BS EN 1993-1-1: 2005
BS 4-1: 2005

UK EUROCODES

B-2

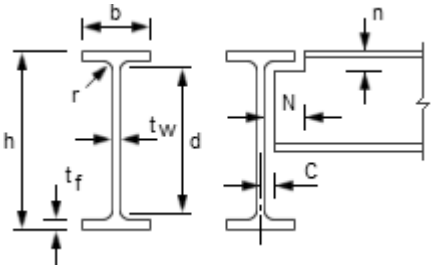
Table 2.1.1.1

SECTION PROPERTIES

UNIVERSAL BEAMS

Advance® UKB

DIMENSIONS



Section Designation	Mass per Metre	Depth of Section	Width of Section	Thickness		Root Radius	Depth between Fillets	Ratios for Local Buckling		Dimensions for Detailing			Surface Area	
				Web	Flange			Flange	Web	End Clearance	Notch		Per Metre	Per Tonne
		h	b	t_w	t_f	r	d	c_f / t_f	c_w / t_w	C	N	n		
	kg/m	mm	mm	mm	mm	mm	mm			mm	mm	mm	m^2	m^2
1016 x 305 x 487 +	486.7	1036.3	308.5	30.0	54.1	30.0	868.1	2.02	28.9	17	150	86	3.20	6.58
1016 x 305 x 437 +	437.0	1026.1	305.4	26.9	49.0	30.0	868.1	2.23	32.3	15	150	80	3.17	7.25
1016 x 305 x 393 +	392.7	1015.9	303.0	24.4	43.9	30.0	868.1	2.49	35.6	14	150	74	3.14	8.00
1016 x 305 x 349 +	349.4	1008.1	302.0	21.1	40.0	30.0	868.1	2.76	41.1	13	152	70	3.13	8.96
1016 x 305 x 314 +	314.3	999.9	300.0	19.1	35.9	30.0	868.1	3.08	45.5	12	152	66	3.11	9.89
1016 x 305 x 272 +	272.3	990.1	300.0	16.5	31.0	30.0	868.1	3.60	52.6	10	152	62	3.10	11.4
1016 x 305 x 249 +	248.7	980.1	300.0	16.5	26.0	30.0	868.1	4.30	52.6	10	152	56	3.08	12.4
1016 x 305 x 222 +	222.0	970.3	300.0	16.0	21.1	30.0	868.1	5.31	54.3	10	152	52	3.06	13.8
914 x 419 x 388	388.0	921.0	420.5	21.4	36.6	24.1	799.6	4.79	37.4	13	210	62	3.44	8.87
914 x 419 x 343	343.3	911.8	418.5	19.4	32.0	24.1	799.6	5.48	41.2	12	210	58	3.42	9.96
914 x 305 x 289	289.1	926.6	307.7	19.5	32.0	19.1	824.4	3.91	42.3	12	156	52	3.01	10.4
914 x 305 x 253	253.4	918.4	305.5	17.3	27.9	19.1	824.4	4.48	47.7	11	156	48	2.99	11.8
914 x 305 x 224	224.2	910.4	304.1	15.9	23.9	19.1	824.4	5.23	51.8	10	156	44	2.97	13.2
914 x 305 x 201	200.9	903.0	303.3	15.1	20.2	19.1	824.4	6.19	54.6	10	156	40	2.96	14.7
838 x 292 x 226	226.5	850.9	293.8	16.1	26.8	17.8	761.7	4.52	47.3	10	150	46	2.81	12.4
838 x 292 x 194	193.8	840.7	292.4	14.7	21.7	17.8	761.7	5.58	51.8	9	150	40	2.79	14.4
838 x 292 x 176	175.9	834.9	291.7	14.0	18.8	17.8	761.7	6.44	54.4	9	150	38	2.78	15.8
762 x 267 x 197	196.8	769.8	268.0	15.6	25.4	16.5	686.0	4.32	44.0	10	138	42	2.55	13.0
762 x 267 x 173	173.0	762.2	266.7	14.3	21.6	16.5	686.0	5.08	48.0	9	138	40	2.53	14.6
762 x 267 x 147	146.9	754.0	265.2	12.8	17.5	16.5	686.0	6.27	53.6	8	138	34	2.51	17.1
762 x 267 x 134	133.9	750.0	264.4	12.0	15.5	16.5	686.0	7.08	57.2	8	138	32	2.51	18.7
686 x 254 x 170	170.2	692.9	255.8	14.5	23.7	15.2	615.1	4.45	42.4	9	132	40	2.35	13.8
686 x 254 x 152	152.4	687.5	254.5	13.2	21.0	15.2	615.1	5.02	46.6	9	132	38	2.34	15.4
686 x 254 x 140	140.1	683.5	253.7	12.4	19.0	15.2	615.1	5.55	49.6	8	132	36	2.33	16.6
686 x 254 x 125	125.2	677.9	253.0	11.7	16.2	15.2	615.1	6.51	52.6	8	132	32	2.32	18.5
610 x 305 x 238	238.1	635.8	311.4	18.4	31.4	16.5	540.0	4.14	29.3	11	158	48	2.45	10.3
610 x 305 x 179	179.0	620.2	307.1	14.1	23.6	16.5	540.0	5.51	38.3	9	158	42	2.41	13.5
610 x 305 x 149	149.2	612.4	304.8	11.8	19.7	16.5	540.0	6.60	45.8	8	158	38	2.39	16.0
610 x 229 x 140	139.9	617.2	230.2	13.1	22.1	12.7	547.6	4.34	41.8	9	120	36	2.11	15.1
610 x 229 x 125	125.1	612.2	229.0	11.9	19.6	12.7	547.6	4.89	46.0	8	120	34	2.09	16.7
610 x 229 x 113	113.0	607.6	228.2	11.1	17.3	12.7	547.6	5.54	49.3	8	120	30	2.08	18.4
610 x 229 x 101	101.2	602.6	227.6	10.5	14.8	12.7	547.6	6.48	52.2	7	120	28	2.07	20.5
610 x 178 x 100 +	100.3	607.4	179.2	11.3	17.2	12.7	547.6	4.14	48.5	8	94	30	1.89	18.8
610 x 178 x 92 +	92.2	603.0	178.8	10.9	15.0	12.7	547.6	4.75	50.2	7	94	28	1.88	20.4
610 x 178 x 82 +	81.8	598.6	177.9	10.0	12.8	12.7	547.6	5.57	54.8	7	94	26	1.87	22.9
533 x 312 x 272 +	273.3	577.1	320.2	21.1	37.6	12.7	476.5	3.64	22.6	13	160	52	2.37	8.67
533 x 312 x 219 +	218.8	560.3	317.4	18.3	29.2	12.7	476.5	4.69	26.0	11	160	42	2.33	10.7
533 x 312 x 182 +	181.5	550.7	314.5	15.2	24.4	12.7	476.5	5.61	31.3	10	160	38	2.31	12.7
533 x 312 x 150 +	150.6	542.5	312.0	12.7	20.3	12.7	476.5	6.75	37.5	8	160	34	2.29	15.2

