

9210-206

Reference booklet

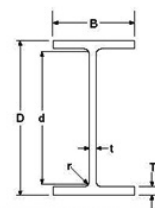
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- Tables of data
 - Table A1 – Universal beam sections
 - Table A2 – Universal column sections
 - Table A3 – Reinforcement areas
 - Table A4 – BS8110 Lever Arm Factor Chart

Table A1- Universal Beam Sections

Structural Sections to BS4: Part 1: 1993 and BS EN10056: 1999

Universal beams

Dimensions and properties to BS 4: Part 1: 1993



Designation	Mass per metre kg/m	Depth of Section D mm	Width of Section B mm	Thickness of Web t mm	Thickness of Flange T mm	Root Radius r mm	Depth between fillets d mm	Ratios for Local Buckling		Second Moment of Area	
Serial Size								Flange B/2T	Web d/t	Axis x-x cm ⁴	Axis y-y cm ⁴
† 1016 x 305 x 487	486.6	1036.1	308.5	30.0	54.1	30.0	867.9	2.85	28.9	1021400	26720
† 1016 x 305 x 437	436.9	1025.9	305.4	26.9	49.0	30.0	867.9	3.12	32.3	909900	23450
† 1016 x 305 x 393	392.7	1016.0	303.0	24.4	43.9	30.0	868.2	3.45	35.6	807700	20500
† 1016 x 305 x 349	349.4	1008.1	302.0	21.1	40.0	30.0	868.1	3.78	41.1	723100	18460
† 1016 x 305 x 314	314.3	1000.0	300.0	19.1	35.9	30.0	868.2	4.18	45.5	644200	16230
† 1016 x 305 x 272	272.3	990.1	300.0	16.5	31.0	30.0	868.1	4.84	52.6	554000	14000
† 1016 x 305 x 249	248.7	980.2	300.0	16.5	26.0	30.0	868.2	5.77	52.6	481300	11750
† 1016 x 305 x 222	222.0	970.3	300.0	16.0	21.1	30.0	868.1	7.11	54.3	408000	9546
914 x 419 x 388	388.0	921.0	420.5	21.4	36.6	24.1	799.6	5.74	37.4	719600	45440
914 x 419 x 343	343.3	911.8	418.5	19.4	32.0	24.1	799.6	6.54	41.2	625800	39160
914 x 305 x 289	289.1	926.6	307.7	19.5	32.0	19.1	824.4	4.81	42.3	504200	15600
914 x 305 x 253	253.4	918.4	305.5	17.3	27.9	19.1	824.4	5.47	47.7	436300	13300
914 x 305 x 224	224.2	910.4	304.1	15.9	23.9	19.1	824.4	6.36	51.8	376400	11240
914 x 305 x 201	200.9	903.0	303.3	15.1	20.2	19.1	824.4	7.51	54.6	325300	9423
838 x 292 x 226	226.5	850.9	293.8	16.1	26.8	17.8	761.7	5.48	47.3	339700	11360
838 x 292 x 194	193.8	840.7	292.4	14.7	21.7	17.8	761.7	6.74	51.8	279200	9066
