	8540	6920	5720	
1864x500x32x25	604			33300	28600	25000	22200	20000	16700	14300	12500	11100	9990	9090	15400	
				38500	33000	28900	25700	23100	16600	12200	9360	7400	5990	4950		
1880x500x40x25	667			39000	33400	29200	26000	23400	19500	16700	14600	13000	11700	10600	15600	
				45000	38600	33800	30000	27000	19600	14400	11000	8730	7070	5840		
1880x600x40x32	829			52600	45100	39500	35100	31600	26300	22600	19700	17500	15800	14400	32700	
				55000	47100	41200	36700	33000	24000	17600	13500	10700	8630	7130		
1900x600x50x32	923			64300	55100	48200	42800	38600	32100	27500	24100	21400	19300	17500	33000	
				64800	55500	48600	43200	38900	28500	21000	16100	12700	10300	8490		
1900x700x50x40	1110			74900	64200	56100	49900	44900	37400	32100	28100	25000	22500	20400	53600	
				76800	65900	57600	51200	46100	33900	24900	19000	15000	12200	10100		
1920x700x60x40	1220			89200	76500	66900	59500	53500	44600	38200	33500	29700	26800	24300	53700	
				88300	75700	66200	58900	53000	39300	28900	22100	17500	14100	11700		

The beams are assumed to be simply supported single spans and be appropriately restrained at supports and within the span so that the beams may be considered to have full lateral restraint. Loads are assumed to be uniformly distributed along the beam. Where loads are transmitted via bearing at load locations or at supports, the capacity of the beam the resist such loads must be checked separately.

Tabulated values are based on regular methods typically used to establish design actions and deflections for steel beams. For very small span/depth ratios these methods may not be sufficiently accurate. Hence, where the span/depth ratio is less than 3, the values are not listed. Values are not listed for beams more than 2000 mm deep.

SECTION 3 PLATE BEAMS

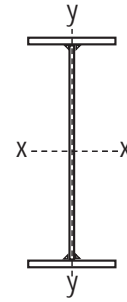


Table 3.B.1 Design Moment Capacities for Members - Without Full Lateral Restraint

Bending about X-axis

Designation	Mass per metre kg/m	Design Member Moment Capacity ϕMb (kN.m)																	
		Effective Length L_e (m)																	
		0	1	2	3	4	5	6	7	8	9	10	12	14	16	18	20	22	
532x250x16x10	102	1530	1520	1330	1080	846	655	515	415	343	291	251	196	161	136	118	105	93.7	
540x250x20x10	118	2000	1980	1730	1400	1100	859	683	557	466	399	348	276	229	195	171	151	136	
540x300x20x10	133	2180	2180	2010	1750	1470	1210	999	830	700	600	523	412	339	288	250	221	199	
550x300x25x10	157	2820	2820	2600	2270	1920	1590	1330	1120	956	830	731	587	490	420	368	327	295	
540x300x20x12	141	2240	2240	2060	1790	1500	1230	1010	844	712	611	533	422	348	296	257	228	204	
550x300x25x12	165	2830	2830	2610	2280	1920	1600	1340	1130	964	838	739	595	497	426	374	333	300	
564x300x32x12	198	3640	3640	3360	2950	2530	2150	1830	1580	1380	1210	1080	891	755	655	579	518	469	
624x225x12x10	89.5	1280	1260	1060	812	596	440	333	262	212	177	151	116	93.3	78.1	67.2	59.0	52.6	
632x250x16x10	110	1910	1890	1640	1320	1010	772	597	475	388	325	278	214	173	145	125	110	98	
640x250x20x10	126	2340	2320	2030	1640	1280	988	775	625	516	437	377	295	242	205	178	157	141	
640x300x20x10	141	2720	2720	2500	2150	1790	1450	1170	958	797	674	580	450	365	306	264	232	207	
650x300x25x10	165	3300	3300	3040	2650	2220	1830	1510	1260	1060	911	794	628	517	440	382	338	304	
640x300x20x12	151	2770	2770	2540	2180	1810	1470	1190	971	808	685	591	459	374	315	271	239	213	
650x300x25x12	174	3570	3570	3260	2810	2330	1900	1560	1290	1080	929	809	639	527	448	389	345	310	
664x300x32x12	207	4420	4420	4070	3550	3000	2500	2090	1770	1520	1320	1170	944	790	680	597	532	480	
650x300x25x16	193	3700	3700	3370	2890	2390	1950	1600	1320	1120	961	840	667	552	471	410	364	327	
664x300x32x16	226	4660	4660	4270	3690	3100	2580	2150	1820	1560	1360	1200	970	813	700	615	548	495	
680x300x40x16	264	5660	5660	5220	4570	3910	3320	2830	2440	2140	1890	1690	1390	1180	1030	908	814	738	
724x225x12x10	97.3	1570	1530	1270	965	698	508	381	297	239	197	167	127	101	84.2	72.0	62.9	55.9	
732x250x16x10	118	2200	2180	1900	1520	1160	881	677	534	432	359	305	232	186	155	132	116	103	
740x250x20x10	133	2630	2610	2280	1860	1450	1110	867	693	568	477	409	315	256	215	185	163	146	
740x300x20x12	160	3330	3330	3030	2590	2130	1700	1360	1100	907	762	651	499	401	335	287	251	223	
750x300x25x12	184	4080	4080	3740	3220	2660	2160	1750	1430	1190	1010	876	683	557	469	406	357	319	
764x300x32x12	217	5030	5030	4640	4040	3390	2810	2320	1940	1650	1420	1250	994	825	704	615	545	491	
750x300x25x16	206	4460	4460	4030	3430	2810	2260	1820	1490	1240	1060	914	715	586	496	430	379	340	
764x300x32x16	239	5580	5580	5080	4360	3610	2950	2420	2020	1710	1470	1290	1030	852	728	636	565	508	
780x300x40x16	276	6730	6730	6170	5360	4520	3780	3170	2690	2320	2030	1800	1460	1230	1060	932	833	752	
824x225x12x10	105	1720	1680	1410	1080	782	569	426	330	265	218	184	138	109	90.4	76.9	66.9	59.2	
824x225x12x12	118	2010	1940	1590	1170	829	596	445	346	279	231	196	149	120	100	85.7	75.1	66.8	
832x250x16x12	138	2810	2770	2370	1860	1390	1030	783	613	494	409	347	263	210	175	149	130	116	
840x250x20x12	154	3310	3270	2820	2250	1710	1290	993	785	639	533	455	348	281	235	202	177	158	
840x300x20x16	195	4230	4230	3800	3200	2570	2030	1600	1280	1050	882	753	576	463	387	331	290	258	
850x300x25x16	218	5410	5410	4850	4080	3280	2590	2060	1660	1370	1150	991	766	621	522	450	395	353	
864x300x32x16	251	6520	6520	5910	5040	4130	3330	2700	2220	1860	1590	1380	1080	891	757	657	582	522	
880x300x40x16	289	7820	7820	7140	6160	5140	4240	3500	2940	2500	2170	1900	1530	1270	1090	956	851	767	
850x350x25x20	263	6040	6040	5650	4990	4250	3530	2910	2410	2020	1720	1480	1150	933	783	673	591	527	
864x350x32x20	301	7680	7680	7210	6380	5460	4580	3810	3190	2700	2320	2020	1590	1300	1100	955	842	754	
880x350x40x20	345	9290	9290	8760	7810	6760	5750	4870	4140	3560	3090	2720	2180	1820	1550	1360	1200	1080	

SECTION 3 PLATE BEAMS

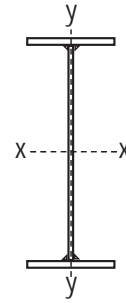


Table 3.B.2 Design Moment Capacities for Members - Without Full Lateral Restraint

Bending about X-axis

Designation	Mass per metre kg/m	Design Member Moment Capacity ϕMb (kN.m)																	
		Effective Length L_e (m)																	
		0	1	2	3	4	5	6	7	8	9	10	12	14	16	18	20	22	
932x250x16x12	148	2960	2930	2530	2010	1510	1130	859	671	540	445	376	283	224	185	158	137	121	
940x250x20x12	163	3470	3440	3000	2420	1860	1410	1080	854	692	575	489	371	297	247	211	185	164	
932x250x16x16	176	3760	3670	3050	2310	1680	1220	925	725	587	489	417	319	258	216	186	163	145	
940x250x20x16	192	4600	4490	3750	2860	2090	1540	1160	915	743	620	530	407	329	277	238	209	187	
940x300x20x16	207	4930	4930	4400	3680	2930	2280	1790	1420	1160	964	819	621	495	411	350	305	270	
950x300x25x16	231	6020	6020	5400	4540	3640	2870	2260	1820	1490	1250	1070	816	657	548	470	411	366	
950x400x25x16	270	7050	7050	6810	6220	5510	4770	4060	3430	2900	2470	2130	1620	1290	1060	898	776	683	
964x400x32x16	314	9070	9070	8760	8020	7120	6180	5290	4510	3850	3310	2870	2230	1800	1500	1280	1120	992	
950x400x25x20	298	7430	7430	7150	6500	5740	4940	4190	3530	2990	2550	2200	1690	1350	1120	951	826	730	
964x400x32x20	342	9550	9550	9190	8380	7400	6400	5450	4630	3950	3390	2950	2290	1860	1550	1330	1160	1030	
980x400x40x20	393	11900	11900	11400	10400	9270	8070	6940	5960	5140	4460	3910	3100	2550	2150	1860	1640	1470	
1032x250x16x12	157	3060	3040	2650	2130	1630	1220	933	729	585	482	405	303	239	196	166	144	127	
1040x250x20x12	173	3570	3550	3130	2550	1990	1520	1170	922	746	618	523	395	314	260	221	192	170	
1050x250x25x12	192	4210	4200	3730	3090	2440	1890	1480	1180	967	809	690	528	425	355	304	267	237	
1040x300x20x16	220	5650	5640	5020	4160	3290	2540	1970	1560	1260	1050	885	665	528	435	369	320	283	
1050x300x25x16	243	6580	6580	5910	4970	3990	3140	2470	1970	1610	1340	1140	867	693	575	491	428	380	
1050x350x25x16	263	7370	7370	6900	6090	5160	4260	3480	2840	2350	1970	1670	1260	1000	822	695	602	530	
1050x400x25x16	283	8010	8010	7720	7040	6210	5350	4520	3800	3200	2710	2320	1750	1380	1130	951	818	716	
1064x400x32x16	327	9910	9910	9580	8770	7800	6760	5780	4910	4180	3580	3090	2380	1910	1580	1340	1160	1030	
1050x400x25x20	314	8480	8480	8140	7380	6480	5550	4670	3920	3300	2790	2400	1820	1450	1190	1010	871	766	
1064x400x32x20	358	11300	11300	10800	9760	8550	7310	6160	5180	4370	3720	3200	2460	1980	1640	1400	1210	1070	
1080x400x40x20	408	13400	13400	12900	11700	10400	8980	7670	6540	5590	4820	4200	3290	2680	2250	1940	1700	1510	
1050x400x25x25	353	9080	9080	8670	7820	6820	5810	4880	4090	3450	2940	2530	1950	1560	1300	1110	966	855	
1064x400x32x25	397	11600	11600	11100	10000	8750	7480	6310	5310	4490	3840	3320	2580	2080	1740	1490	1300	1160	
1080x400x40x25	447	14200	14200	13600	12300	10900	9340	7950	6750	5770	4980	4340	3410	2780	2350	2020	1780	1590	
1240x300x20x16	245	6260	6260	5620	4720	3770	2940	2290	1810	1460	1210	1010	755	593	484	408	352	309	
1250x300x25x16	268	7270	7270	6600	5620	4560	3610	2840	2270	1850	1530	1290	972	768	631	534	463	408	
1250x400x25x20	345	10700	10700	10200	9230	8040	6810	5670	4700	3910	3290	2800	2100	1640	1340	1120	962	841	
1264x400x32x20	389	13300	13300	12700	11500	10100	8600	7230	6040	5070	4290	3670	2780	2200	1810	1530	1320	1160	
1264x500x32x20	440	15300	15300	15100	14200	13100	11900	10600	9290	8110	7070	6180	4780	3800	3100	2600	2220	1940	
1280x500x40x20	502	18700	18700	18600	17500	16200	14700	13200	11600	10200	8980	7900	6200	5000	4130	3500	3020	2650	
1264x500x32x25	487	16100	16100	15900	15000	13700	12400	11000	9610	8370	7290	6360	4930	3930	3230	2720	2340	2040	
1280x500x40x25	550	20200	20200	20000	18800	17200	15600	13800	12100	10600	9300	8160	6390	5150	4260	3620	3130	2750	