Table 2.1.1.1. Advance® UKB. Dimensions

BS EN 1993-1-1: 2005
BS 4-1: 2005

UK EUROCODES

B-3

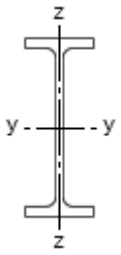
Table 2.1.1.2

SECTION PROPERTIES

UNIVERSAL BEAMS

Advance® UKB

PROPERTIES



Section Designation	Second Moment of Area		Radius of Gyration		Elastic Modulus		Plastic Modulus		Buckling Parameter	Torsional Index	Warping Constant	Torsional Constant	Area of Section
	Axis y-y	Axis z-z	Axis y-y	Axis z-z	Axis y-y	Axis z-z	Axis y-y	Axis z-z					
	cm^4	cm^4	cm	cm	cm^3	cm^3	cm^3	cm^3	U	X	I_w dm^6	I_T cm^4	A cm^2
1016 x 305 x 487 +	1020000	26700	40.6	6.57	19700	1730	23200	2800	0.867	21.1	64.4	4300	620
1016 x 305 x 437 +	910000	23400	40.4	6.49	17700	1540	20800	2470	0.868	23.1	56.0	3190	557
1016 x 305 x 393 +	808000	20500	40.2	6.40	15900	1350	18500	2170	0.868	25.5	48.4	2330	500
1016 x 305 x 349 +	723000	18500	40.3	6.44	14300	1220	16600	1940	0.872	27.9	43.3	1720	445
1016 x 305 x 314 +	644000	16200	40.1	6.37	12900	1080	14800	1710	0.872	30.7	37.7	1260	400
1016 x 305 x 272 +	554000	14000	40.0	6.35	11200	934	12800	1470	0.872	35.0	32.2	835	347
1016 x 305 x 249 +	481000	11800	39.0	6.09	9820	784	11300	1240	0.861	39.9	26.8	582	317
1016 x 305 x 222 +	408000	9550	38.0	5.81	8410	636	9810	1020	0.850	45.7	21.5	390	283
914 x 419 x 388	720000	45400	38.2	9.59	15600	2160	17700	3340	0.885	26.7	88.9	1730	494
914 x 419 x 343	626000	39200	37.8	9.46	13700	1870	15500	2890	0.883	30.1	75.8	1190	437
914 x 305 x 289	504000	15600	37.0	6.51	10900	1010	12600	1600	0.867	31.9	31.2	926	368
914 x 305 x 253	436000	13300	36.8	6.42	9500	871	10900	1370	0.865	36.2	26.4	626	323
914 x 305 x 224	376000	11200	36.3	6.27	8270	739	9530	1160	0.860	41.3	22.1	422	286
914 x 305 x 201	325000	9420	35.7	6.07	7200	621	8350	982	0.853	46.9	18.4	291	256
838 x 292 x 226	340000	11400	34.3	6.27	7980	773	9160	1210	0.869	35.0	19.3	514	289
838 x 292 x 194	279000	9070	33.6	6.06	6640	620	7640	974	0.862	41.6	15.2	306	247
838 x 292 x 176	246000	7800	33.1	5.90	5890	535	6810	842	0.856	46.5	13.0	221	224
762 x 267 x 197	240000	8170	30.9	5.71	6230	610	7170	958	0.869	33.1	11.3	404	251
762 x 267 x 173	205000	6850	30.5	5.58	5390	514	6200	807	0.865	38.0	9.39	267	220
762 x 267 x 147	169000	5460	30.0	5.40	4470	411	5160	647	0.858	45.2	7.40	159	187
762 x 267 x 134	151000	4790	29.7	5.30	4020	362	4640	570	0.853	49.8	6.46	119	171
686 x 254 x 170	170000	6630	28.0	5.53	4920	518	5630	811	0.872	31.8	7.42	308	217
686 x 254 x 152	150000	5780	27.8	5.46	4370	455	5000	710	0.871	35.4	6.42	220	194
686 x 254 x 140	136000	5180	27.6	5.39	3990	409	4560	638	0.870	38.6	5.72	169	178
686 x 254 x 125	118000	4380	27.2	5.24	3480	346	3990	542	0.863	43.8	4.80	116	159
610 x 305 x 238	209000	15800	26.3	7.23	6590	1020	7490	1570	0.886	21.3	14.5	785	303
610 x 305 x 179	153000	11400	25.9	7.07	4930	743	5550	1140	0.885	27.7	10.2	340	228
610 x 305 x 149	126000	9310	25.7	7.00	4110	611	4590	937	0.886	32.7	8.17	200	190
610 x 229 x 140	112000	4510	25.0	5.03	3620	391	4140	611	0.875	30.6	3.99	216	178
610 x 229 x 125	98600	3930	24.9	4.97	3220	343	3680	535	0.875	34.0	3.45	154	159
610 x 229 x 113	87300	3430	24.6	4.88	2870	301	3280	469	0.870	38.0	2.99	111	144
610 x 229 x 101	75800	2910	24.2	4.75	2520	256	2880	400	0.863	43.0	2.52	77.0	129
610 x 178 x 100 +	72500	1660	23.8	3.60	2390	185	2790	296	0.854	38.7	1.44	95.0	128
610 x 178 x 92 +	64600	1440	23.4	3.50	2140	161	2510	258	0.850	42.7	1.24	71.0	117
610 x 178 x 82 +	55900	1210	23.2	3.40	1870	136	2190	218	0.843	48.5	1.04	48.8	104
533 x 312 x 272 +	199000	20600	23.9	7.69	6890	1290	7870	1990	0.891	15.9	15.0	1290	348
533 x 312 x 219 +	151000	15600	23.3	7.48	5400	982	6120	1510	0.884	19.8	11.0	642	279
533 x 312 x 182 +	123000	12700	23.1	7.40	4480	806	5040	1240	0.886	23.4	8.77	373	231
533 x 312 x 150 +	101000	10300	22.9	7.32	3710	659	4150	1010	0.885	27.8	7.01	216	192