838 x 292 x 176	175.9	834.9	291.7	14.0	18.8	17.8	761.7	7.76	54.4	246000	7799
762 x 267 x 197	196.8	769.8	268.0	15.6	25.4	16.5	686.0	5.28	44.0	240000	8175
762 x 267 x 173	173.0	762.2	266.7	14.3	21.6	16.5	686.0	6.17	48.0	205300	6850
762 x 267 x 147	146.9	754.0	265.2	12.8	17.5	16.5	686.0	7.58	53.6	168500	5455
762 x 267 x 134	133.9	750.0	264.4	12.0	15.5	16.5	686.0	8.53	57.2	150700	4788
686 x 254 x 170	170.2	692.9	255.8	14.5	23.7	15.2	615.1	5.40	42.4	170300	6630
686 x 254 x 152	152.4	687.5	254.5	13.2	21.0	15.2	615.1	6.06	46.6	150400	5784
686 x 254 x 140	140.1	683.5	253.7	12.4	19.0	15.2	615.1	6.68	49.6	136300	5183
686 x 254 x 125	125.2	677.9	253.0	11.7	16.2	15.2	615.1	7.81	52.6	118000	4383
610 x 305 x 238	238.1	635.8	311.4	18.4	31.4	16.5	540.0	4.96	29.3	209500	15840
610 x 305 x 179	179.0	620.2	307.1	14.1	23.6	16.5	540.0	6.51	38.3	153000	11410
610 x 305 x 149	149.2	612.4	304.8	11.8	19.7	16.5	540.0	7.74	45.8	125900	9308
610 x 229 x 140	139.9	617.2	230.2	13.1	22.1	12.7	547.6	5.21	41.8	111800	4505
610 x 229 x 125	125.1	612.2	229.0	11.9	19.6	12.7	547.6	5.84	46.0	98610	3932
610 x 229 x 113	113.0	607.6	228.2	11.1	17.3	12.7	547.6	6.60	49.3	87320	3434
610 x 229 x 101	101.2	602.6	227.6	10.5	14.8	12.7	547.6	7.69	52.2	75780	2915
533 x 210 x 122	122.0	544.5	211.9	12.7	21.3	12.7	476.5	4.97	37.5	76040	3388
533 x 210 x 109	109.0	539.5	210.8	11.6	18.8	12.7	476.5	5.61	41.1	66820	2943
533 x 210 x 101	101.0	536.7	210.0	10.8	17.4	12.7	476.5	6.03	44.1	61520	2692
533 x 210 x 92	92.1	533.1	209.3	10.1	15.6	12.7	476.5	6.71	47.2	55230	2389
533 x 210 x 82	82.2	528.3	208.8	9.6	13.2	12.7	476.5	7.91	49.6	47540	2007
457 x 191 x 98	98.3	467.2	192.8	11.4	19.6	10.2	407.6	4.92	35.8	45730	2347
457 x 191 x 89	89.3	463.4	191.9	10.5	17.7	10.2	407.6	5.42	38.8	41020	2089
457 x 191 x 82	82.0	460.0	191.3	9.9	16.0	10.2	407.6	5.98	41.2	37050	1871
457 x 191 x 74	74.3	457.0	190.4	9.0	14.5	10.2	407.6	6.57	45.3	33320	1671
457 x 191 x 67	67.1	453.4	189.9	8.5	12.7	10.2	407.6	7.48	48.0	29380	1452