SECTION 3 PLATE BEAMS

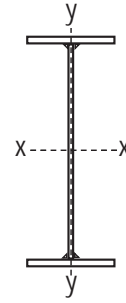


Table 3.B.3 Design Moment Capacities for Members - Without Full Lateral Restraint

Bending about X-axis

Designation	Mass per metre kg/m	Design Member Moment Capacity ϕM_b (kN.m)																	
		Effective Length L_e (m)																	
		0	1	2	3	4	5	6	7	8	9	10	12	14	16	18	20	22	
1550x400x25x20	393	12800	12800	12200	11100	9680	8230	6880	5700	4740	3970	3360	2500	1940	1560	1300	1100	955	
1564x400x32x20	436	15100	15100	14600	13300	11800	10100	8560	7180	6030	5090	4340	3260	2550	2070	1730	1480	1290	
1564x500x32x25	546	21500	21500	21100	19800	18000	16100	14100	12200	10500	9070	7840	5970	4690	3800	3160	2690	2330	
1580x500x40x25	608	25900	25900	25500	23900	21900	19700	17400	15100	13100	11400	9900	7610	6040	4930	4130	3530	3080	
1580x600x40x32	754	31200	31200	31200	29900	28100	26000	23700	21400	19200	17100	15200	12100	9730	8010	6730	5770	5020	
1600x600x50x32	848	40100	40100	40100	38300	36000	33300	30400	27400	24500	21900	19500	15600	12600	10500	8850	7630	6680	
1864x500x32x25	604	25000	25000	24600	23100	21100	18900	16600	14400	12400	10600	9180	6950	5420	4360	3600	3040	2620	
1880x500x40x25	667	29200	29200	28900	27200	25000	22500	20000	17500	15200	13200	11400	8760	6900	5590	4640	3940	3410	
1880x600x40x32	829	39500	39500	39500	37600	35200	32400	29400	26400	23400	20700	18300	14300	11400	9270	7710	6550	5660	
1900x600x50x32	923	48200	48200	48200	46100	43200	39900	36300	32700	29100	25900	22900	18100	14500	11900	9980	8530	7410	
1900x700x50x40	1110	56100	56100	56100	54900	52400	49300	46000	42400	38800	35300	32000	26100	21400	17800	15100	12900	11200	
1920x700x60x40	1220	66900	66900	66900	65500	62500	58900	55000	50800	46600	42500	38600	31700	26200	21900	18600	16100	14000	
2164x500x32x25	663	26300	26300	26100	24600	22600	20400	18100	15900	13800	11900	10300	7860	6130	4910	4040	3400	2910	
2180x500x40x25	726	30600	30600	30400	28800	26700	24300	21700	19200	16800	14700	12800	9830	7730	6240	5160	4360	3760	
2180x600x40x32	904	46900	46900	46900	44600	41700	38300	34700	31000	27400	24100	21200	16500	13000	10500	8700	7340	6310	
2200x600x50x32	999	54700	54700	54700	52400	49200	45500	41400	37300	33300	29500	26100	20600	16400	13400	11100	9440	8150	
2200x700x50x40	1210	68700	68700	68700	66900	63700	59800	55500	50900	46300	41900	37700	30500	24700	20400	17000	14500	12500	
2220x700x60x40	1320	81900	81900	81900	79800	76000	71400	66400	61000	55600	50400	45500	36900	30100	24900	20900	17900	15500	
2220x900x60x50	1670	97500	97500	97500	97500	95100	91800	88000	83700	79200	74500	69800	60500	52000	44700	38500	33400	29300	
2250x900x75x50	1880	110000	110000	110000	110000	108000	105000	101000	96800	92100	87200	82200	72400	63200	55000	48100	42200	37300	
2480x600x40x32	980	50100	50100	50100	47900	45000	41500	37800	33900	30200	26700	23500	18300	14500	11700	9650	8110	6950	
2500x600x50x32	1070	58200	58200	58200	56000	52800	49100	44900	40700	36500	32500	28800	22800	18200	14800	12300	10400	8910	
2500x700x50x40	1300	81600	81600	81600	79200	75200	70400	65100	59600	54000	48600	43500	34800	28000	22900	19000	16100	13800	
2520x700x60x40	1410	92100	92100	92100	89900	85600	80500	74800	68800	62700	56800	51200	41400	33600	27700	23100	19700	17000	
2520x900x60x50	1790	116000	116000	116000	116000	113000	108000	104000	98500	92900	87200	81300	70000	59700	50900	43500	37500	32700	
2550x900x75x50	2000	133000	133000	133000	133000	130000	126000	121000	116000	110000	103000	97000	84500	73000	63000	54500	47400	41600	
3220x900x60x50	2060	162000	162000	162000	162000	157000	151000	143000	136000	127000	118000	110000	93000	78200	65700	55500	47300	40700	
3260x900x80x50	2350	182000	182000	182000	182000	178000	172000	165000	157000	149000	141000	132000	114000	98400	84300	72400	62600	54500	

SECTION 3 PLATE COLUMNS

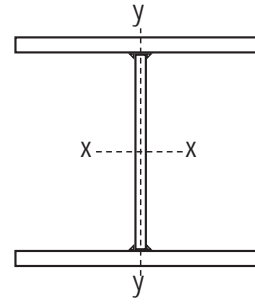


Table 3.C.1 Design Moment Capacities for Members - Without Full Lateral Restraint

Bending about X-axis

Designation	Mass per metre kg/m	Design Member Moment Capacity ϕMb (kN.m)																	
		Effective Length L_e (m)																	
		0	1	2	3	4	5	6	7	8	9	10	12	14	16	18	20	22	
250x250x16x12	83.3	616	616	553	477	405	345	298	260	230	205	186	155	133	117	104	93.4	84.9	
250x250x20x12	98.3	768	766	691	604	524	457	401	357	320	289	264	224	194	171	153	138	126	
250x250x25x16	123	973	971	881	784	696	621	558	505	460	422	389	335	293	261	234	213	194	
250x250x32x20	155	1190	1190	1100	1000	914	838	772	713	661	615	574	505	450	404	366	334	307	
250x250x40x25	190	1420	1420	1330	1240	1150	1080	1010	952	896	845	798	717	648	589	540	497	460	
250x250x50x32	234	1660	1660	1590	1510	1430	1360	1300	1240	1180	1130	1080	986	907	837	776	721	673	
250x250x60x40	276	1870	1870	1820	1740	1680	1610	1550	1490	1440	1390	1340	1240	1160	1080	1020	955	899	
300x300x25x16	149	1390	1390	1310	1180	1050	937	840	756	686	626	575	493	430	381	341	309	282	
300x300x32x20	188	1770	1770	1670	1520	1390	1270	1160	1070	985	914	850	744	659	591	534	487	447	
300x300x40x25	232	2130	2130	2020	1880	1750	1630	1520	1420	1330	1250	1180	1060	952	864	789	725	670	
300x300x50x32	286	2530	2530	2430	2300	2170	2060	1960	1860	1770	1680	1600	1460	1340	1230	1140	1060	987	
300x300x60x40	339	2880	2880	2800	2680	2570	2460	2360	2270	2180	2090	2010	1870	1730	1620	1510	1420	1330	
300x300x75x50	412	2980	2980	2950	2870	2790	2710	2640	2570	2500	2430	2370	2240	2130	2030	1930	1830	1750	
300x300x80x50	432	3080	3080	3060	2980	2910	2830	2760	2690	2630	2560	2500	2380	2270	2170	2070	1980	1890	
350x350x20x16	149	1500	1500	1440	1320	1180	1050	925	820	731	656	593	496	424	371	329	295	268	
350x350x25x16	175	1880	1880	1800	1650	1490	1340	1200	1080	977	888	813	691	600	529	473	427	389	
350x350x32x20	221	2440	2440	2340	2160	1980	1800	1650	1510	1390	1280	1190	1040	914	817	737	670	615	
350x350x40x25	273	2980	2980	2870	2680	2490	2310	2150	2010	1880	1760	1650	1470	1320	1190	1090	999	922	
350x350x50x32	338	3570	3570	3470	3280	3090	2920	2760	2620	2480	2360	2250	2040	1870	1710	1580	1460	1360	
350x350x60x40	402	4110	4110	4020	3840	3660	3500	3350	3210	3080	2950	2830	2620	2430	2260	2100	1970	1840	
350x350x75x50	491	4310	4310	4270	4140	4020	3900	3780	3680	3570	3470	3370	3190	3020	2860	2720	2580	2460	
350x350x90x60	575	4810	4810	4810	4700	4590	4480	4380	4280	4190	4090	4000	3830	3670	3510	3370	3230	3100	
350x350x100x60	620	5070	5070	5070	4990	4890	4790	4700	4600	4520	4430	4340	4180	4020	3880	3730	3600	3470	
400x400x20x16	171	1750	1750	1720	1610	1480	1350	1210	1090	983	887	804	672	573	499	441	394	357	
400x400x25x16	201	2420	2420	2370	2210	2020	1830	1650	1490	1350	1220	1110	942	812	712	633	570	518	
400x400x32x20	254	3160	3160	3090	2890	2660	2440	2230	2040	1880	1730	1600	1390	1220	1090	977	887	812	
400x400x40x25	314	3970	3970	3890	3650	3400	3150	2930	2720	2540	2370	2220	1970	1760	1590	1440	1320	1220	
400x400x50x32	389	4790	4790	4710	4460	4210	3960	3740	3530	3350	3170	3010	2730	2480	2270	2090	1940	1800	
400x400x60x40	465	5550	5550	5470	5230	4980	4750	4540	4340	4150	3970	3810	3500	3240	3000	2800	2610	2440	
400x400x75x50	569	5880	5880	5860	5670	5490	5310	5150	4990	4840	4700	4560	4300	4070	3850	3640	3460	3280	
400x400x90x60	669	6630	6630	6630	6480	6310	6160	6010	5870	5730	5590	5460	5210	4980	4760	4550	4360	4180	
400x400x100x60	722	7030	7030	7030	6910	6760	6620	6480	6340	6210	6090	5960	5720	5500	5280	5080	4890	4710	