Table 2.1.1.2. Advance® UKB. Properties

BS EN 1993-1-1: 2005
BS 4-1: 2005

UK EUROCODES

B-4

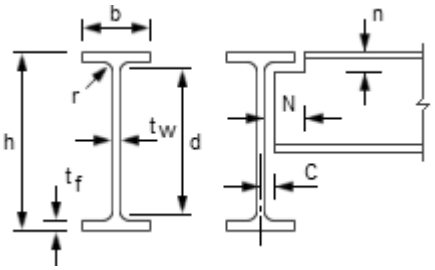
Table 2.1.1.3

SECTION PROPERTIES

UNIVERSAL BEAMS

Advance® UKB

DIMENSIONS



Section Designation	Mass per Metre	Depth of Section	Width of Section	Thickness		Root Radius	Depth between Fillets	Ratios for Local Buckling		Dimensions for Detailing			Surface Area	
				Web	Flange			Flange	Web	End Clearance	Notch		Per Metre	Per Tonne
		h	b	t_w	t_f	r	d	c_f / t_f	c_w / t_w	C	N	n		
	kg/m	mm	mm	mm	mm	mm	mm			mm	mm	mm	m^2	m^2
533 x 210 x 138 +	138.3	549.1	213.9	14.7	23.6	12.7	476.5	3.68	32.4	9	110	38	1.90	13.7
533 x 210 x 122	122.0	544.5	211.9	12.7	21.3	12.7	476.5	4.08	37.5	8	110	34	1.89	15.5
533 x 210 x 109	109.0	539.5	210.8	11.6	18.8	12.7	476.5	4.62	41.1	8	110	32	1.88	17.2
533 x 210 x 101	101.0	536.7	210.0	10.8	17.4	12.7	476.5	4.99	44.1	7	110	32	1.87	18.5
533 x 210 x 92	92.1	533.1	209.3	10.1	15.6	12.7	476.5	5.57	47.2	7	110	30	1.86	20.2
533 x 210 x 82	82.2	528.3	208.8	9.6	13.2	12.7	476.5	6.58	49.6	7	110	26	1.85	22.5
533 x 165 x 85 +	84.8	534.9	166.5	10.3	16.5	12.7	476.5	3.96	46.3	7	90	30	1.69	19.9
533 x 165 x 74 +	74.7	529.1	165.9	9.7	13.6	12.7	476.5	4.81	49.1	7	90	28	1.68	22.5
533 x 165 x 66 +	65.7	524.7	165.1	8.9	11.4	12.7	476.5	5.74	53.5	6	90	26	1.67	25.4
457 x 191 x 161 +	161.4	492.0	199.4	18.0	32.0	10.2	407.6	2.52	22.6	11	102	44	1.73	10.7
457 x 191 x 133 +	133.3	480.6	196.7	15.3	26.3	10.2	407.6	3.06	26.6	10	102	38	1.70	12.8
457 x 191 x 106 +	105.8	469.2	194.0	12.6	20.6	10.2	407.6	3.91	32.3	8	102	32	1.67	15.8
457 x 191 x 98	98.3	467.2	192.8	11.4	19.6	10.2	407.6	4.11	35.8	8	102	30	1.67	17.0
457 x 191 x 89	89.3	463.4	191.9	10.5	17.7	10.2	407.6	4.55	38.8	7	102	28	1.66	18.6
457 x 191 x 82	82.0	460.0	191.3	9.9	16.0	10.2	407.6	5.03	41.2	7	102	28	1.65	20.1
457 x 191 x 74	74.3	457.0	190.4	9.0	14.5	10.2	407.6	5.55	45.3	7	102	26	1.64	22.1
457 x 191 x 67	67.1	453.4	189.9	8.5	12.7	10.2	407.6	6.34	48.0	6	102	24	1.63	24.3
457 x 152 x 82	82.1	465.8	155.3	10.5	18.9	10.2	407.6	3.29	38.8	7	84	30	1.51	18.4
457 x 152 x 74	74.2	462.0	154.4	9.6	17.0	10.2	407.6	3.66	42.5	7	84	28	1.50	20.2
457 x 152 x 67	67.2	458.0	153.8	9.0	15.0	10.2	407.6	4.15	45.3	7	84	26	1.50	22.3
457 x 152 x 60	59.8	454.6	152.9	8.1	13.3	10.2	407.6	4.68	50.3	6	84	24	1.49	24.9
457 x 152 x 52	52.3	449.8	152.4	7.6	10.9	10.2	407.6	5.71	53.6	6	84	22	1.48	28.3
406 x 178 x 85 +	85.3	417.2	181.9	10.9	18.2	10.2	360.4	4.14	33.1	7	96	30	1.52	17.8
406 x 178 x 74	74.2	412.8	179.5	9.5	16.0	10.2	360.4	4.68	37.9	7	96	28	1.51	20.4
406 x 178 x 67	67.1	409.4	178.8	8.8	14.3	10.2	360.4	5.23	41.0	6	96	26	1.50	22.3
406 x 178 x 60	60.1	406.4	177.9	7.9	12.8	10.2	360.4	5.84	45.6	6	96	24	1.49	24.8
406 x 178 x 54	54.1	402.6	177.7	7.7	10.9	10.2	360.4	6.86	46.8	6	96	22	1.48	27.3
406 x 140 x 53 +	53.3	406.6	143.3	7.9	12.9	10.2	360.4	4.46	45.6	6	78	24	1.35	25.3
406 x 140 x 46	46.0	403.2	142.2	6.8	11.2	10.2	360.4	5.13	53.0	5	78	22	1.34	29.1
406 x 140 x 39	39.0	398.0	141.8	6.4	8.6	10.2	360.4	6.69	56.3	5	78	20	1.33	34.1
356 x 171 x 67	67.1	363.4	173.2	9.1	15.7	10.2	311.6	4.58	34.2	7	94	26	1.38	20.6
356 x 171 x 57	57.0	358.0	172.2	8.1	13.0	10.2	311.6	5.53	38.5	6	94	24	1.37	24.1
356 x 171 x 51	51.0	355.0	171.5	7.4	11.5	10.2	311.6	6.25	42.1	6	94	22	1.36	26.7
356 x 171 x 45	45.0	351.4	171.1	7.0	9.7	10.2	311.6	7.41	44.5	6	94	20	1.36	30.2
356 x 127 x 39	39.1	353.4	126.0	6.6	10.7	10.2	311.6	4.63	47.2	5	70	22	1.18	30.2
356 x 127 x 33	33.1	349.0	125.4	6.0	8.5	10.2	311.6	5.82	51.9	5	70	20	1.17	35.4
305 x 165 x 54	54.0	310.4	166.9	7.9	13.7	8.9	265.2	5.15	33.6	6	90	24	1.26	23.3
305 x 165 x 46	46.1	306.6	165.7	6.7	11.8	8.9	265.2	5.98	39.6	5	90	22	1.25	27.1
305 x 165 x 40	40.3	303.4	165.0	6.0	10.2	8.9	265.2	6.92	44.2	5	90	20	1.24	30.8

Table 2.1.1.3. Advance® UKB. Dimensions

BS EN 1993-1-1: 2005
BS 4-1: 2005

UK EUROCODES

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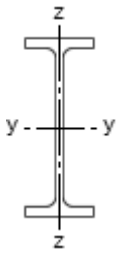
Table 2.1.1.4