† These dimensions are in addition to our standard range to BS4 specifications



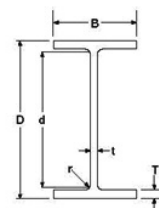
Universal beams

Dimensions and properties to BS 4: Part 1: 1993

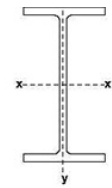
Radius of Gyration		Elastic Modulus		Plastic Modulus		Buckling Parameter	Torsional Index	Warping Constant	Torsional Constant	Area of Section	Mass per metre	Designation
Axis x-x	Axis y-y	Axis x-x	Axis y-y	Axis x-x	Axis y-y	u	x	H	J	cm ²	kg/m	Serial Size
cm	cm	cm ⁴	cm ⁴	cm ³	cm ³			dm ⁶	cm ⁴			
40.6	6.57	19720	1732	23200	2800	0.867	21.1	64.4	4299	620	486.6	1016 x 305 x 487
40.4	6.49	17740	1535	20760	2469	0.868	23.1	55.9	3185	557	436.9	1016 x 305 x 437
40.2	6.40	15900	1353	18540	2168	0.868	25.5	48.4	2330	500	392.7	1016 x 305 x 393
40.3	6.44	14350	1223	16590	1941	0.872	27.9	43.3	1718	445	349.4	1016 x 305 x 349
40.1	6.37	12880	1082	14850	1713	0.872	30.7	37.7	1264	400	314.3	1016 x 305 x 314
40.0	6.35	11190	934	12830	1470	0.873	35.0	32.2	835	347	272.3	1016 x 305 x 272
39.0	6.09	9821	784	11350	1245	0.861	39.9	26.8	582	317	248.7	1016 x 305 x 249
38.0	5.81	8409	636	9807	1020	0.850	45.7	21.5	390	283	222.0	1016 x 305 x 222
38.2	9.59	15630	2161	17670	3341	0.885	26.7	88.9	1734	494	388.0	914 x 419 x 388
37.8	9.46	13730	1871	15480	2890	0.883	30.1	75.8	1193	437	343.3	914 x 419 x 343
37.0	6.51	10880	1014	12570	1601	0.867	31.9	31.2	926	368	289.1	914 x 305 x 289
36.8	6.42	9501	871	10940	1371	0.866	36.2	26.4	626	323	253.4	914 x 305 x 253
36.3	6.27	8269	739	9535	1163	0.861	41.3	22.1	422	286	224.2	914 x 305 x 224
35.7	6.07	7204	621	8351	982	0.854	46.8	18.4	291	256	200.9	914 x 305 x 201
34.3	6.27	7985	773	9155	1212	0.870	35.0	19.3	514	289	226.5	838 x 292 x 226
33.6	6.06	6641	620	7640	974	0.862	41.6	15.2	306	247	193.8	838 x 292 x 194
33.1	5.90	5893	535	6808	842	0.856	46.5	13.0	221	224	175.9	838 x 292 x 176
30.9	5.71	6234	610	7167	959	0.869	33.2	11.3	404	251	196.8	762 x 267 x 197
30.5	5.58	5387	514	6198	807	0.864	38.1	9.39	267	220	173.0	762 x 267 x 173
30.0	5.40	4470	411	5156	647	0.858	45.2	7.40	159	187	146.9	762 x 267 x 147
29.7	5.30	4018	362	4644	570	0.854	49.8	6.46	119	171	133.9	762 x 267 x 134
28.0	5.53	4916	518	5631	811	0.872	31.8	7.42	308	217	170.2	686 x 254 x 170
27.8	5.46	4374	455	5000	710	0.871	35.5	6.42	220	194	152.4	686 x 254 x 152
27.6	5.39	3987	409	4558	638	0.868	38.7	5.72	169	178	140.1	686 x 254 x 140
27.2	5.24	3481	346	3994	542	0.862	43.9	4.80	116	159	125.2	686 x 254 x 125
26.3	7.23	6589	1017	7486	1574	0.886	21.3	14.5	785	303	238.1	610 x 305 x 238
25.9	7.07	4935	743	5547	1144	0.886	27.7	10.2	340	228	179.0	610 x 305 x 179
25.7	7.00	4111	611	4594	937	0.886	32.7	8.17	200	190	149.2	610 x 305 x 149
25.0	5.03	3622	391	4142	611	0.875	30.6	3.99	216	178	139.9	610 x 229 x 140
24.9	4.97	3221	343	3676	535	0.873	34.1	3.45	154	159	125.1	610 x 229 x 125
24.6	4.88	2874	301	3281	469	0.870	38.0	2.99	111	144	113.0	610 x 229 x 113
24.2	4.75	2515	256	2881	400	0.864	43.1	2.52	77.0	129	101.2	610 x 229 x 101
22.1	4.67	2793	320	3196	500	0.877	27.6	2.32	178	155	122.0	533 x 210 x 122
21.9	4.60	2477	279	2828	436	0.875	30.9	1.99	126	139	109.0	533 x 210 x 109
21.9	4.57	2292	256	2612	399	0.874	33.2	1.81	101	129	101.0	533 x 210 x 101
21.7	4.51	2072	228	2360	356	0.872	36.5	1.60	75.7	117	92.1	533 x 210 x 92
21.3	4.38	1800	192	2059	300	0.864	41.6	1.33	51.5	105	82.2	533 x 210 x 82
19.1	4.33	1957	243	2232	379	0.881	25.7	1.18	121	125	98.3	457 x 191 x 98
19.0	4.29	1770	218	2014	338	0.880	28.3	1.04	90.7	114	89.3	457 x 191 x 89
18.8	4.23	1611	196	1831	304	0.877	30.9	0.922	69.2	104	82.0	457 x 191 x 82
18.8	4.20	1458	176	1653	272	0.877	33.9	0.818	51.8	94.6	74.3	457 x 191 x 74
18.5	4.12	1296	153	1471	237	0.872	37.9	0.705	37.1	85.5	67.1	457 x 191 x 67