SECTION 3 PLATE COLUMNS

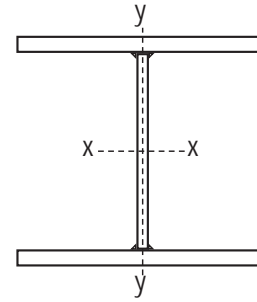


Table 3.C.2 Design Moment Capacities for Members - Without Full Lateral Restraint

Bending about X-axis

Designation	Mass per metre kg/m	Design Member Moment Capacity ϕMb (kN.m)																
		Effective Length L_e (m)																
		0	1	2	3	4	5	6	7	8	9	10	12	14	16	18	20	22
450x450x32x20	287	3960	3960	3920	3710	3460	3190	2930	2690	2470	2280	2100	1810	1590	1410	1260	1140	1040
450x450x40x25	355	5030	5030	4970	4710	4410	4110	3820	3550	3310	3090	2890	2550	2270	2040	1850	1690	1560
450x450x50x32	441	6200	6200	6140	5840	5520	5200	4900	4620	4370	4130	3910	3530	3210	2930	2690	2480	2300
450x450x60x40	528	7220	7220	7160	6860	6540	6230	5930	5660	5400	5160	4940	4530	4180	3870	3590	3350	3130
450x450x75x50	648	7690	7690	7690	7450	7210	6970	6740	6530	6320	6130	5940	5590	5270	4980	4710	4460	4230
450x450x90x60	763	8750	8750	8750	8560	8330	8120	7910	7710	7520	7330	7160	6820	6500	6200	5920	5660	5420
450x450x100x60	824	9310	9310	9310	9160	8950	8750	8560	8370	8190	8010	7840	7510	7200	6910	6630	6370	6130
500x500x32x25	337	4960	4960	4950	4720	4440	4140	3830	3530	3260	3000	2780	2390	2090	1850	1660	1500	1360
500x500x40x25	396	6170	6170	6160	5880	5550	5200	4850	4520	4210	3920	3670	3220	2860	2570	2320	2120	1950
500x500x50x32	493	7780	7780	7770	7430	7050	6650	6270	5910	5570	5260	4970	4470	4040	3680	3370	3110	2880
500x500x60x40	590	9090	9090	9090	8730	8330	7940	7560	7190	6860	6540	6250	5720	5260	4860	4500	4190	3910
500x500x75x50	726	9750	9750	9750	9500	9190	8880	8580	8290	8020	7760	7520	7060	6640	6260	5910	5590	5300
500x500x90x60	857	11200	11200	11200	11000	10700	10400	10100	9820	9570	9320	9090	8640	8220	7840	7470	7130	6820
500x500x100x60	926	11900	11900	11900	11800	11500	11200	10900	10700	10400	10200	9980	9550	9140	8760	8390	8050	7730
550x550x32x25	372	5920	5920	5920	5730	5440	5110	4770	4420	4090	3790	3500	3020	2630	2320	2070	1860	1690
550x550x40x25	438	7410	7410	7410	7160	6810	6420	6020	5630	5250	4900	4580	4020	3560	3180	2870	2610	2390
550x550x50x32	545	9420	9420	9420	9110	8690	8230	7770	7330	6910	6520	6160	5520	4980	4530	4140	3810	3520
550x550x60x40	653	11200	11200	11200	10800	10400	9900	9420	8970	8540	8130	7760	7080	6490	5980	5530	5140	4790
550x550x75x50	805	12000	12000	12000	11800	11400	11000	10700	10300	9950	9620	9310	8720	8190	7710	7270	6870	6500
550x550x90x60	951	13900	13900	13900	13700	13300	12900	12600	12200	11900	11600	11300	10700	10200	9670	9210	8780	8380
550x550x100x60	1030	14800	14800	14800	14700	14300	14000	13600	13300	13000	12700	12400	11800	11300	10800	10400	9930	9530
600x600x40x25	479	8750	8750	8750	8560	8190	7770	7330	6880	6440	6030	5640	4950	4370	3900	3510	3180	2910
600x600x50x32	597	11200	11200	11200	10900	10500	9950	9430	8910	8410	7940	7500	6720	6050	5490	5010	4600	4250
600x600x60x40	716	13500	13500	13500	13200	12700	12100	11500	11000	10500	9950	9480	8630	7890	7250	6690	6210	5780
600x600x75x50	883	14600	14600	14600	14400	14000	13500	13000	12600	12100	11700	11300	10600	9930	9330	8780	8280	7830
600x600x90x60	1050	16800	16800	16800	16700	16200	15800	15300	14900	14500	14100	13700	13000	12300	11700	11100	10600	10100
600x600x100x60	1130	18100	18100	18100	18000	17500	17100	16700	16200	15800	15500	15100	14400	13700	13100	12600	12000	11500

SECTION 3 PLATE COLUMNS

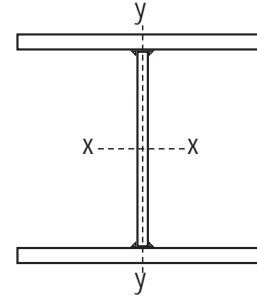


Table 3.C.3 Design Moment Capacities for Members - Without Full Lateral Restraint

Bending about X-axis

Designation	Mass per metre kg/m	Design Member Moment Capacity ϕMb (kN.m)																	
		Effective Length L_e (m)																	
		0	1	2	3	4	5	6	7	8	9	10	12	14	16	18	20	22	
650x650x40x32	551	10400	10400	10400	10300	9910	9460	8970	8460	7960	7470	7010	6170	5470	4880	4390	3980	3630	
650x650x50x32	648	13000	13000	13000	12800	12400	11800	11300	10700	10100	9540	9020	8080	7270	6580	5990	5490	5060	
650x650x60x40	779	15900	15900	15900	15600	15100	14500	13800	13200	12500	11900	11400	10300	9430	8650	7970	7380	6860	
650x650x75x50	962	17400	17400	17400	17300	16800	16200	15700	15100	14600	14100	13600	12700	11900	11100	10500	9860	9310	
650x650x90x60	1140	20100	20100	20100	20000	19500	19000	18400	17900	17400	16900	16400	15500	14700	14000	13300	12600	12000	
650x650x100x60	1230	21600	21600	21600	21600	21100	20500	20000	19500	19000	18500	18100	17200	16400	15700	15000	14300	13700	
700x700x40x32	595	12000	12000	12000	11900	11500	11100	10500	9990	9440	8900	8370	7400	6560	5850	5250	4750	4320	
700x700x50x32	700	15000	15000	15000	14900	14400	13900	13200	12600	12000	11300	10700	9610	8640	7810	7110	6500	5980	
700x700x60x40	842	18300	18300	18300	18200	17600	16900	16200	15500	14800	14100	13400	12200	11100	10200	9390	8680	8060	
700x700x75x50	1040	20400	20400	20400	20400	19800	19200	18600	17900	17300	16700	16100	15000	14000	13100	12300	11600	10900	
700x700x90x60	1230	23700	23700	23700	23700	23100	22500	21800	21200	20600	20000	19400	18400	17400	16500	15600	14800	14100	
700x700x100x60	1330	25500	25500	25500	25500	25000	24400	23700	23100	22500	21900	21400	20300	19400	18500	17600	16800	16100	
750x750x50x32	752	17100	17100	17100	17100	16600	16000	15400	14700	14000	13300	12600	11300	10200	9210	8360	7640	7010	
750x750x60x40	904	21000	21000	21000	20900	20300	19600	18900	18100	17300	16500	15700	14300	13000	11900	11000	10100	9390	
750x750x75x50	1120	23700	23700	23700	23700	23200	22500	21800	21000	20300	19600	18900	17600	16400	15300	14400	13500	12700	
750x750x90x60	1330	27600	27600	27600	27600	27000	26300	25600	24900	24100	23400	22700	21500	20300	19200	18200	17300	16400	
750x750x100x60	1440	29700	29700	29700	29700	29200	28500	27800	27100	26400	25700	25000	23800	22600	21500	20500	19600	18700	
800x800x50x40	848	19800	19800	19800	19800	19400	18700	18100	17300	16500	15800	15000	13500	12200	11100	10000	9180	8430	
800x800x60x40	967	23700	23700	23700	23700	23200	22500	21700	20800	19900	19100	18200	16600	15100	13800	12700	11700	10900	
800x800x75x50	1200	27200	27200	27200	27200	26800	26000	25200	24400	23600	22800	22000	20400	19000	17800	16600	15600	14700	
800x800x90x60	1420	31700	31700	31700	31700	31300	30500	29700	28800	28000	27200	26400	24900	23500	22200	21000	19900	18900	
800x800x100x60	1540	34300	34300	34300	34300	33800	33000	32200	31400	30600	29800	29000	27500	26100	24800	23700	22600	21500	
850x850x50x40	903	22200	22200	22200	22200	21800	21200	20500	19700	18900	18100	17300	15600	14100	12800	11600	10600	9750	
850x850x60x40	1030	26600	26600	26600	26600	26200	25500	24600	23800	22800	21900	20900	19100	17500	16000	14700	13500	12500	
850x850x75x50	1280	30700	30700	30700	30700	30400	29600	28800	27900	27000	26100	25200	23400	21800	20400	19100	17900	16800	
850x850x90x60	1520	36200	36200	36200	36200	35800	35000	34100	33200	32200	31300	30300	28600	27000	25400	24100	22800	21600	
850x850x100x60	1640	39100	39100	39100	39100	38800	37900	37000	36100	35100	34200	33300	31600	30000	28500	27100	25800	24600	
900x900x60x40	1090	29700	29700	29700	29700	29400	28700	27800	26900	25900	24900	23900	21900	20000	18300	16800	15500	14300	
900x900x75x50	1350	34300	34300	34300	34300	34100	33300	32500	31500	30500	29600	28600	26600	24800	23200	21700	20300	19000	
900x900x90x60	1610	40900	40900	40900	40900	40700	39800	38800	37800	36800	35700	34700	32600	30700	29000	27400	25900	24600	
900x900x100x60	1740	44300	44300	44300	44300	44100	43200	42200	41100	40100	39000	38000	36000	34100	32400	30800	29300	27900	