SECTION PROPERTIES

UNIVERSAL BEAMS

Advance® UKB

PROPERTIES



Section Designation	Second Moment of Area		Radius of Gyration		Elastic Modulus		Plastic Modulus		Buckling Parameter	Torsional Index	Warping Constant	Torsional Constant	Area of Section
	Axis y-y	Axis z-z	Axis y-y	Axis z-z	Axis y-y	Axis z-z	Axis y-y	Axis z-z					
	cm^4	cm^4	cm	cm	cm^3	cm^3	cm^3	cm^3	U	X	I_w dm^6	I_T cm^4	A cm^2
533 x 210 x 138 +	86100	3860	22.1	4.68	3140	361	3610	568	0.874	24.9	2.67	250	176
533 x 210 x 122	76000	3390	22.1	4.67	2790	320	3200	500	0.878	27.6	2.32	178	155
533 x 210 x 109	66800	2940	21.9	4.60	2480	279	2830	436	0.875	30.9	1.99	126	139
533 x 210 x 101	61500	2690	21.9	4.57	2290	256	2610	399	0.874	33.1	1.81	101	129
533 x 210 x 92	55200	2390	21.7	4.51	2070	228	2360	355	0.873	36.4	1.60	75.7	117
533 x 210 x 82	47500	2010	21.3	4.38	1800	192	2060	300	0.863	41.6	1.33	51.5	105
533 x 165 x 85 +	48500	1270	21.2	3.44	1820	153	2100	243	0.861	35.5	0.857	73.8	108
533 x 165 x 74 +	41100	1040	20.8	3.30	1550	125	1810	200	0.853	41.1	0.691	47.9	95.2
533 x 165 x 66 +	35000	859	20.5	3.20	1340	104	1560	166	0.847	47.0	0.566	32.0	83.7
457 x 191 x 161 +	79800	4250	19.7	4.55	3240	426	3780	672	0.881	16.5	2.25	515	206
457 x 191 x 133 +	63800	3350	19.4	4.44	2660	341	3070	535	0.879	19.6	1.73	292	170
457 x 191 x 106 +	48900	2510	19.0	4.32	2080	259	2390	405	0.876	24.4	1.27	146	135
457 x 191 x 98	45700	2350	19.1	4.33	1960	243	2230	379	0.881	25.8	1.18	121	125
457 x 191 x 89	41000	2090	19.0	4.29	1770	218	2010	338	0.878	28.3	1.04	90.7	114
457 x 191 x 82	37100	1870	18.8	4.23	1610	196	1830	304	0.879	30.8	0.922	69.2	104
457 x 191 x 74	33300	1670	18.8	4.20	1460	176	1650	272	0.877	33.8	0.818	51.8	94.6
457 x 191 x 67	29400	1450	18.5	4.12	1300	153	1470	237	0.873	37.8	0.705	37.1	85.5
457 x 152 x 82	36600	1180	18.7	3.37	1570	153	1810	240	0.872	27.4	0.591	89.2	105
457 x 152 x 74	32700	1050	18.6	3.33	1410	136	1630	213	0.872	30.1	0.518	65.9	94.5
457 x 152 x 67	28900	913	18.4	3.27	1260	119	1450	187	0.868	33.6	0.448	47.7	85.6
457 x 152 x 60	25500	795	18.3	3.23	1120	104	1290	163	0.868	37.5	0.387	33.8	76.2
457 x 152 x 52	21400	645	17.9	3.11	950	84.6	1100	133	0.859	43.8	0.311	21.4	66.6
406 x 178 x 85 +	31700	1830	17.1	4.11	1520	201	1730	313	0.880	24.4	0.728	93.0	109
406 x 178 x 74	27300	1550	17.0	4.04	1320	172	1500	267	0.882	27.5	0.608	62.8	94.5
406 x 178 x 67	24300	1360	16.9	3.99	1190	153	1350	237	0.880	30.4	0.533	46.1	85.5
406 x 178 x 60	21600	1200	16.8	3.97	1060	135	1200	209	0.880	33.7	0.466	33.3	76.5
406 x 178 x 54	18700	1020	16.5	3.85	930	115	1050	178	0.871	38.3	0.392	23.1	69.0
406 x 140 x 53 +	18300	635	16.4	3.06	899	88.6	1030	139	0.870	34.1	0.246	29.0	67.9
406 x 140 x 46	15700	538	16.4	3.03	778	75.7	888	118	0.871	39.0	0.207	19.0	58.6
406 x 140 x 39	12500	410	15.9	2.87	629	57.8	724	90.8	0.858	47.4	0.155	10.7	49.7
356 x 171 x 67	19500	1360	15.1	3.99	1070	157	1210	243	0.886	24.4	0.412	55.7	85.5
356 x 171 x 57	16000	1110	14.9	3.91	896	129	1010	199	0.882	28.8	0.330	33.4	72.6
356 x 171 x 51	14100	968	14.8	3.86	796	113	896	174	0.881	32.1	0.286	23.8	64.9
356 x 171 x 45	12100	811	14.5	3.76	687	94.8	775	147	0.874	36.8	0.237	15.8	57.3
356 x 127 x 39	10200	358	14.3	2.68	576	56.8	659	89.0	0.871	35.2	0.105	15.1	49.8
356 x 127 x 33	8250	280	14.0	2.58	473	44.7	543	70.2	0.863	42.1	0.081	8.79	42.1
305 x 165 x 54	11700	1060	13.0	3.93	754	127	846	196	0.889	23.6	0.234	34.8	68.8
305 x 165 x 46	9900	896	13.0	3.90	646	108	720	166	0.890	27.1	0.195	22.2	58.7
305 x 165 x 40	8500	764	12.9	3.86	560	92.6	623	142	0.889	31.0	0.164	14.7	51.3