Universal beams

Dimensions and properties to BS 4: Part 1: 1993



Designation Serial Size	Mass per metre kg/m	Depth of Section D mm	Width of Section B mm	Thickness of Web t mm	Thickness of Flange T mm	Root Radius r mm	Depth between fillets d mm	Ratios for Local Buckling		Second Moment of Area	
								Flange B/2T	Web d/t	Axis x-x cm ⁴	Axis y-y cm ⁴
457 x 152 x 82	82.1	465.8	155.3	10.5	18.9	10.2	407.6	4.11	38.8	36590	1185
457 x 152 x 74	74.2	462.0	154.4	9.6	17.0	10.2	407.6	4.54	42.5	32670	1047
457 x 152 x 67	67.2	458.0	153.8	9.0	15.0	10.2	407.6	5.13	45.3	28930	913
457 x 152 x 60	59.8	454.6	152.9	8.1	13.3	10.2	407.6	5.75	50.3	25500	795
457 x 152 x 52	52.3	449.8	152.4	7.6	10.9	10.2	407.6	6.99	53.6	21370	645
406 x 178 x 74	74.2	412.8	179.5	9.5	16.0	10.2	360.4	5.61	37.9	27310	1545
406 x 178 x 67	67.1	409.4	178.8	8.8	14.3	10.2	360.4	6.25	41.0	24330	1365
406 x 178 x 60	60.1	406.4	177.9	7.9	12.8	10.2	360.4	6.95	45.6	21600	1203
406 x 178 x 54	54.1	402.6	177.7	7.7	10.9	10.2	360.4	8.15	46.8	18720	1021
406 x 140 x 46	46.0	403.2	142.2	6.8	11.2	10.2	360.4	6.35	53.0	15690	538
406 x 140 x 39	39.0	398.0	141.8	6.4	8.6	10.2	360.4	8.24	56.3	12510	410
356 x 171 x 67	67.1	363.4	173.2	9.1	15.7	10.2	311.6	5.52	34.2	19460	1362
356 x 171 x 57	57.0	358.0	172.2	8.1	13.0	10.2	311.6	6.62	38.5	16040	1108
356 x 171 x 51	51.0	355.0	171.5	7.4	11.5	10.2	311.6	7.46	42.1	14140	968
356 x 171 x 45	45.0	351.4	171.1	7.0	9.7	10.2	311.6	8.82	44.5	12070	811
356 x 127 x 39	39.1	353.4	126.0	6.6	10.7	10.2	311.6	5.89	47.2	10170	358
356 x 127 x 33	33.1	349.0	125.4	6.0	8.5	10.2	311.6	7.38	51.9	8249	280
305 x 165 x 54	54.0	310.4	166.9	7.9	13.7	8.9	265.2	6.09	33.6	11700	1063
305 x 165 x 46	46.1	306.6	165.7	6.7	11.8	8.9	265.2	7.02	39.6	9899	896
305 x 165 x 40	40.3	303.4	165.0	6.0	10.2	8.9	265.2	8.09	44.2	8503	764
305 x 127 x 48	48.1	311.0	125.3	9.0	14.0	8.9	265.2	4.48	29.5	9575	461
305 x 127 x 42	41.9	307.2	124.3	8.0	12.1	8.9	265.2	5.14	33.2	8196	389
305 x 127 x 37	37.0	304.4	123.4	7.1	10.7	8.9	265.2	5.77	37.4	7171	336
305 x 102 x 33	32.8	312.7	102.4	6.6	10.8	7.6	275.9	4.74	41.8	6501	194
305 x 102 x 28	28.2	308.7	101.8	6.0	8.8	7.6	275.9	5.78	46.0	5366	155
305 x 102 x 25	24.8	305.1	101.6	5.8	7.0	7.6	275.9	7.26	47.6	4455	123
254 x 146 x 43	43.0	259.6	147.3	7.2	12.7	7.6	219.0	5.80	30.4	6544	677
254 x 146 x 37	37.0	256.0	146.4	6.3	10.9	7.6	219.0	6.72	34.8	5537	571
254 x 146 x 31	31.1	251.4	146.1	6.0	8.6	7.6	219.0	8.49	36.5	4413	448
254 x 102 x 28	28.3	260.4	102.2	6.3	10.0	7.6	225.2	5.11	35.7	4005	179
254 x 102 x 25	25.2	257.2	101.9	6.0	8.4	7.6	225.2	6.07	37.5	3415	149
254 x 102 x 22	22.0	254.0	101.6	5.7	6.8	7.6	225.2	7.47	39.5	2841	119
203 x 133 x 30	30.0	206.8	133.9	6.4	9.6	7.6	172.4	6.97	26.9	2896	385
203 x 133 x 25	25.1	203.2	133.2	5.7	7.8	7.6	172.4	8.54	30.2	2340	308
203 x 102 x 23	23.1	203.2	101.8	5.4	9.3	7.6	169.4	5.47	31.4	2105	164
178 x 102 x 19	19.0	177.8	101.2	4.8	7.9	7.6	146.8	6.41	30.6	1356	137
152 x 89 x 16	16.0	152.4	88.7	4.5	7.7	7.6	121.8	5.76	27.1	834	89.8
127 x 76 x 13	13.0	127.0	76.0	4.0	7.6	7.6	96.6	5.00	24.2	473	55.7



Universal beams

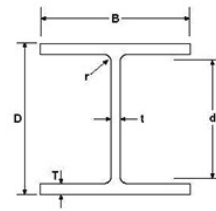
Dimensions and properties to BS 4: Part 1: 1993