SECTION 4 PLATE COLUMNS

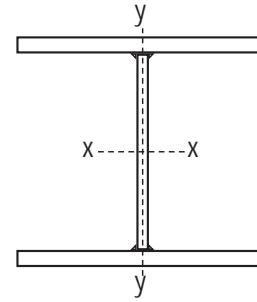


Table 4.C.1 (a) Design Member Capacities in Axial Compression

Buckling about x-axis

Designation	Mass per metre kg/m	Design Member Capacity in Axial Compression ϕN_c (kN) for Buckling About x-Axis														
		Effective Length L_e (m)														
		0	2	4	6	8	10	12	15	18	21	24	27	30	33	36
250x250x16x12	83.3	6590	6360	5600	4270	2860	1930	1380	897	630	467	360	285	232	193	162
250x250x20x12	98.3	7770	7500	6610	5040	3380	2290	1630	1060	744	551	425	337	274	228	192
250x250x25x16	123	9750	9390	8210	6150	4070	2740	1950	1270	891	660	508	404	328	272	229
250x250x32x20	155	12200	11800	10200	7490	4890	3280	2330	1520	1060	788	607	482	392	325	274
250x250x40x25	190	15100	14400	12400	8860	5700	3810	2700	1750	1230	911	701	557	453	375	316
250x250x50x32	234	18500	17700	14900	10300	6520	4330	3060	1990	1400	1030	795	631	513	426	359
250x250x60x40	276	21900	20800	17200	11500	7150	4730	3340	2170	1520	1120	866	687	558	463	390
300x300x25x16	149	11800	11500	10600	8910	6660	4730	3420	2250	1580	1180	907	720	586	486	410
300x300x32x20	188	14900	14500	13200	11000	8150	5740	4140	2720	1920	1420	1100	870	708	587	495
300x300x40x25	232	18300	17800	16200	13400	9690	6760	4860	3190	2240	1660	1280	1020	829	688	580
300x300x50x32	286	22600	22000	19800	16000	11400	7850	5630	3680	2590	1920	1480	1180	957	793	669
300x300x60x40	339	26800	26000	23300	18400	12800	8750	6250	4080	2870	2130	1640	1300	1060	878	740
300x300x75x50	412	29300	28400	25400	20200	14000	9630	6880	4500	3160	2340	1810	1430	1170	968	816
300x300x80x50	432	30700	29700	26500	20900	14400	9870	7040	4600	3230	2400	1850	1470	1190	989	834
350x350x20x16	149	11800	11600	10900	9740	8020	6110	4560	3050	2160	1610	1240	987	803	667	562
350x350x25x16	175	13800	13600	12800	11500	9460	7220	5390	3610	2560	1900	1470	1170	951	790	666
350x350x32x20	221	17500	17200	16100	14300	11700	8870	6590	4400	3120	2320	1790	1420	1160	962	811
350x350x40x25	273	21600	21200	19800	17500	14200	10600	7840	5220	3690	2740	2120	1680	1370	1140	959
350x350x50x32	338	26700	26200	24400	21400	17000	12500	9200	6100	4310	3200	2470	1970	1600	1330	1120
350x350x60x40	402	31800	31200	28900	25000	19500	14200	10400	6860	4840	3590	2770	2200	1790	1490	1250
350x350x75x50	491	34900	34200	31800	27600	21700	15800	11600	7680	5430	4030	3110	2470	2010	1670	1410
350x350x90x60	575	40800	40000	36900	31600	24100	17300	12600	8310	5860	4350	3360	2670	2170	1800	1520
350x350x100x60	620	44100	43100	39600	33600	25300	18000	13100	8610	6060	4500	3470	2760	2240	1860	1570
400x400x20x16	171	12100	11800	10700	9420	7970	6490	5220	3790	2830	2180	1720	1390	1150	962	817
400x400x25x16	201	15800	15300	13800	12000	10000	8040	6390	4600	3420	2620	2070	1670	1370	1150	976
400x400x32x20	254	20100	19900	18900	17400	15200	12400	9620	6600	4720	3520	2720	2170	1770	1470	1240
400x400x40x25	314	24800	24600	23400	21400	18600	15000	11600	7880	5620	4190	3240	2580	2100	1750	1470
400x400x50x32	389	30800	30400	28900	26300	22600	17900	13700	9320	6640	4950	3820	3040	2480	2060	1740
400x400x60x40	465	36800	36300	34300	31100	26400	20700	15700	10600	7520	5600	4330	3440	2800	2330	1960
400x400x75x50	569	40500	40000	37900	34500	29400	23200	17700	12000	8540	6360	4920	3910	3190	2650	2230
400x400x90x60	669	47500	46900	44200	39900	33500	26000	19600	13200	9360	6970	5380	4280	3490	2890	2440
400x400x100x60	722	51300	50600	47600	42800	35600	27300	20500	13800	9760	7260	5610	4460	3630	3020	2540

SECTION 4 PLATE COLUMNS

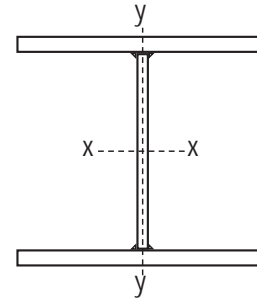


Table 4.C.1 (b) Design Member Capacities in Axial Compression

Buckling about y-axis

Designation	Mass per metre kg/m	Design Member Capacity in Axial Compression ϕN_c (kN) for Buckling About y-Axis															
		Effective Length L_e (m)															
		0	1	2	3	4	5	6	7	8	10	12	14	16	18	20	22
250x250x16x12	83.3	6590	6430	5890	4940	3670	2590	1870	1400	1090	707	496	367	282	224	182	151
250x250x20x12	98.3	7770	7600	6990	5940	4500	3210	2330	1750	1360	882	619	458	353	280	228	189
250x250x25x16	123	9750	9530	8770	7450	5630	4020	2910	2190	1700	1100	774	573	441	350	285	236
250x250x32x20	155	12200	12000	11000	9410	7160	5130	3720	2800	2170	1410	990	733	564	448	364	302
250x250x40x25	190	15100	14700	13600	11600	8900	6400	4650	3490	2710	1760	1240	916	706	560	456	378
250x250x50x32	234	18500	18100	16700	14400	11100	7980	5810	4370	3390	2210	1550	1150	883	701	570	473
250x250x60x40	276	21900	21400	19800	17100	13200	9560	6970	5240	4070	2650	1860	1380	1060	842	685	568
300x300x25x16	149	11800	11600	11000	9890	8280	6410	4830	3680	2880	1880	1320	981	756	600	488	405
300x300x32x20	188	14900	14700	13800	12500	10500	8160	6160	4710	3680	2410	1690	1260	967	768	625	519
300x300x40x25	232	18300	18100	17100	15500	13000	10200	7690	5880	4600	3010	2120	1570	1210	961	782	648
300x300x50x32	286	22600	22300	21100	19100	16200	12700	9600	7340	5750	3760	2650	1960	1510	1200	978	811
300x300x60x40	339	26800	26500	25100	22700	19300	15100	11500	8810	6900	4520	3180	2360	1820	1440	1170	974
300x300x75x50	412	29300	29000	27600	25400	22200	18000	14000	10900	8540	5620	3960	2940	2270	1800	1470	1220
300x300x80x50	432	30700	30400	29000	26700	23400	19100	14900	11500	9090	5990	4220	3130	2410	1920	1560	1300
350x350x20x16	149	11800	11700	11100	10300	9060	7450	5840	4550	3590	2370	1670	1240	954	759	617	512
350x350x25x16	175	13800	13700	13100	12200	10900	9060	7190	5630	4460	2950	2080	1540	1190	947	771	639
350x350x32x20	221	17500	17300	16600	15400	13700	11500	9170	7200	5700	3770	2660	1980	1520	1210	986	818
350x350x40x25	273	21600	21400	20500	19100	17000	14300	11400	8980	7120	4710	3330	2470	1910	1510	1230	1020
350x350x50x32	338	26700	26500	25400	23700	21200	17800	14300	11200	8900	5890	4160	3090	2380	1890	1540	1280
350x350x60x40	402	31800	31500	30200	28200	25300	21300	17100	13500	10700	7070	4990	3710	2860	2270	1850	1540
350x350x75x50	491	34900	34700	33400	31400	28600	24800	20500	16400	13200	8780	6220	4620	3570	2840	2310	1920
350x350x90x60	575	40800	40600	39200	36900	33700	29400	24300	19600	15700	10500	7460	5540	4280	3400	2770	2300
350x350x100x60	620	44100	43900	42300	40000	36600	32100	26700	21600	17400	11700	8270	6150	4750	3780	3080	2550
400x400x20x16	171	12100	12000	11000	9960	8760	7470	6220	5150	4270	3020	2220	1690	1330	1070	878	734
400x400x25x16	201	15800	15600	14300	12900	11300	9550	7910	6520	5390	3800	2790	2120	1670	1340	1100	919
400x400x32x20	254	20100	20000	19300	18300	16800	14900	12500	10200	8230	5530	3930	2920	2260	1800	1460	1210
400x400x40x25	314	24800	24700	23900	22700	20900	18500	15600	12700	10300	6910	4910	3650	2820	2250	1830	1520
400x400x50x32	389	30800	30700	29700	28100	25900	23000	19400	15800	12800	8640	6140	4570	3530	2810	2290	1900
400x400x60x40	465	36800	36600	35400	33600	31000	27500	23200	19000	15400	10400	7370	5490	4240	3370	2750	2280
400x400x75x50	569	40500	40400	39200	37400	34900	31500	27400	22900	18800	12800	9160	6830	5280	4200	3420	2840
400x400x90x60	669	47500	47400	46100	44000	41200	37300	32500	27300	22500	15400	11000	8190	6340	5040	4110	3410
400x400x100x60	722	51300	51200	49800	47600	44600	40600	35500	30000	24800	17000	12200	9090	7030	5600	4560	3790