Table 2.1.1.4. Advance® UKB. Properties

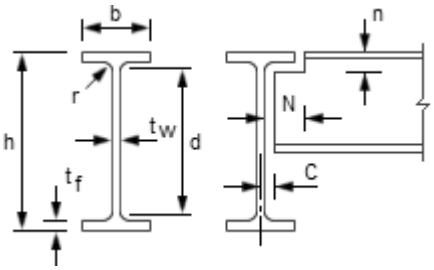
Table 2.1.1.5

SECTION PROPERTIES

UNIVERSAL BEAMS

Advance® UKB

DIMENSIONS



Section Designation	Mass per Metre	Depth of Section	Width of Section	Thickness		Root Radius	Depth between Fillets	Ratios for Local Buckling		Dimensions for Detailing			Surface Area	
				Web	Flange			Flange	Web	End Clearance	Notch		Per Metre	Per Tonne
		h	b	t_w	t_f	r	d	c_f / t_f	c_w / t_w	C	N	n		
	kg/m	mm	mm	mm	mm	mm	mm			mm	mm	mm	m^2	m^2
305 x 127 x 48	48.1	311.0	125.3	9.0	14.0	8.9	265.2	3.52	29.5	7	70	24	1.09	22.7
305 x 127 x 42	41.9	307.2	124.3	8.0	12.1	8.9	265.2	4.07	33.2	6	70	22	1.08	25.8
305 x 127 x 37	37.0	304.4	123.4	7.1	10.7	8.9	265.2	4.60	37.4	6	70	20	1.07	28.9
305 x 102 x 33	32.8	312.7	102.4	6.6	10.8	7.6	275.9	3.73	41.8	5	58	20	1.01	30.8
305 x 102 x 28	28.2	308.7	101.8	6.0	8.8	7.6	275.9	4.58	46.0	5	58	18	1.00	35.5
305 x 102 x 25	24.8	305.1	101.6	5.8	7.0	7.6	275.9	5.76	47.6	5	58	16	0.992	40.0
254 x 146 x 43	43.0	259.6	147.3	7.2	12.7	7.6	219.0	4.92	30.4	6	82	22	1.08	25.1
254 x 146 x 37	37.0	256.0	146.4	6.3	10.9	7.6	219.0	5.73	34.8	5	82	20	1.07	28.9
254 x 146 x 31	31.1	251.4	146.1	6.0	8.6	7.6	219.0	7.26	36.5	5	82	18	1.06	34.0
254 x 102 x 28	28.3	260.4	102.2	6.3	10.0	7.6	225.2	4.04	35.7	5	58	18	0.904	31.9
254 x 102 x 25	25.2	257.2	101.9	6.0	8.4	7.6	225.2	4.80	37.5	5	58	16	0.897	35.7
254 x 102 x 22	22.0	254.0	101.6	5.7	6.8	7.6	225.2	5.93	39.5	5	58	16	0.890	40.5
203 x 133 x 30	30.0	206.8	133.9	6.4	9.6	7.6	172.4	5.85	26.9	5	74	18	0.923	30.8
203 x 133 x 25	25.1	203.2	133.2	5.7	7.8	7.6	172.4	7.20	30.2	5	74	16	0.915	36.5
203 x 102 x 23	23.1	203.2	101.8	5.4	9.3	7.6	169.4	4.37	31.4	5	60	18	0.790	34.2
178 x 102 x 19	19.0	177.8	101.2	4.8	7.9	7.6	146.8	5.14	30.6	4	60	16	0.738	38.7
152 x 89 x 16	16.0	152.4	88.7	4.5	7.7	7.6	121.8	4.48	27.1	4	54	16	0.638	40.0
127 x 76 x 13	13.0	127.0	76.0	4.0	7.6	7.6	96.6	3.74	24.2	4	46	16	0.537	41.4

Table 2.1.1.5. Advance® UKB. Dimensions

BS EN 1993-1-1: 2005
BS 4-1: 2005

UK EUROCODES

B-7

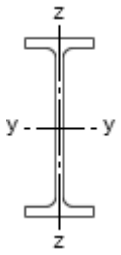
Table 2.1.1.6

SECTION PROPERTIES

UNIVERSAL BEAMS

Advance® UKB

PROPERTIES



Section Designation	Second Moment of Area		Radius of Gyration		Elastic Modulus		Plastic Modulus		Buckling Parameter	Torsional Index	Warping Constant	Torsional Constant	Area of Section
	Axis y-y	Axis z-z	Axis y-y	Axis z-z	Axis y-y	Axis z-z	Axis y-y	Axis z-z					
	cm^4	cm^4	cm	cm	cm^3	cm^3	cm^3	cm^3	U	X	I_w dm^6	I_T cm^4	A cm^2
305 x 127 x 48	9570	461	12.5	2.74	616	73.6	711	116	0.873	23.3	0.102	31.8	61.2
305 x 127 x 42	8200	389	12.4	2.70	534	62.6	614	98.4	0.872	26.5	0.0846	21.1	53.4
305 x 127 x 37	7170	336	12.3	2.67	471	54.5	539	85.4	0.872	29.7	0.0725	14.8	47.2
305 x 102 x 33	6500	194	12.5	2.15	416	37.9	481	60.0	0.867	31.6	0.0442	12.2	41.8
305 x 102 x 28	5370	155	12.2	2.08	348	30.5	403	48.4	0.859	37.3	0.0349	7.40	35.9
305 x 102 x 25	4460	123	11.9	1.97	292	24.2	342	38.8	0.846	43.4	0.027	4.77	31.6
254 x 146 x 43	6540	677	10.9	3.52	504	92.0	566	141	0.891	21.1	0.103	23.9	54.8
254 x 146 x 37	5540	571	10.8	3.48	433	78.0	483	119	0.890	24.3	0.0857	15.3	47.2
254 x 146 x 31	4410	448	10.5	3.36	351	61.3	393	94.1	0.879	29.6	0.0660	8.55	39.7
254 x 102 x 28	4000	179	10.5	2.22	308	34.9	353	54.8	0.873	27.5	0.0280	9.57	36.1
254 x 102 x 25	3410	149	10.3	2.15	266	29.2	306	46.0	0.866	31.4	0.0230	6.42	32.0
254 x 102 x 22	2840	119	10.1	2.06	224	23.5	259	37.3	0.856	36.3	0.0182	4.15	28.0
203 x 133 x 30	2900	385	8.71	3.17	280	57.5	314	88.2	0.882	21.5	0.0374	10.3	38.2
203 x 133 x 25	2340	308	8.56	3.10	230	46.2	258	70.9	0.876	25.6	0.0294	5.96	32.0
203 x 102 x 23	2100	164	8.46	2.36	207	32.2	234	49.7	0.888	22.4	0.0154	7.02	29.4
178 x 102 x 19	1360	137	7.48	2.37	153	27.0	171	41.6	0.886	22.6	0.0099	4.41	24.3
152 x 89 x 16	834	89.8	6.41	2.10	109	20.2	123	31.2	0.890	19.5	0.00470	3.56	20.3
127 x 76 x 13	473	55.7	5.35	1.84	74.6	14.7	84.2	22.6	0.894	16.3	0.00200	2.85	16.5