Radius of Gyration		Elastic Modulus		Plastic Modulus		Buckling	Torsional	Warping	Torsional	Area	Mass	Designation
Axis	Axis	Axis	Axis	Axis	Axis	Parameter	Index	Constant	Constant	of	per	Serial
x-x	y-y	x-x	y-y	x-x	y-y	u	x	H	J	Section	metre	Size
cm	cm	cm ³	cm ³	cm ³	cm ³			dm ⁶	cm ⁴	cm ²	kg/m	
18.7	3.37	1571	153	1811	240	0.873	27.4	0.591	89.2	105	82.1	457 x 152 x 82
18.6	3.33	1414	136	1627	213	0.873	30.1	0.518	65.9	94.5	74.2	457 x 152 x 74
18.4	3.27	1263	119	1453	187	0.869	33.6	0.448	47.7	85.6	67.2	457 x 152 x 67
18.3	3.23	1122	104	1287	163	0.868	37.5	0.387	33.8	76.2	59.8	457 x 152 x 60
17.9	3.11	950	84.6	1096	133	0.859	43.9	0.311	21.4	66.6	52.3	457 x 152 x 52
17.0	4.04	1323	172	1501	267	0.882	27.6	0.608	62.8	94.5	74.2	406 x 178 x 74
16.9	3.99	1189	153	1346	237	0.880	30.5	0.533	46.1	85.5	67.1	406 x 178 x 67
16.8	3.97	1063	135	1199	209	0.880	33.8	0.466	33.3	76.5	60.1	406 x 178 x 60
16.5	3.85	930	115	1055	178	0.871	38.3	0.392	23.1	69.0	54.1	406 x 178 x 54
16.4	3.03	778	75.7	888	118	0.871	38.9	0.207	19.0	58.6	46.0	406 x 140 x 46
15.9	2.87	629	57.8	724	90.8	0.858	47.5	0.155	10.7	49.7	39.0	406 x 140 x 39
15.1	3.99	1071	157	1211	243	0.886	24.4	0.412	55.7	85.5	67.1	356 x 171 x 67
14.9	3.91	896	129	1010	199	0.882	28.8	0.330	33.4	72.6	57.0	356 x 171 x 57
14.8	3.86	796	113	896	174	0.881	32.1	0.286	23.8	64.9	51.0	356 x 171 x 51
14.5	3.76	687	94.8	775	147	0.874	36.8	0.237	15.8	57.3	45.0	356 x 171 x 45
14.3	2.68	576	56.8	659	89.1	0.871	35.2	0.105	15.1	49.8	39.1	356 x 127 x 39
14.0	2.58	473	44.7	543	70.3	0.863	42.2	0.0812	8.79	42.1	33.1	356 x 127 x 33
13.0	3.93	754	127	846	196	0.889	23.6	0.234	34.8	68.8	54.0	305 x 165 x 54
13.0	3.90	646	108	720	166	0.891	27.1	0.195	22.2	58.7	46.1	305 x 165 x 46
12.9	3.86	560	92.6	623	142	0.889	31.0	0.164	14.7	51.3	40.3	305 x 165 x 40
12.5	2.74	616	73.6	711	116	0.873	23.3	0.102	31.8	61.2	48.1	305 x 127 x 48
12.4	2.70	534	62.6	614	98.4	0.872	26.5	0.0846	21.1	53.4	41.9	305 x 127 x 42
12.3	2.67	471	54.5	539	85.4	0.872	29.7	0.0725	14.8	47.2	37.0	305 x 127 x 37
12.5	2.15	416	37.9	481	60.0	0.866	31.6	0.0442	12.2	41.8	32.8	305 x 102 x 33
12.2	2.08	348	30.5	403	48.5	0.859	37.4	0.0349	7.40	35.9	28.2	305 x 102 x 28
11.9	1.97	292	24.2	342	38.8	0.846	43.4	0.0273	4.77	31.6	24.8	305 x 102 x 25
10.9	3.52	504	92.0	566	141	0.891	21.2	0.103	23.9	54.8	43.0	254 x 146 x 43
10.8	3.48	433	78.0	483	119	0.890	24.3	0.0857	15.3	47.2	37.0	254 x 146 x 37
10.5	3.36	351	61.3	393	94.1	0.880	29.6	0.0660	8.55	39.7	31.1	254 x 146 x 31
10.5	2.22	308	34.9	353	54.8	0.874	27.5	0.0280	9.57	36.1	28.3	254 x 102 x 28
10.3	2.15	266	29.2	306	46.0	0.866	31.5	0.0230	6.42	32.0	25.2	254 x 102 x 25
10.1	2.06	224	23.5	259	37.3	0.856	36.4	0.0182	4.15	28.0	22.0	254 x 102 x 22
8.71	3.17	280	57.5	314	88.2	0.881	21.5	0.0374	10.3	38.2	30.0	203 x 133 x 30
8.56	3.10	230	46.2	258	70.9	0.877	25.6	0.0294	5.96	32.0	25.1	203 x 133 x 25
8.46	2.36	207	32.2	234	49.8	0.888	22.5	0.0154	7.02	29.4	23.1	203 x 102 x 23
7.48	2.37	153	27.0	171	41.6	0.888	22.6	0.0099	4.41	24.3	19.0	178 x 102 x 19
6.41	2.10	109	20.2	123	31.2	0.890	19.6	0.0047	3.56	20.3	16.0	152 x 89 x 16
5.35	1.84	74.6	14.7	84.2	22.6	0.895	16.3	0.0020	2.85	16.5	13.0	127 x 76 x 13