SECTION 4 PLATE COLUMNS

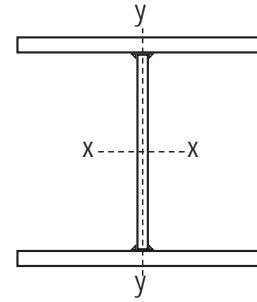


Table 4.C.2 (a) Design Member Capacities in Axial Compression

Buckling about x-axis

Designation	Mass per metre kg/m	Design Member Capacity in Axial Compression ϕN_c (kN) for Buckling About x-Axis														
		Effective Length L_e (m)														
		0	2	4	6	8	10	12	15	18	21	24	27	30	33	36
450x450x32x20	287	22700	22500	21700	20400	18500	15900	13000	9300	6740	5060	3920	3130	2550	2120	1790
450x450x40x25	355	28100	27900	26800	25100	22700	19400	15800	11200	8090	6060	4700	3750	3060	2540	2140
450x450x50x32	441	34900	34600	33200	31000	27900	23600	19000	13300	9620	7200	5580	4450	3630	3010	2540
450x450x60x40	528	41700	41400	39600	36900	32900	27500	21900	15300	11000	8220	6360	5070	4130	3430	2900
450x450x75x50	648	46000	45700	43800	40900	36700	31000	24900	17500	12600	9430	7310	5820	4750	3940	3330
450x450x90x60	763	54200	53800	51400	47800	42400	35300	28000	19500	14000	10400	8080	6440	5250	4360	3680
450x450x100x60	824	58600	58100	55500	51400	45400	37500	29600	20400	14700	11000	8470	6750	5500	4570	3860
500x500x32x25	337	26600	26500	25700	24400	22600	20200	17200	12700	9400	7100	5530	4410	3600	3000	2530
500x500x40x25	396	31400	31300	30300	28800	26600	23800	20200	15000	11100	8380	6520	5210	4250	3540	2990
500x500x50x32	493	39000	38800	37600	35600	32900	29100	24600	18100	13300	10000	7790	6220	5080	4220	3560
500x500x60x40	590	46700	46500	44900	42400	39000	34300	28700	20900	15300	11500	8940	7130	5820	4840	4080
500x500x75x50	726	51600	51400	49700	47100	43500	38600	32600	24000	17600	13300	10300	8250	6740	5600	4730
500x500x90x60	857	60900	60600	58500	55300	50700	44500	37200	27000	19700	14900	11500	9210	7510	6240	5270
500x500x100x60	926	65800	65500	63200	59600	54500	47600	39600	28600	20800	15700	12200	9700	7920	6580	5550
550x550x32x25	372	29400	29400	28600	27400	25800	23600	20900	16300	12300	9430	7380	5910	4830	4020	3400
550x550x40x25	438	34600	34600	33600	32300	30400	27900	24700	19300	14600	11200	8730	6990	5720	4760	4020
550x550x50x32	545	43100	43000	41800	40100	37600	34400	30200	23400	17600	13400	10500	8390	6860	5710	4820
550x550x60x40	653	51700	51600	50100	47900	44800	40700	35500	27200	20400	15500	12100	9670	7900	6570	5550
550x550x75x50	805	57200	57100	55500	53200	50000	45700	40300	31300	23600	18000	14100	11300	9210	7660	6470
550x550x90x60	951	67600	67500	65500	62700	58700	53300	46500	35600	26600	20300	15800	12700	10300	8600	7270
550x550x100x60	1030	73100	72900	70800	67600	63200	57200	49700	37900	28300	21500	16700	13400	10900	9100	7690
600x600x40x25	479	37900	37900	37000	35800	34100	31800	29000	23700	18500	14400	11300	9120	7470	6230	5270
600x600x50x32	597	47200	47200	46100	44500	42300	39400	35600	28900	22500	17400	13700	11000	9000	7500	6340
600x600x60x40	716	56600	56600	55200	53200	50500	46800	42200	33900	26100	20200	15800	12700	10400	8670	7330
600x600x75x50	883	62800	62800	61300	59200	56400	52600	47700	38900	30300	23500	18500	14900	12200	10200	8590
600x600x90x60	1050	74300	74300	72500	69900	66300	61600	55500	44700	34600	26700	21000	16800	13800	11500	9700
600x600x100x60	1130	80400	80400	78400	75500	71500	66300	59600	47800	36800	28400	22300	17900	14600	12200	10300

SECTION 4 PLATE COLUMNS

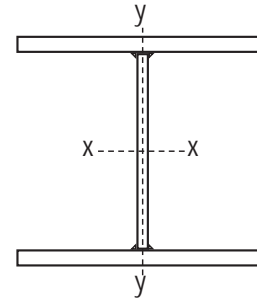


Table 4.C.2 (b) Design Member Capacities in Axial Compression

Buckling about y-axis

Designation	Mass per metre	Design Member Capacity in Axial Compression ϕN_c (kN) for Buckling About y-Axis															
		Effective Length L_e (m)															
		0	1	2	3	4	5	6	7	8	10	12	14	16	18	20	22
450x450x32x20	287	22700	22600	22000	21100	19800	18100	15900	13500	11200	7710	5520	4120	3190	2540	2070	1720
450x450x40x25	355	28100	28100	27300	26100	24600	22500	19800	16800	14000	9640	6900	5150	3990	3180	2590	2150
450x450x50x32	441	34900	34900	33900	32500	30600	27900	24600	21000	17400	12000	8630	6440	4990	3970	3240	2690
450x450x60x40	528	41700	41700	40500	38900	36600	33500	29500	25100	20900	14500	10400	7740	5990	4770	3880	3230
450x450x75x50	648	46000	46000	44900	43300	41000	38100	34200	29800	25300	17800	12800	9620	7450	5940	4840	4020
450x450x90x60	763	54200	54200	52900	51000	48400	45000	40600	35500	30200	21300	15400	11500	8940	7130	5810	4830
450x450x100x60	824	58600	58600	57200	55200	52500	48900	44300	38900	33200	23600	17100	12800	9920	7910	6450	5360
500x500x32x25	337	26600	26600	26000	25100	23800	22100	19900	17300	14700	10400	7500	5620	4350	3470	2830	2350
500x500x40x25	396	31400	31400	30600	29600	28200	26300	23900	21000	18000	12900	9320	7000	5430	4330	3530	2930
500x500x50x32	493	39000	39000	38100	36800	35100	32700	29800	26200	22500	16100	11700	8750	6780	5410	4410	3670
500x500x60x40	590	46700	46700	45600	44100	42000	39200	35700	31500	27000	19300	14000	10500	8140	6490	5300	4400
500x500x75x50	726	51600	51600	50600	49100	47000	44400	41000	36800	32200	23600	17300	13000	10100	8090	6600	5490
500x500x90x60	857	60900	60900	59800	58000	55600	52500	48600	43800	38400	28200	20700	15600	12200	9700	7920	6580
500x500x100x60	926	65800	65800	64600	62800	60300	57000	52900	47800	42100	31200	22900	17300	13500	10800	8790	7310
550x550x32x25	372	29400	29400	28800	28000	26800	25300	23300	20900	18300	13400	9810	7390	5740	4590	3740	3110
550x550x40x25	438	34600	34600	34000	33000	31700	30000	27900	25300	22300	16500	12200	9200	7160	5720	4670	3880
550x550x50x32	545	43100	43100	42300	41100	39500	37400	34700	31500	27800	20600	15200	11500	8950	7150	5840	4850
550x550x60x40	653	51700	51700	50700	49300	47400	44900	41700	37800	33400	24800	18300	13800	10700	8580	7010	5830
550x550x75x50	805	57200	57200	56300	54900	53000	50600	47500	43700	39300	30100	22500	17100	13300	10700	8720	7260
550x550x90x60	951	67600	67600	66600	65000	62700	59900	56300	51900	46800	35900	26900	20500	16000	12800	10500	8710
550x550x100x60	1030	73100	73100	72100	70300	68000	65000	61200	56600	51200	39600	29800	22700	17800	14200	11600	9670
600x600x40x25	479	37900	37900	37300	36400	35200	33700	31700	29300	26500	20500	15400	11800	9200	7370	6020	5010
600x600x50x32	597	47200	47200	46500	45400	43900	42000	39600	36600	33100	25600	19300	14700	11500	9210	7530	6260
600x600x60x40	716	56600	56600	55800	54500	52700	50400	47500	43900	39700	30800	23200	17700	13800	11100	9040	7520
600x600x75x50	883	62800	62800	62000	60700	58900	56600	53800	50400	46300	37000	28400	21800	17100	13700	11200	9370
600x600x90x60	1050	74300	74300	73500	71900	69800	67200	63900	59900	55100	44200	34000	26200	20500	16500	13500	11200
600x600x100x60	1130	80400	80400	79500	77800	75600	72800	69400	65200	60200	48500	37500	29000	22800	18300	15000	12500