Table 2.1.1.6. Advance® UKB. Properties

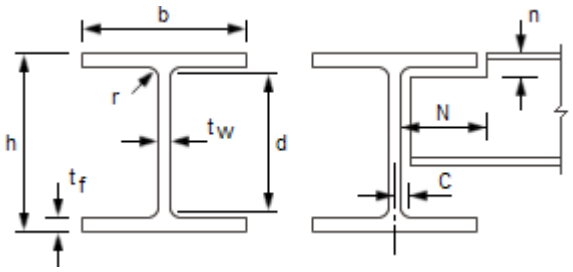
Table 2.1.2.1

SECTION PROPERTIES

UNIVERSAL COLUMNS

Advance® UKC

DIMENSIONS



Section Designation	Mass per Metre	Depth of Section	Width of Section	Thickness		Root Radius	Depth between Fillets	Ratios for Local Buckling		Dimensions for Detailing			Surface Area	
				Web	Flange			Flange	Web	End Clearance	Notch		Per Metre	Per Tonne
		h	b	t_w	t_f	r	d	c_f / t_f	c_w / t_w	C	N	n		
	kg/m	mm	mm	mm	mm	mm	mm			mm	mm	mm	m^2	m^2
356 x 406 x 634	633.9	474.6	424.0	47.6	77.0	15.2	290.2	2.25	6.10	26	200	94	2.52	3.98
356 x 406 x 551	551.0	455.6	418.5	42.1	67.5	15.2	290.2	2.56	6.89	23	200	84	2.47	4.48
356 x 406 x 467	467.0	436.6	412.2	35.8	58.0	15.2	290.2	2.98	8.11	20	200	74	2.42	5.18
356 x 406 x 393	393.0	419.0	407.0	30.6	49.2	15.2	290.2	3.52	9.48	17	200	66	2.38	6.06
356 x 406 x 340	339.9	406.4	403.0	26.6	42.9	15.2	290.2	4.03	10.9	15	200	60	2.35	6.91
356 x 406 x 287	287.1	393.6	399.0	22.6	36.5	15.2	290.2	4.74	12.8	13	200	52	2.31	8.05
356 x 406 x 235	235.1	381.0	394.8	18.4	30.2	15.2	290.2	5.73	15.8	11	200	46	2.28	9.70
356 x 368 x 202	201.9	374.6	374.7	16.5	27.0	15.2	290.2	6.07	17.6	10	190	44	2.19	10.8
356 x 368 x 177	177.0	368.2	372.6	14.4	23.8	15.2	290.2	6.89	20.2	9	190	40	2.17	12.3
356 x 368 x 153	152.9	362.0	370.5	12.3	20.7	15.2	290.2	7.92	23.6	8	190	36	2.16	14.1
356 x 368 x 129	129.0	355.6	368.6	10.4	17.5	15.2	290.2	9.4	27.9	7	190	34	2.14	16.6
305 x 305 x 283	282.9	365.3	322.2	26.8	44.1	15.2	246.7	3.00	9.21	15	158	60	1.94	6.86
305 x 305 x 240	240.0	352.5	318.4	23.0	37.7	15.2	246.7	3.51	10.7	14	158	54	1.91	7.96
305 x 305 x 198	198.1	339.9	314.5	19.1	31.4	15.2	246.7	4.22	12.9	12	158	48	1.87	9.44
305 x 305 x 158	158.1	327.1	311.2	15.8	25.0	15.2	246.7	5.30	15.6	10	158	42	1.84	11.6
305 x 305 x 137	136.9	320.5	309.2	13.8	21.7	15.2	246.7	6.11	17.90	9	158	38	1.82	13.3
305 x 305 x 118	117.9	314.5	307.4	12.0	18.7	15.2	246.7	7.09	20.6	8	158	34	1.81	15.4
305 x 305 x 97	96.9	307.9	305.3	9.9	15.4	15.2	246.7	8.60	24.9	7	158	32	1.79	18.5
254 x 254 x 167	167.1	289.1	265.2	19.2	31.7	12.7	200.3	3.48	10.4	12	134	46	1.58	9.46
254 x 254 x 132	132.0	276.3	261.3	15.3	25.3	12.7	200.3	4.36	13.1	10	134	38	1.55	11.7
254 x 254 x 107	107.1	266.7	258.8	12.8	20.5	12.7	200.3	5.38	15.6	8	134	34	1.52	14.2
254 x 254 x 89	88.9	260.3	256.3	10.3	17.3	12.7	200.3	6.38	19.4	7	134	30	1.50	16.9
254 x 254 x 73	73.1	254.1	254.6	8.6	14.2	12.7	200.3	7.77	23.3	6	134	28	1.49	20.4
203 x 203 x 127 +	127.5	241.4	213.9	18.1	30.1	10.2	160.8	2.91	8.88	11	108	42	1.28	10.0
203 x 203 x 113 +	113.5	235.0	212.1	16.3	26.9	10.2	160.8	3.26	9.87	10	108	38	1.27	11.2
203 x 203 x 100 +	99.6	228.6	210.3	14.5	23.7	10.2	160.8	3.70	11.1	9	108	34	1.25	12.6
203 x 203 x 86	86.1	222.2	209.1	12.7	20.5	10.2	160.8	4.29	12.7	8	110	32	1.24	14.4
203 x 203 x 71	71.0	215.8	206.4	10.0	17.3	10.2	160.8	5.09	16.1	7	110	28	1.22	17.2
203 x 203 x 60	60.0	209.6	205.8	9.4	14.2	10.2	160.8	6.20	17.1	7	110	26	1.21	20.2
203 x 203 x 52	52.0	206.2	204.3	7.9	12.5	10.2	160.8	7.04	20.4	6	110	24	1.20	23.1
203 x 203 x 46	46.1	203.2	203.6	7.2	11.0	10.2	160.8	8.00	22.3	6	110	22	1.19	25.8
152 x 152 x 51 +	51.2	170.2	157.4	11.0	15.7	7.6	123.6	4.18	11.2	8	84	24	0.935	18.3
152 x 152 x 44 +	44.0	166.0	155.9	9.5	13.6	7.6	123.6	4.82	13.0	7	84	22	0.924	21.0
152 x 152 x 37	37.0	161.8	154.4	8.0	11.5	7.6	123.6	5.70	15.5	6	84	20	0.912	24.7
152 x 152 x 30	30.0	157.6	152.9	6.5	9.4	7.6	123.6	6.98	19.0	5	84	18	0.901	30.0
152 x 152 x 23	23.0	152.4	152.2	5.8	6.8	7.6	123.6	9.65	21.3	5	84	16	0.889	38.7