Table A2- Universal Column Sections

Universal columns

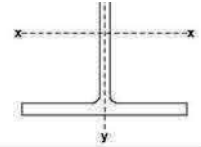
Dimensions and properties to BS 4: Part 1: 1993



Designation	Mass per metre kg/m	Depth of Section D mm	Width of Section B mm	Thickness of Web t mm	Thickness of Flange T mm	Root Radius r mm	Depth between fillets d mm	Ratios for Local Buckling		Second Moment of Area	
								Flange B/2T	Web d/t	Axis x-x cm ⁴	Axis y-y cm ⁴
356 x 406 x 634	633.9	474.6	424.0	47.6	77.0	15.2	290.2	2.75	6.10	274800	98130
356 x 406 x 551	551.0	455.6	418.5	42.1	67.5	15.2	290.2	3.10	6.89	226900	82670
356 x 406 x 467	467.0	436.6	412.2	35.8	58.0	15.2	290.2	3.55	8.11	183000	67830
356 x 406 x 393	393.0	419.0	407.0	30.6	49.2	15.2	290.2	4.14	9.48	146600	55370
356 x 406 x 340	339.9	406.4	403.0	26.6	42.9	15.2	290.2	4.70	10.9	122500	46850
356 x 406 x 287	287.1	393.6	399.0	22.6	36.5	15.2	290.2	5.47	12.8	99880	38680
356 x 406 x 235	235.1	381.0	394.8	18.4	30.2	15.2	290.2	6.54	15.8	79080	30990
356 x 368 x 202	201.9	374.6	374.7	16.5	27.0	15.2	290.2	6.94	17.6	66260	23690
356 x 368 x 177	177.0	368.2	372.6	14.4	23.8	15.2	290.2	7.83	20.2	57120	20530
356 x 368 x 153	152.9	362.0	370.5	12.3	20.7	15.2	290.2	8.95	23.6	48590	17550
356 x 368 x 129	129.0	355.6	368.6	10.4	17.5	15.2	290.2	10.5	27.9	40250	14610
305 x 305 x 283	282.9	365.3	322.2	26.8	44.1	15.2	246.7	3.65	9.21	78870	24630
305 x 305 x 240	240.0	352.5	318.4	23.0	37.7	15.2	246.7	4.22	10.7	64200	20310
305 x 305 x 198	198.1	339.9	314.5	19.1	31.4	15.2	246.7	5.01	12.9	50900	16300
305 x 305 x 158	158.1	327.1	311.2	15.8	25.0	15.2	246.7	6.22	15.6	38750	12570
305 x 305 x 137	136.9	320.5	309.2	13.8	21.7	15.2	246.7	7.12	17.9	32810	10700
305 x 305 x 118	117.9	314.5	307.4	12.0	18.7	15.2	246.7	8.22	20.6	27670	9059
305 x 305 x 97	96.9	307.9	305.3	9.9	15.4	15.2	246.7	9.91	24.9	22250	7308
254 x 254 x 167	167.1	289.1	265.2	19.2	31.7	12.7	200.3	4.18	10.4	30000	9870
254 x 254 x 132	132.0	276.3	261.3	15.3	25.3	12.7	200.3	5.16	13.1	22530	7531
254 x 254 x 107	107.1	266.7	258.8	12.8	20.5	12.7	200.3	6.31	15.6	17510	5928
254 x 254 x 89	88.9	260.3	256.3	10.3	17.3	12.7	200.3	7.41	19.4	14270	4857
254 x 254 x 73	73.1	254.1	254.6	8.6	14.2	12.7	200.3	8.96	23.3	11410	3908
203 x 203 x 86	86.1	222.2	209.1	12.7	20.5	10.2	160.8	5.10	12.7	9449	3127
203 x 203 x 71	71.0	215.8	206.4	10.0	17.3	10.2	160.8	5.97	16.1	7618	2537
203 x 203 x 60	60.0	209.6	205.8	9.4	14.2	10.2	160.8	7.25	17.1	6125	2065
203 x 203 x 52	52.0	206.2	204.3	7.9	12.5	10.2	160.8	8.17	20.4	5259	1778
203 x 203 x 46	46.1	203.2	203.6	7.2	11.0	10.2	160.8	9.25	22.3	4568	1548
152 x 152 x 37	37.0	161.8	154.4	8.0	11.5	7.6	123.6	6.71	15.5	2210	706
152 x 152 x 30	30.0	157.6	152.9	6.5	9.4	7.6	123.6	8.13	19.0	1748	560
152 x 152 x 23	23.0	152.4	152.2	5.8	6.8	7.6	123.6	11.2	21.3	1250	400