SECTION 4 PLATE COLUMNS

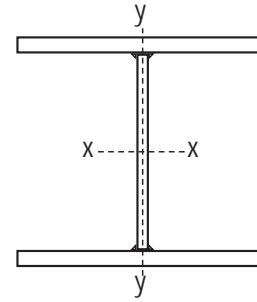


Table 4.C.3 (a) Design Member Capacities in Axial Compression

Buckling about x-axis

Designation	Mass per metre kg/m	Design Member Capacity in Axial Compression ϕN_c (kN) for Buckling About x-Axis														
		Effective Length L_e (m)														
		0	2	4	6	8	10	12	15	18	21	24	27	30	33	36
650x650x40x32	551	43600	43600	42800	41500	39800	37500	34700	29300	23500	18500	14700	11900	9750	8140	6890
650x650x50x32	648	51300	51300	50300	48800	46800	44200	40900	34500	27700	21900	17400	14000	11500	9610	8140
650x650x60x40	779	61600	61600	60400	58500	56000	52700	48600	40700	32500	25500	20200	16300	13400	11200	9440
650x650x75x50	962	68400	68400	67100	65200	62500	59100	54800	46600	37600	29800	23700	19100	15700	13100	11100
650x650x90x60	1140	81000	81000	79500	77000	73800	69600	64200	54000	43200	34000	27000	21800	17900	14900	12600
650x650x100x60	1230	87600	87600	85900	83200	79700	75000	69100	57900	46200	36300	28800	23200	19000	15900	13400
700x700x40x32	595	47100	47100	46400	45200	43600	41500	38900	34000	28200	22700	18200	14800	12200	10200	8640
700x700x50x32	700	55400	55400	54500	53100	51300	48900	45900	40100	33300	26800	21600	17500	14400	12100	10200
700x700x60x40	842	66600	66600	65500	63800	61500	58500	54700	47500	39200	31400	25200	20400	16800	14100	11900
700x700x75x50	1040	73900	73900	72900	71000	68600	65500	61600	54100	45300	36700	29600	24100	19800	16600	14100
700x700x90x60	1230	87700	87700	86400	84100	81100	77300	72500	63200	52300	42100	33800	27500	22600	18900	16000
700x700x100x60	1330	94900	94900	93400	90900	87600	83400	78100	67900	56100	45100	36200	29300	24200	20200	17100
750x750x50x32	752	59500	59500	58800	57400	55700	53500	50700	45400	38900	32100	26200	21500	17800	14900	12600
750x750x60x40	904	71500	71500	70600	69000	66800	64100	60700	54000	46000	37800	30700	25100	20700	17400	14700
750x750x75x50	1120	79500	79500	78600	76900	74600	71800	68200	61400	53000	44000	36100	29600	24500	20600	17500
750x750x90x60	1330	94400	94400	93300	91100	88400	84900	80500	72000	61600	50900	41500	34000	28100	23600	20000
750x750x100x60	1440	102000	102000	101000	98500	95500	91600	86800	77600	66200	54600	44400	36400	30100	25200	21400
800x800x50x40	848	67100	67100	66400	65000	63200	61000	58200	52900	46100	38800	32100	26400	22000	18500	15700
800x800x60x40	967	76500	76500	75700	74200	72100	69600	66400	60400	52700	44400	36700	30300	25200	21200	18000
800x800x75x50	1200	85100	85100	84300	82700	80600	77900	74700	68400	60500	51600	43100	35700	29800	25100	21400
800x800x90x60	1420	101000	101000	100000	98100	95500	92300	88300	80500	70800	60000	49800	41200	34300	28800	24500
800x800x100x60	1540	109000	109000	108000	106000	103000	99700	95300	86900	76200	64500	53400	44200	36700	30900	26300
850x850x50x40	903	71400	71400	70800	69500	67800	65700	63100	58200	51900	44700	37600	31300	26200	22100	18800
850x850x60x40	1030	81500	81500	80800	79300	77400	75000	72100	66500	59400	51200	43100	35900	30100	25400	21600
850x850x75x50	1280	90700	90700	90000	88500	86500	84000	81000	75300	67900	59300	50400	42400	35600	30100	25700
850x850x90x60	1520	108000	108000	107000	105000	103000	99600	95900	88800	79700	69200	58500	49000	41100	34700	29600
850x850x100x60	1640	117000	117000	116000	114000	111000	108000	104000	95900	86000	74500	63000	52700	44200	37300	31800
900x900x60x40	1090	86400	86400	85900	84500	82700	80400	77700	72500	65900	58000	49700	42000	35400	30000	25700
900x900x75x50	1350	96300	96300	95800	94300	92400	90000	87200	81900	75100	66900	58000	49500	42000	35700	30600
900x900x90x60	1610	115000	115000	114000	112000	110000	107000	103000	96800	88400	78400	67600	57400	48600	41300	35300
900x900x100x60	1740	124000	124000	123000	121000	119000	116000	112000	105000	95500	84500	72800	61800	52300	44400	38000

SECTION 4 PLATE COLUMNS

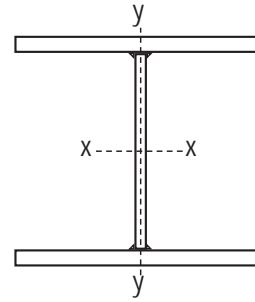


Table 4.C.3 (b) Design Member Capacities in Axial Compression

Buckling about y-axis

Designation	Mass per metre kg/m	Design Member Capacity in Axial Compression ϕN_c (kN) for Buckling About y-Axis															
		Effective Length L_e (m)															
		0	1	2	3	4	5	6	7	8	10	12	14	16	18	20	22
650x650x40x32	551	43600	43600	43100	42100	40900	39200	37200	34800	31900	25300	19300	14800	11600	9320	7630	6350
650x650x50x32	648	51300	51300	50700	49700	48200	46500	44300	41600	38300	30900	23800	18400	14500	11600	9510	7920
650x650x60x40	779	61600	61600	60900	59600	57900	55800	53100	49900	46000	37100	28600	22100	17400	13900	11400	9510
650x650x75x50	962	68400	68400	67700	66400	64800	62700	60100	56900	53100	44100	34800	27200	21500	17300	14200	11800
650x650x90x60	1140	81000	81000	80300	78800	76800	74400	71300	67600	63200	52600	41700	32600	25800	20800	17000	14200
650x650x100x60	1230	87600	87600	86900	85300	83200	80600	77400	73500	68900	57700	45900	36100	28600	23000	18900	15800
700x700x40x32	595	47100	47100	46600	45700	44500	43000	41200	38900	36200	29800	23400	18200	14400	11500	9460	7890
700x700x50x32	700	55400	55400	54900	53900	52600	50900	48900	46400	43400	36200	28800	22500	17800	14400	11800	9830
700x700x60x40	842	66600	66600	66000	64800	63200	61200	58700	55700	52200	43500	34500	27100	21400	17300	14200	11800
700x700x75x50	1040	73900	73900	73400	72200	70600	68600	66200	63300	59800	51300	41700	33100	26400	21400	17600	14700
700x700x90x60	1230	87700	87700	87200	85700	83800	81500	78700	75200	71200	61100	49900	39700	31700	25600	21100	17600
700x700x100x60	1330	94900	94900	94300	92700	90800	88300	85300	81700	77500	66900	54900	43900	35100	28400	23400	19500
750x750x50x32	752	59500	59500	59100	58100	56900	55300	53400	51100	48400	41600	34000	27100	21600	17500	14400	12000
750x750x60x40	904	71500	71500	71100	69900	68400	66500	64200	61400	58100	50000	40800	32500	25900	21000	17300	14400
750x750x75x50	1120	79500	79500	79100	77900	76400	74500	72300	69600	66400	58300	48800	39600	31900	26000	21400	17900
750x750x90x60	1330	94400	94400	94000	92600	90800	88600	85900	82700	79000	69600	58300	47400	38300	31200	25700	21500
750x750x100x60	1440	102000	102000	102000	100000	98300	96000	93200	89800	85900	76000	64100	52300	42300	34500	28500	23900
800x800x50x40	848	67100	67100	66700	65700	64300	62700	60700	58300	55500	48400	40100	32300	26000	21100	17400	14500
800x800x60x40	967	76500	76500	76200	75000	73600	71800	69600	67000	64000	56300	47200	38300	30900	25200	20800	17400
800x800x75x50	1200	85100	85100	84800	83700	82200	80400	78300	75700	72800	65300	56000	46400	37900	31100	25700	21600
800x800x90x60	1420	101000	101000	101000	99400	97700	95600	93100	90100	86600	77800	66900	55500	45400	37300	30900	25900
800x800x100x60	1540	109000	109000	109000	108000	106000	104000	101000	97800	94100	84900	73400	61200	50200	41300	34200	28700
850x850x50x40	903	71400	71400	71200	70100	68900	67300	65400	63200	60500	53900	45800	37600	30600	25000	20700	17300
850x850x60x40	1030	81500	81500	81200	80100	78700	77000	75000	72500	69700	62500	53700	44500	36400	29800	24700	20700
850x850x75x50	1280	90700	90700	90500	89400	88000	86300	84200	81800	79000	72100	63200	53500	44400	36700	30500	25700
850x850x90x60	1520	108000	108000	108000	106000	105000	103000	100000	97400	94100	85900	75500	64000	53100	44000	36600	30800
850x850x100x60	1640	117000	117000	116000	115000	113000	111000	109000	106000	102000	93600	82700	70400	58600	48600	40500	34100
900x900x60x40	1090	86400	86400	86300	85200	83900	82200	80300	78000	75300	68600	60200	50900	42200	34800	29000	24400
900x900x75x50	1350	96300	96300	96200	95100	93700	92100	90200	87900	85300	78700	70400	60700	51100	42700	35700	30200
900x900x90x60	1610	115000	115000	114000	113000	112000	110000	107000	105000	102000	93800	84000	72600	61200	51200	42900	36200
900x900x100x60	1740	124000	124000	124000	122000	121000	119000	116000	114000	110000	102000	91800	79700	67500	56600	47400	40100

SECTION 5 DESIGN EXAMPLES

	kg/m	3	4	5	6	7	8	9	10	12	14	16	18	20	22	
840x300x20x16	195	11300	8460	6770	5640	4840	4230	3760	3390	2820	2420	2120	1880	1690	1540	9260
		11800	8870	6640	4610	3390	2590	2050	1660	1150	846	648	512	415	343	

5.1 SIMPLY SUPPORTED BEAM WITH UNIFORMLY DISTRIBUTED LOAD

Determine preliminary beam sizes for the following:

Span = 12 m, Simply Supported, UDL.

The beam can be considered to have full lateral restraint throughout the span.

Nominal Dead Load $G = 66$ kN/m (including allowance for beam self weight),

Nominal Live Load $Q = 42$ kN/m.

Total deflection limit for $G + 0.7Q = \text{Span}/250$.

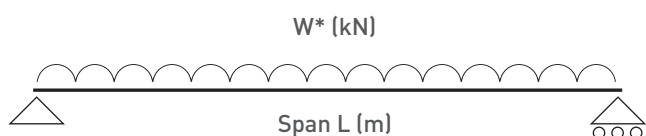
Determining design Loading W^* on span to enable use of tables in section 2:

$$W^* (\text{strength}) = \max (1.2 \times G + 1.5 \times Q, 1.35 \times G) \times L$$

$$W^* (\text{strength}) = \max (1.2 \times 66 + 1.5 \times 42, 1.35 \times 66) \times 12 = \mathbf{1706 \text{ kN}}$$

$$W^* (\text{serviceability}) = (G + 0.7 \times Q) \times L$$

$$W^* (\text{serviceability}) = (66 + 0.7 \times 42) \times 12 = \mathbf{1145 \text{ kN}}$$



From Table 2.B.2, (extract above) for an 840x300x20x16 (195 kg/m) BISALLOY® Structural 80 steel beam and for a span of 12 m, the limiting strength limit state loads are $W^*_{L1} = 2820$ kN (based on midspan moment) and $W^*_{L2} = 9260$ kN (based on end shear). As these values are greater than 1706 kN, the beam is satisfactory in terms of strength.