Table 2.1.2.1. Advance® UKC. Dimensions

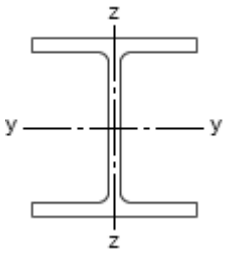
Table 2.1.2.2

SECTION PROPERTIES

UNIVERSAL COLUMNS

Advance® UKC

PROPERTIES



Section Designation	Second Moment of Area		Radius of Gyration		Elastic Modulus		Plastic Modulus		Buckling Parameter	Torsional Index	Warping Constant	Torsional Constant	Area of Section
	Axis y-y	Axis z-z	Axis y-y	Axis z-z	Axis y-y	Axis z-z	Axis y-y	Axis z-z					
	cm^4	cm^4	cm	cm	cm^3	cm^3	cm^3	cm^3	U	X	I_w dm^6	I_T cm^4	A cm^2
356 x 406 x 634	275000	98100	18.4	11.0	11600	4630	14200	7110	0.843	5.46	38.8	13700	808
356 x 406 x 551	227000	82700	18.0	10.9	9960	3950	12100	6060	0.841	6.05	31.1	9240	702
356 x 406 x 467	183000	67800	17.5	10.7	8380	3290	10000	5030	0.839	6.85	24.3	5810	595
356 x 406 x 393	147000	55400	17.1	10.5	7000	2720	8220	4150	0.837	7.86	18.9	3550	501
356 x 406 x 340	123000	46900	16.8	10.4	6030	2330	7000	3540	0.836	8.84	15.5	2340	433
356 x 406 x 287	99900	38700	16.5	10.3	5070	1940	5810	2950	0.835	10.17	12.3	1440	366
356 x 406 x 235	79100	31000	16.3	10.2	4150	1570	4690	2380	0.834	12.04	9.54	812	299
356 x 368 x 202	66300	23700	16.1	9.60	3540	1260	3970	1920	0.844	13.35	7.16	558	257
356 x 368 x 177	57100	20500	15.9	9.54	3100	1100	3460	1670	0.844	15.00	6.09	381	226
356 x 368 x 153	48600	17600	15.8	9.49	2680	948	2960	1430	0.844	17.01	5.11	251	195
356 x 368 x 129	40200	14600	15.6	9.43	2260	793	2480	1200	0.844	19.81	4.18	153	164
305 x 305 x 283	78900	24600	14.8	8.27	4320	1530	5110	2340	0.855	7.64	6.35	2030	360
305 x 305 x 240	64200	20300	14.5	8.15	3640	1280	4250	1950	0.854	8.73	5.03	1270	306
305 x 305 x 198	50900	16300	14.2	8.04	3000	1040	3440	1580	0.854	10.23	3.88	734	252
305 x 305 x 158	38700	12600	13.9	7.90	2370	808	2680	1230	0.851	12.46	2.87	378	201
305 x 305 x 137	32800	10700	13.7	7.83	2050	692	2300	1050	0.851	14.13	2.39	249	174
305 x 305 x 118	27700	9060	13.6	7.77	1760	589	1960	895	0.850	16.14	1.98	161	150
305 x 305 x 97	22200	7310	13.4	7.69	1450	479	1590	726	0.850	19.19	1.56	91.2	123
254 x 254 x 167	30000	9870	11.9	6.81	2080	744	2420	1140	0.851	8.48	1.63	626	213
254 x 254 x 132	22500	7530	11.6	6.69	1630	576	1870	878	0.850	10.32	1.19	319	168
254 x 254 x 107	17500	5930	11.3	6.59	1310	458	1480	697	0.848	12.38	0.898	172	136
254 x 254 x 89	14300	4860	11.2	6.55	1100	379	1220	575	0.850	14.46	0.717	102	113
254 x 254 x 73	11400	3910	11.1	6.48	898	307	992	465	0.849	17.24	0.562	57.6	93.1
203 x 203 x 127 +	15400	4920	9.75	5.50	1280	460	1520	704	0.854	7.38	0.549	427	162
203 x 203 x 113 +	13300	4290	9.59	5.45	1130	404	1330	618	0.853	8.11	0.464	305	145
203 x 203 x 100 +	11300	3680	9.44	5.39	988	350	1150	534	0.852	9.02	0.386	210	127
203 x 203 x 86	9450	3130	9.28	5.34	850	299	977	456	0.850	10.20	0.318	137	110
203 x 203 x 71	7620	2540	9.18	5.30	706	246	799	374	0.853	11.90	0.250	80.2	90.4
203 x 203 x 60	6120	2060	8.96	5.20	584	201	656	305	0.846	14.10	0.197	47.2	76.4
203 x 203 x 52	5260	1780	8.91	5.18	510	174	567	264	0.848	15.80	0.167	31.8	66.3
203 x 203 x 46	4570	1550	8.82	5.13	450	152	497	231	0.847	17.70	0.143	22.2	58.7
152 x 152 x 51 +	3230	1020	7.04	3.96	379	130	438	199	0.848	10.10	0.061	48.8	65.2
152 x 152 x 44 +	2700	860	6.94	3.92	326	110	372	169	0.848	11.50	0.050	31.7	56.1
152 x 152 x 37	2210	706	6.85	3.87	273	91.5	309	140	0.848	13.30	0.040	19.2	47.1
152 x 152 x 30	1750	560	6.76	3.83	222	73.3	248	112	0.849	16.00	0.031	10.5	38.3
152 x 152 x 23	1250	400	6.54	3.70	164	52.6	182	80.1	0.840	20.70	0.021	4.63	29.2

Table 2.1.2.2. Advance® UKC. Properties

BS EN 1993-1-1: 2005
BS 4-1: 2005

UK EUROCODES

B-34

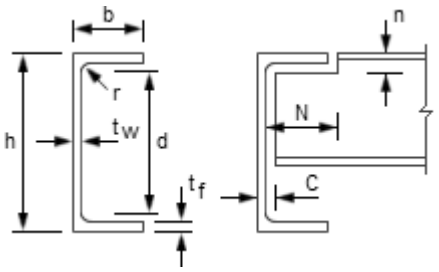
Table 2.1.4.1

SECTION PROPERTIES

PARALLEL FLANGE CHANNELS

Advance® UKPFC

DIMENSIONS



Section Designation	Mass per Metre	Depth of Section	Width of Section	Thickness		Root Radius	Depth between Fillets	Ratios for Local Buckling		Distance	Dimensions for Detailing			Surface Area	
				Web	Flange			Flange	Web		End Clearance	Notch		Per Metre	Per Tonne
		h	b	t_w	t_f	r	d	c_f / t_f	c_w / t_w	e_0	C	N	n		
	kg/m	mm	mm	mm	mm	mm	mm			cm	mm	mm	mm	m^2	m^2
430 x 100 x 64	64.4	430	100	11.0	19.0	15	362	3.89	32.9	3.27	13	96	36	1.23	19.0
380 x 100 x 54	54.0	380	100	9.5	17.5	15	315	4.31	33.2	3.48	12	98	34	1.13	20.9
300 x 100 x 46	45.5	300	100	9.0	16.5	15	237	4.61	26.3	3.68	11	98	32	0.969	21.3
300 x 90 x 41	41.4	300	90	9.0	15.5	12	245	4.45	27.2	3.18	11	88	28	0.932	22.5
260 x 90 x 35	34.8	260	90	8.0	14.0	12	208	5.00	26.0	3.32	10	88	28	0.854	24.5
260 x 75 x 28	27.6	260	75	7.0	12.0	12	212	4.67	30.3	2.62	9	74	26	0.796	28.8
230 x 90 x 32	32.2	230	90	7.5	14.0	12	178	5.04	23.7	3.46	10	90	28	0.795	24.7
230 x 75 x 26	25.7	230	75	6.5	12.5	12	181	4.52	27.8	2.78	9	76	26	0.737	28.7
200 x 90 x 30	29.7	200	90	7.0	14.0	12	148	5.07	21.1	3.60	9	90	28	0.736	24.8
200 x 75 x 23	23.4	200	75	6.0	12.5	12	151	4.56	25.2	2.91	8	76	26	0.678	28.9
180 x 90 x 26	26.1	180	90	6.5	12.5	12	131	5.72	20.2	3.64	9	90	26	0.697	26.7
180 x 75 x 20	20.3	180	75	6.0	10.5	12	135	5.43	22.5	2.87	8	76	24	0.638	31.4
150 x 90 x 24	23.9	150	90	6.5	12.0	12	102	5.96	15.7	3.71	9	90	26	0.637	26.7
150 x 75 x 18	17.9	150	75	5.5	10.0	12	106	5.75	19.3	2.99	8	76	24	0.579	32.4
125 x 65 x 15	14.8	125	65	5.5	9.5	12	82.0	5.00	14.9	2.56	8	66	22	0.489	33.1
100 x 50 x 10	10.2	100	50	5.0	8.5	9	65.0	4.24	13.0	1.94	7	52	18	0.382	37.5