Universal columns

Dimensions and properties to BS 4: Part 1: 1993



Radius of Gyration		Elastic Modulus		Plastic Modulus		Buckling Parameter u	Torsional Index x	Warping Constant H dm ⁶	Torsional Constant J cm ⁴	Area of Section cm ²	Mass per metre kg/m	Designation Serial Size
Axis x-x cm	Axis y-y cm	Axis x-x cm ²	Axis y-y cm ²	Axis x-x cm ³	Axis y-y cm ³							
18.4	11.0	11580	4629	14240	7108	0.843	5.46	38.8	13720	808	633.9	356 x 406 x 634
18.0	10.9	9962	3951	12080	6058	0.841	6.05	31.1	9240	702	551.0	356 x 406 x 551
17.5	10.7	8383	3291	10000	5034	0.839	6.86	24.3	5809	595	467.0	356 x 406 x 467
17.1	10.5	6998	2721	8222	4154	0.837	7.86	18.9	3545	501	393.0	356 x 406 x 393
16.8	10.4	6031	2325	6999	3544	0.836	8.85	15.5	2343	433	339.9	356 x 406 x 340
16.5	10.3	5075	1939	5812	2949	0.835	10.2	12.3	1441	366	287.1	356 x 406 x 287
16.3	10.2	4151	1570	4687	2383	0.834	12.1	9.54	812	299	235.1	356 x 406 x 235
16.1	9.60	3538	1264	3972	1920	0.844	13.4	7.16	558	257	201.9	356 x 368 x 202
15.9	9.54	3103	1102	3455	1671	0.844	15.0	6.09	381	226	177.0	356 x 368 x 177
15.8	9.49	2684	948	2965	1435	0.844	17.0	5.11	251	195	152.9	356 x 368 x 153
15.6	9.43	2264	793	2479	1199	0.844	19.9	4.18	153	164	129.0	356 x 368 x 129
14.8	8.27	4318	1529	5105	2342	0.855	7.65	6.35	2034	360	282.9	305 x 305 x 283
14.5	8.15	3643	1276	4247	1951	0.854	8.74	5.03	1271	306	240.0	305 x 305 x 240
14.2	8.04	2995	1037	3440	1581	0.854	10.2	3.88	734	252	198.1	305 x 305 x 198
13.9	7.90	2369	808	2680	1230	0.851	12.5	2.87	378	201	158.1	305 x 305 x 158
13.7	7.83	2048	692	2297	1053	0.851	14.2	2.39	249	174	136.9	305 x 305 x 137
13.6	7.77	1760	589	1958	895	0.850	16.2	1.98	161	150	117.9	305 x 305 x 118
13.4	7.69	1445	479	1592	726	0.850	19.3	1.56	91.2	123	96.9	305 x 305 x 97
11.9	6.81	2075	744	2424	1137	0.851	8.49	1.63	626	213	167.1	254 x 254 x 167
11.6	6.69	1631	576	1869	878	0.850	10.3	1.19	319	168	132.0	254 x 254 x 132
11.3	6.59	1313	458	1484	697	0.848	12.4	0.898	172	136	107.1	254 x 254 x 107
11.2	6.55	1096	379	1224	575	0.850	14.5	0.717	102	113	88.9	254 x 254 x 89
11.1	6.48	898	307	992	465	0.849	17.3	0.562	57.6	93.1	73.1	254 x 254 x 73
9.28	5.34	850	299	977	456	0.850	10.2	0.318	137	110	86.1	203 x 203 x 86
9.18	5.30	706	246	799	374	0.853	11.9	0.250	80.2	90.4	71.0	203 x 203 x 71
8.96	5.20	584	201	666	305	0.846	14.1	0.197	47.2	76.4	60.0	203 x 203 x 60
8.91	5.18	510	174	567	264	0.848	15.8	0.167	31.8	66.3	52.0	203 x 203 x 52
8.82	5.13	450	152	497	231	0.847	17.7	0.143	22.2	58.7	46.1	203 x 203 x 46
6.85	3.87	273	91.5	309	140	0.848	13.3	0.0399	19.2	47.1	37.0	152 x 152 x 37
6.76	3.83	222	73.3	248	112	0.849	16.0	0.0308	10.5	38.3	30.0	152 x 152 x 30
6.54	3.70	164	52.6	182	80.2	0.840	20.7	0.0212	4.63	29.2	23.0	152 x 152 x 23