Also from Table 2.B.2, the corresponding serviceability load limit W^*_s is 1150 kN. As this is greater than 1145 kN, the BISALLOY® Structural 80 steel beam is also satisfactory in relation to Span/250 total deflection and first yield checks.

Alternative Welded Beam sections for the same criteria are 900WB257 and 1000WB215 (both Grade 300).

The preliminary beam designs may be compared as follows:

Designation	kg/m	Depth mm
900WB257	257	916
840x300x20x16	195	840
Saving:	62 kg/m = 24 %	76 mm

Designation	kg/m	Depth mm
1000WB215	215	1000
840x300x20x16	195	840
Saving:	20 kg/m = 9 %	160 mm

SECTION 5 DESIGN EXAMPLES

	kg/m	3	4	5	6	7	8	9	10	12	14	16	18	20	22	
950x400x25x16	270	18800	14100	11300	9400	8060	7050	6270	5640	4700	4030	3520	3130	2820	2560	8260
		20300	15300	12200	8960	6580	5040	3980	3230	2240	1650	1260	996	807	667	
1050x300x25x16	243		13200	10500	8780	7520	6580	5850	5270	4390	3760	3290	2930	2630	2390	7410
			13900	11100	9000	6610	5060	4000	3240	2250	1650	1270	1000	810	669	

Comments: Even though the BISALLOY® Structural 80 steel beam was governed by serviceability, against a 900WB257 it still provided a significant mass saving as well as a depth reduction of 76mm. In comparison to the deeper, lighter Welded Beam option, the BISALLOY® Structural 80 steel beam was slightly lighter but significantly shallower. This depth reduction may be important in some situations.

By cambering the BISALLOY® Structural 80 steel beam for the calculated dead load deflection, the total deflection could be reduced, or alternatively a lighter BISALLOY® Structural 80 steel beam may be possible, offering further savings. The Welded Beam sections are governed by bending strength in this case, so cambering will not lead to lighter sizes. When cambered beams are considered, rather than use W^*_s from the tables in section 2, it is recommended deflection checks are carried out for each component of load and the total serviceability load checked against first yield.

The above preliminary sizing does not include a comprehensive range of design checks. In particular, where bearing loads are applied within the span or at supports, the ability of the beam to resist these loads must be checked.

5.2 SIMPLY SUPPORTED BEAM WITH LARGE UNIFORMLY DISTRIBUTED LOAD

Determine preliminary beam sizes for the following:

Span = 8 m, Simply Supported, UDL.

The beam can be considered to have full lateral restraint throughout the span.

Nominal Dead Load $G = 360$ kN/m (including allowance for beam self weight),

Nominal Live Load $Q = 240$ kN/m.

Total deflection limit for $G + 0.7Q = \text{Span}/250$.

Determining design Loading W^* on span to enable use of tables in section 2:

$$W^* \text{ (strength)} = \max (1.2 \times G + 1.5 \times Q, 1.35 \times G) \times L$$

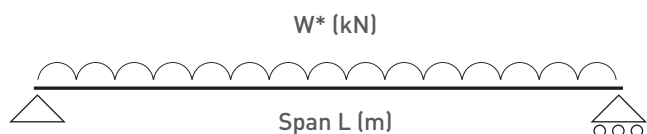
$$W^* \text{ (strength)} = \max (1.2 \times 360 + 1.5 \times 240, 1.35 \times 360) \times 8 = \mathbf{6336} \text{ kN.}$$

$$W^* \text{ (serviceability)} = (G + 0.7 \times Q) \times L$$

$$W^* \text{ (serviceability)} = (360 + 0.7 \times 240) \times 8 = \mathbf{4224} \text{ kN.}$$

From Table 2.B.2, (extract above) for a 950x400x25x16 (270 kg/m) BISALLOY® Structural 80 steel beam and for a span of 8m, the limiting strength limit state loads are $W^*_{L1} = 7050$ kN (based on midspan moment) and $W^*_{L2} = 8260$ kN (based on end shear). As these values are greater than 6336 kN, the beam is satisfactory in terms of strength.

Also from Table 2.B.2, the corresponding serviceability load limit W^*_s is 5040 kN. As this is greater than 4224 kN, the BISALLOY® Structural 80 steel beam is also satisfactory in relation to Span/250 total deflection and first yield checks.



SECTION 5 DESIGN EXAMPLES

An alternative size is a 1050x300x25x16 BISALLOY® Structural 80 steel beam (243 kg/m).

The Welded Beam section required for this loading and criteria is a 1200WB342 (Grade 400).

The preliminary beam designs may be compared as follows:

Designation	kg/m	Depth mm
1200WB342	342	1184
950x400x25x16	270	950
Saving:	72 kg/m = 21 %	234 mm

Designation	kg/m	Depth mm
1200WB342	342	1184
1050x300x25x16	243	1050
Saving:	99 kg/m = 29 %	134 mm

Comments: The BISALLOY® Structural 80 steel beam options provide significant weight and depth savings, even though the Welded Beam was of the higher grade (400). This demonstrates the advantage BISALLOY® Structural 80 steel beams can provide, particularly when loads are large

The loading in this example required one of the largest Welded Beams in the higher grade option. If the loading was a little larger again, the structural requirements may be outside the range of Welded Beams. However, the BISALLOY® Structural 80 steel beams may be fabricated to suit cases with much larger loading, illustrated by the extensive range tabulated.

As before, other checks such as the ability of the beam to resist bearing loads must be carried out and stiffeners or other design details introduced as appropriate.

5.3 SIMPLY SUPPORTED BEAM WITH LARGE POINT LOAD AT MID-SPAN

Determine preliminary beam sizes for the following:

Span = 8 m, Simply Supported, Point Load at Mid-Span.

The beam can be considered to have full lateral restraint at the end supports and at the Mid-Span.

Nominal Dead Load $G = 1500$ kN (assume this includes sufficient allowance for beam self weight),

Nominal Live Load $Q = 1050$ kN/m.

Total deflection limit for $G + 0.7Q = \text{Span}/250$.

Determining design Loading P^* :

$$P^* (\text{strength}) = \max (1.2 \times G + 1.5 \times Q, 1.35 \times G)$$

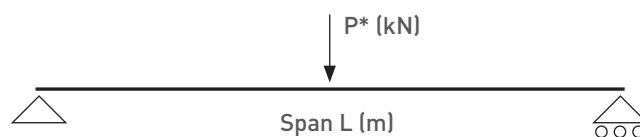
$$P^* (\text{strength}) = \max (1.2 \times 1500 + 1.5 \times 1050, 1.35 \times 1500) = \mathbf{3375 \text{ kN}}$$

$$P^* (\text{serviceability}) = (G + 0.7 \times Q)$$

$$P^* (\text{serviceability}) = (1500 + 0.7 \times 1050) = \mathbf{2235 \text{ kN}}$$

$$M^* = P^* \times L / 4 = 3375 \times 8 / 4 = 6750 \text{ kN.m}$$

$$V^* = P^* / 2 = 1688 \text{ kN}$$



SECTION 5 DESIGN EXAMPLES

	kg/m	0	1	2	3	4	5	6	7	8	9	10	12	14	16	18	20	22
950x400x25x16	270	7050	7050	6810	6220	5510	4770	4060	3430	2900	2470	2130	1620	1290	1060	898	776	683

From Table 3.B.2, (extract above) for a 950x400x25x16 (270 kg/m) BISALLOY® Structural 80 steel beam and for an effective length for bending about the x-axis of 4 m, the Design Member Moment Capacity is 5510 kN.m. However the shape of the bending moment diagram is triangular, such that $\alpha_m=1.75$ from AS 4100 Table 5.6.1. Therefore, the Design Moment is compared to the minimum of 1.75×5510 and the Design Section Moment Capacity of 7050 kN.m

ie, ensure $M^* = 6750 \text{ kN.m} \leq \min(1.75 \times 5510, 7050) = 7050 \text{ kN.m}$, OK.

Design Shear $V^* = 1688 \text{ kN} \leq \phi V_v = 4130 \text{ kN}$ (refer Table 1.B.2 (b)), OK.

As $V^* < 0.6 \phi V_v$, moment and shear interaction is OK (AS 4100 CL 5.12.3).

Check serviceability: Use Table 1.B.2 (a) to obtain $I_x = 5250 \times 10^6 \text{ mm}^4$ and $Z_x = 11100 \times 10^3 \text{ mm}^3$.

Mid-Span Deflection = $2235 \times 1000 \times 8^3 / (48 \times E \times 5250) = 22.7 \text{ mm}$ (OK, less than Span/250 limit = 32 mm).

Mid-Span maximum flange stress = $2235 \times 8 / 4 / Z_x = 403 \text{ MPa}$ (OK, less than Yield Stress of 690 MPa).

Using a similar procedure, a 1200WB455 (Grade 300) satisfies the strength and serviceability criteria.

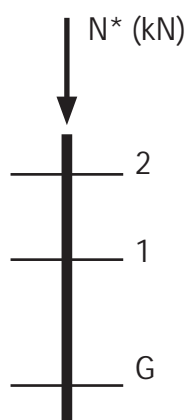
The preliminary beam designs may be compared as follows:

Designation	kg/m	Depth mm
1200WB455	455	1200
950x400x25x16	270	950
Saving:	185 kg/m = 40 %	250 mm

Comments: The BISALLOY® Structural 80 steel beam option provides significant weight and depth savings, even though the effective length was significant at 4 m.

Similar to the previous beam examples, other checks such as the ability of the beam to resist bearing loads must be carried out and stiffeners or other design details introduced as appropriate.

SECTION 5 DESIGN EXAMPLES



5.4 COLUMNS IN HIGH-RISE BUILDINGS

Determine preliminary column sizes for the lower levels of a high-rise building.

Assume:

Level 1 to 2, Height = 4 m,

Level G to 1, Height = 6 m,

Strength Limit State Design Loading applied per level is 800kN.

3 cases of (i) 10 levels, (ii) 20 levels and (iii) 50 levels of load applied above level 2.

The lateral loads on the structure are assumed to be carried by other elements such as a core or bracing. Floor framing and the slab may be assumed to provide lateral stability to the columns at each level such that the columns can be considered braced. The beams are connected to columns with 'simple' connections.

For simplicity, assume axial loads for each case are the same throughout levels G to 2.