Table A3 – Reinforcement Areas

REINFORCEMENT: METRIC BAR DATA

		Bar size in millimetres										
		6	8	10	12	16	20	25	32	40	50	
Cross-sectional areas of bars at specific spacings	Bar spacing in millimetres (non-preferred spacings shown in italics)	75	376	670	1047	1507	2680	4188	6544	—	—	—
		80	353	628	981	1413	2513	3926	6135	—	—	—
		90	314	558	872	1256	2234	3490	5454	—	—	—
		100	282	502	785	1130	2010	3141	4908	8042	—	—
		110	257	456	713	1028	1827	2855	4462	7311	—	—
		120	235	418	654	942	1675	2617	4090	6702	10471	—
		125	226	402	628	904	1608	2513	3926	6433	10053	—
		130	217	386	604	869	1546	2416	3775	6186	9666	—
		140	201	359	560	807	1436	2243	3506	5744	8975	—
		150	188	335	523	753	1340	2094	3272	5361	8377	13090
		160	176	314	490	706	1256	1963	3067	5026	7853	12272
		175	161	287	448	646	1148	1795	2804	4595	7180	11220
		180	157	279	436	628	1117	1745	2727	4468	6981	10908
		200	141	251	392	565	1005	1570	2454	4021	6283	9817
		220	128	228	356	514	913	1427	2231	3655	5711	8925
		225	125	223	349	502	893	1396	2181	3574	5585	8727
		240	117	209	327	471	837	1308	2045	3351	5235	8181
		250	113	201	314	452	804	1256	1963	3216	5026	7854
		275	102	182	285	411	731	1142	1784	2924	4569	7140
		300	94	167	261	376	670	1047	1636	2680	4188	6545
		Number of bars	Number of bars	1	28.3	50.3	78.5	113.1	201.0	314.2	490.9	804.2
2	56.5			100.5	157.1	226.2	402.1	628.3	981.7	1608	2513	3927
3	84.8			150.8	235.6	339.3	603.2	942.5	1473	2413	3770	5890
4	113.1			201.1	314.2	452.4	804.2	1257	1963	3217	5027	7854
5	141.4			251.3	392.7	565.5	1005	1571	2454	4021	6283	9817
6	169.6			301.6	471.2	678.6	1206	1885	2945	4825	7540	11781
7	197.9			351.9	549.8	791.7	1407	2199	3436	5630	8796	13744
8	226.2			402.1	628.3	904.8	1608	2513	3927	6434	10053	15708
9	254.5			452.4	706.9	1018	1810	2827	4418	7238	11310	17671
10	282.7			502.7	785.4	1131	2011	3142	4909	8042	12566	19635
11	311.0			552.9	863.9	1244	2212	3456	5400	8847	13823	21598
12	339.3			603.2	942.5	1357	2413	3770	5890	9651	15080	23562
13	367.6			653.5	1021	1470	2614	4084	6381	10455	16336	25525
14	395.8			703.7	1100	1583	2815	4398	6872	11259	17593	27489
15	424.1			754.0	1178	1696	3016	4712	7363	12064	18850	29452
16	452.4			804.2	1257	1810	3217	5027	7854	12868	20106	31416
17	480.7			854.5	1335	1923	3418	5341	8345	13672	21363	33379
18	508.9			904.8	1414	2036	3619	5655	8836	14476	22619	35343
19	537.2			955.0	1492	2149	3820	5969	9327	15281	23876	37306
20	565.5			1005	1571	2262	4021	6283	9817	16085	25133	39270
Perimetres of specific numbers of bars	Number of bars	1	18.8	25.1	31.4	37.6	50.2	62.8	78.5	100.5	125.6	157.7
		2	37.6	50.2	62.8	75.3	100.5	125.6	157.0	201.0	251.3	314.7
		3	56.5	75.3	94.2	113.0	150.7	188.4	235.6	301.5	376.5	471.7
		4	75.3	100.5	125.6	150.7	201.0	251.3	314.1	402.1	502.6	628.7
		5	94.2	125.6	157.0	188.4	251.3	314.1	392.6	502.6	628.3	785.7
		6	113.0	150.7	188.4	226.1	301.5	376.9	471.2	603.1	753.9	942.7
		7	131.9	175.9	219.9	263.8	351.8	439.8	549.7	703.7	879.6	1100
		8	150.7	201.0	251.3	301.5	402.1	502.6	628.3	804.2	1005	1257
		9	169.6	226.1	282.7	339.2	452.3	565.4	706.8	904.7	1130	1414
		10	188.4	251.3	314.1	376.9	502.6	628.3	785.3	1005	1256	1571

Areas are given in square millimetres; perimetres in millimetres.

Table A4 – BS 8110 Lever Arm factor chart