The detailed design of such columns is best carried out using commercially available software, to cater for and determine the following:

- A range of load cases involving axial load and bending moment or eccentric load applied at each level. (Varying combinations of axial and bending design actions may result for example from pattern loading at a particular floor level, or various combinations of dead, live, wind, earthquake loading etc.)
- The effective lengths for axial compression applicable to each level and in each direction (buckling @ x-axis and y-axis); established for example using a buckling analysis.
- The effective lengths for bending considering buckling @ the x-axis.
- The moment amplification effects generally best established using a non-linear analysis.
- The check of member capacity considering axial compression and typically bi-axial bending for each combination.

However, for preliminary design of I-section columns, an approach traditionally employed is to provide sufficient design capacity in axial compression (including a suitable buffer of approx. 10%), for buckling @ the y-axis, adopting an effective length L_e equal to the floor-to-floor distance. This simplified approach is used for the following comparisons. The following BISALLOY® Structural 80 steel column sizes have been determined via reference to section 4 tables.

The results are presented on the following pages.

SECTION 5 DESIGN EXAMPLES

Case (i) 10 Levels Supported.

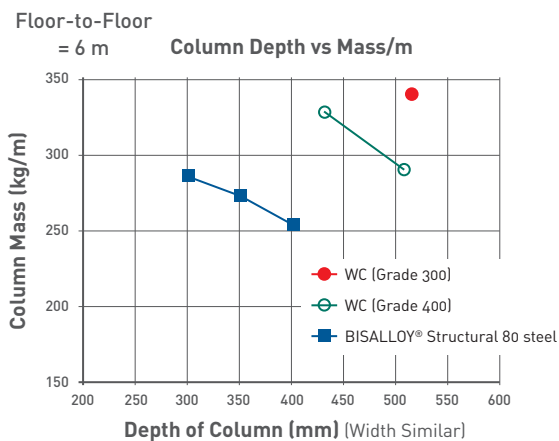
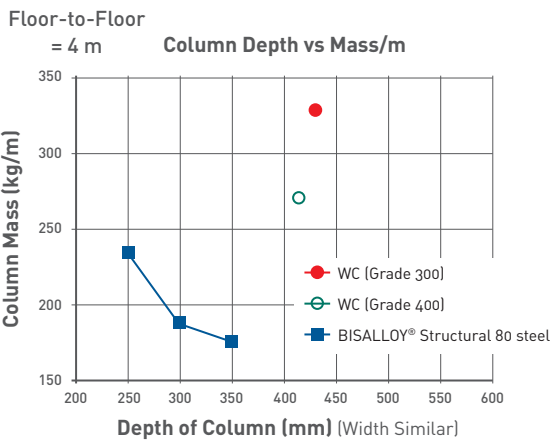
Preliminary Column Design:

No. of Levels Supported	N* Incl. prelim. design buffer.	Floor-to-Floor m	Designation	kg/m	Depth mm
10	10 x 800 + 15% = 9200 kN	4	400WC328 (Grade 300)	328	430
			400WC270 (Grade 400)	270	414
			250x250x50x32	234	250
			300x300x32x20	188	300
			350x350x25x16	175	350
		6	500WC340 (Grade 300)	340	514
			400WC328 (Grade 400)	328	430
			500WC290 (Grade 400)	290	506
			300x300x50x32	286	300
			350x350x40x25	273	350
			400x400x32x20	254	400

Note, a buffer of 15% was applied above as the effects of bending moment tend to be more significant for relatively light columns.

The results tabulated may be illustrated in graphical form:

Comments: Steel column solutions that are shallower and/or lighter are generally favoured. Solutions located towards the lower left side of the charts therefore offer benefits in terms of both size and mass/m. For this case of 10 levels of load supported, the results show BISALLOY® Structural 80 steel columns can provide significant size and mass/m reductions compared to the Welded Column alternatives.



SECTION 5 DESIGN EXAMPLES

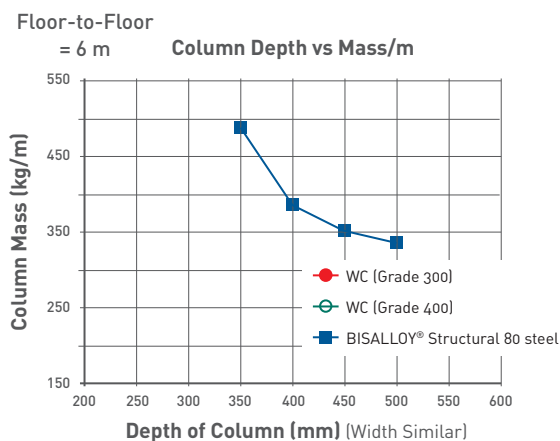
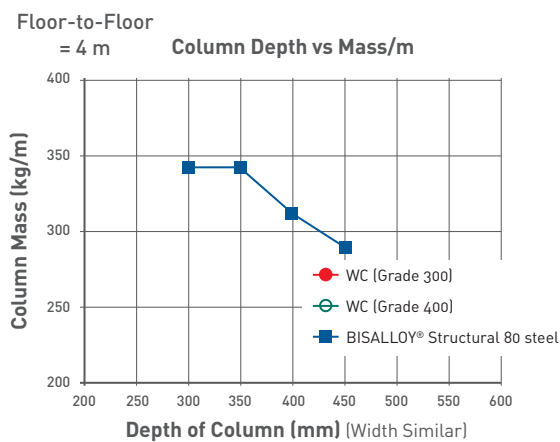
Case (ii) 20 Levels Supported.

Preliminary Column Design:

No. of Levels Supported	N* Incl. prelim. design buffer.	Floor-to-Floor m	Designation	kg/m	Depth mm
20	20 x 800 + 10% = 17600 kN	4	300x300x60x40	339	300
			350x350x50x32	338	350
			400x400x40x25	314	400
			450x450x32x20	287	450
		6	350x350x75x50	491	350
			400x400x50x32	389	400
			450x450x40x25	355	450
			500x500x32x25	337	500

For this loading and effective length, no Welded Column sections have sufficient capacity.

The results tabulated may be illustrated in graphical form:



Comments: BISALLOY® Structural 80 steel columns of moderate dimensions and mass/m are capable of supporting the 20 levels of load, for the column heights considered of 4 and 6 m.

The advantages demonstrated for BISALLOY® Structural 80 steel as columns should similarly apply to truss chord and web members for heavily loaded trusses (eg transfer trusses).

SECTION 5 DESIGN EXAMPLES

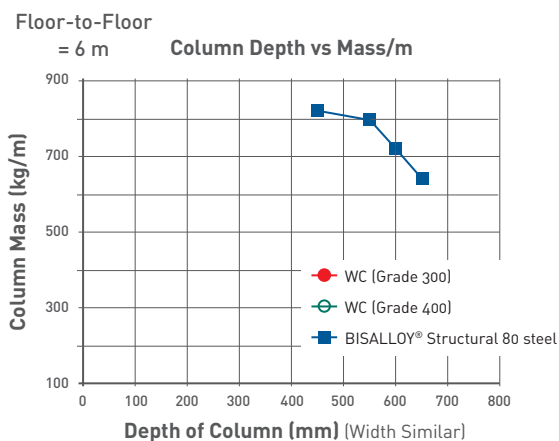
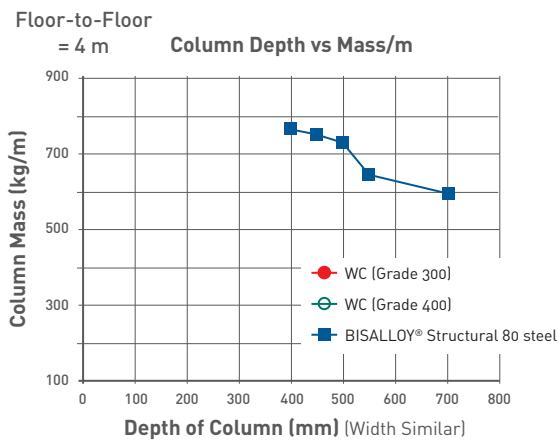
Case (iii) 50 Levels Supported.

Preliminary Column Design:

No. of Levels Supported	N* Incl. prelim. design buffer.	Floor-to-Floor	Designation	kg/m	Depth mm
50	50 x 800 + 10% = 44000 kN	4	400x400x100x60	772	400
			450x450x90x60	763	450
			500x500x75x50	726	500
			550x550x60x40	653	550
			700x700x40x32	595	700
		6	450x450x100x60	824	450
			550x550x75x50	805	550
			600x600x60x40	716	600
			650x650x50x32	648	650

The results tabulated may be illustrated in graphical form:

Conclusion: BISALLOY® Structural 80 steel column solutions can be developed to support high loads such as those developed near the base of tall buildings.



CUSTOMER:		SPECIFICATION: BISALLOY® Structural 80 steel														
CHEMICAL ANALYSIS		LADLE ANALYSIS - PERCENTAGE OF ELEMENT BY MASS														
HEAT No	BATCH No	C	P	Mn	Si	S	Ni	Cr	Mo	Cu	Al	Sn	Ti	B		
7517378	55819	0.164	0.014	0.350	0.510	0.002	0.150	0.850	0.210	0.030	0.041	0.000	0.022	0.0011		
		CA = 0.0009 N = 0.0058 NB = 0.0010 V = 0.0040 CE(IIW) = 0.4463														
HEAT TREATMENT DETAILS: 900°C/WQ / 625°C/QT																
MECHANICAL TESTS		TEST METHODS														
CUSTOMER ORG	ITEM No	SERIAL No	PLATE SIZE min x min x m WIDTH X THICKNESS X LENGTH		0.2% PROOF STRESS MPa		TENSILE STRENGTH MPa		ELONGATION %		PS/TS RATIO		HARDNESS HBW 10/3000		CHARPY V-NOTCH IMPACT TEST	
21095740P	317209	55819	2500 x 12 x 6.000		856		906		26		50		265		10 x 10 L -40 170 182 187	
21095740P	317209	55820	2500 x 12 x 6.000												NOMINAL STRIKING ENERGY 300J NOMINAL IMPACT VELOCITY 5.24 m/s	

METRIC/IMPERIAL CONVERSION FACTORS PER ASTM E380

thick = 25.4mm
thick = 6.094757 Mpa
°F = (°C x 1.8) + 32
TR. INF = 1.356818 Joules

Plate No 55819 is a BATCH TEST plate only

THE ABOVE CHEMICAL ANALYSES ARE REPRODUCED FROM FEED SUPPLIER NATA OR EQUIVALENT INTERNATIONALLY ENDORSED LABORATORIES.

FEED CERTIFICATE No. NATA No: 0632
FEED LABORATORY No. QS2181

DATED: 21/10/2016

WE CERTIFY THE ABOVE INFORMATION IS IN ACCORDANCE WITH THE RECORDS OF THE COMPANY AND CONFORMS TO THE SPECIFICATION AS STATED.

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