Table 2.1.4.1. Advance® UKPFC. Dimensions

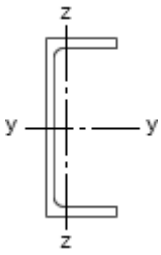
Table 2.1.4.2

SECTION PROPERTIES

PARALLEL FLANGE CHANNELS

Advance® UKPFC

PROPERTIES



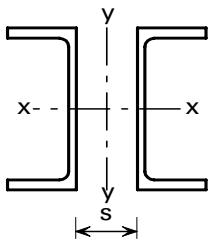
Section Designation	Second Moment of Area		Radius of Gyration		Elastic Modulus		Plastic Modulus		Buckling Parameter	Torsional Index	Warping Constant	Torsional Constant	Area of Section
	Axis y-y	Axis z-z	Axis y-y	Axis z-z	Axis y-y	Axis z-z	Axis y-y	Axis z-z					
	cm^4	cm^4	cm	cm	cm^3	cm^3	cm^3	cm^3	U	X	I_w dm^6	I_T cm^4	A cm^2
430 x 100 x 64	21900	722	16.3	2.97	1020	97.9	1220	176	0.917	22.5	0.219	63.0	82.1
380 x 100 x 54	15000	643	14.8	3.06	791	89.2	933	161	0.933	21.2	0.150	45.7	68.7
300 x 100 x 46	8230	568	11.9	3.13	549	81.7	641	148	0.944	17.0	0.0813	36.8	58.0
300 x 90 x 41	7220	404	11.7	2.77	481	63.1	568	114	0.934	18.3	0.0581	28.8	52.7
260 x 90 x 35	4730	353	10.3	2.82	364	56.3	425	102	0.943	17.2	0.0379	20.6	44.4
260 x 75 x 28	3620	185	10.1	2.30	278	34.4	328	62.0	0.932	20.5	0.0203	11.7	35.1
230 x 90 x 32	3520	334	9.27	2.86	306	55.0	355	98.9	0.949	15.1	0.0279	19.3	41.0
230 x 75 x 26	2750	181	9.17	2.35	239	34.8	278	63.2	0.945	17.3	0.0153	11.8	32.7
200 x 90 x 30	2520	314	8.16	2.88	252	53.4	291	94.5	0.952	12.9	0.0197	18.3	37.9
200 x 75 x 23	1960	170	8.11	2.39	196	33.8	227	60.6	0.956	14.7	0.0107	11.1	29.9
180 x 90 x 26	1820	277	7.40	2.89	202	47.4	232	83.5	0.950	12.8	0.0141	13.3	33.2
180 x 75 x 20	1370	146	7.27	2.38	152	28.8	176	51.8	0.945	15.3	0.00754	7.34	25.9
150 x 90 x 24	1160	253	6.18	2.89	155	44.4	179	76.9	0.937	10.8	0.00890	11.8	30.4
150 x 75 x 18	861	131	6.15	2.40	115	26.6	132	47.2	0.945	13.1	0.00467	6.10	22.8
125 x 65 x 15	483	80.0	5.07	2.06	77.3	18.8	89.9	33.2	0.942	11.1	0.00194	4.72	18.8
100 x 50 x 10	208	32.3	4.00	1.58	41.5	9.89	48.9	17.5	0.942	10.0	0.000491	2.53	13.0

Table 2.1.4.2. Advance® UKPFC. Properties

BS 5950-1: 2000
BS 4-1: 2005

TWO PARALLEL FLANGE CHANNELS LACED

TWO Advance UKPFC LACED



Dimensions and properties

Composed of Two Channels	Total Mass per Metre	Total Area	Space between Webs	Second Moment of Area		Radius of Gyration		Elastic Modulus		Plastic Modulus	
				Axis x-x	Axis y-y	Axis x-x	Axis y-y	Axis x-x	Axis y-y	Axis x-x	Axis y-y
			s								
	kg/m	cm^2	mm	cm^4	cm^4	cm	cm	cm^3	cm^3	cm^3	cm^3
430x100x64	129	164	270	43900	44100	16.3	16.4	2040	1880	2440	2650
380x100x54	108	137	235	30100	30400	14.8	14.9	1580	1400	1870	2000
300x100x46	91.1	116	170	16500	16600	11.9	12.0	1100	898	1280	1340
300x90x41	82.8	105	175	14400	14400	11.7	11.7	962	811	1140	1200
260x90x35	69.7	88.8	145	9460	9560	10.3	10.4	727	588	849	886
260x75x28	55.2	70.3	155	7240	7190	10.1	10.1	557	472	656	692
230x90x32	64.3	81.9	120	7040	7190	9.27	9.37	612	479	709	731
230x75x26	51.3	65.4	135	5500	5720	9.17	9.35	478	401	557	592
200x90x30	59.4	75.7	90.0	5050	5030	8.16	8.15	505	372	583	577
200x75x23	46.9	59.7	105	3930	3910	8.11	8.09	393	306	454	462
180x90x26	52.1	66.4	75.0	3640	3730	7.40	7.49	404	292	464	459
180x75x20	40.7	51.8	90.0	2740	2770	7.27	7.31	304	231	352	358
150x90x24	47.7	60.8	45.0	2320	2380	6.18	6.26	310	212	357	338
150x75x18	35.7	45.5	65.0	1720	1810	6.15	6.30	230	168	264	265
125x65x15	29.5	37.6	50.0	966	1010	5.07	5.18	155	112	180	178
100x50x10	20.4	26.0	40.0	415	427	4.00	4.05	83.1	61.0	97.7	97.1

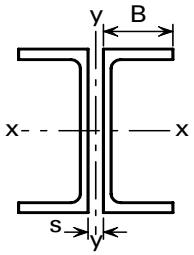
Advance and UKPFC are trademarks of Corus. A fuller description of the relationship between Parallel Flange Channels (PFC) and the Advance range of sections manufactured by Corus is given on page A - 42.

FOR EXPLANATION OF TABLES SEE NOTES 2 AND 3

BS 5950-1: 2000
BS 4-1: 2005

TWO PARALLEL FLANGE CHANNELS BACK TO BACK

TWO Advance UKPFC BACK TO BACK



Dimensions and properties

Composed of Two Channels	Total Mass per Metre	Total Area	Properties about Axis x-x				Radius of Gyration r_y about Axis y-y (cm)				
			I_x	r_x	Z_x	S_x	Space between webs, s (mm)				
	kg/m	cm^2	cm^4	cm	cm^3	cm^3	0	8	10	12	15
430x100x64	129	164	43900	16.3	2040	2440	3.96	4.23	4.31	4.38	4.49
380x100x54	108	137	30100	14.8	1580	1870	4.14	4.42	4.49	4.57	4.68
300x100x46	91.1	116	16500	11.9	1100	1280	4.37	4.66	4.73	4.81	4.92
300x90x41	82.8	105	14400	11.7	962	1140	3.80	4.08	4.16	4.23	4.35
260x90x35	69.7	88.8	9460	10.3	727	849	3.93	4.22	4.29	4.37	4.48
260x75x28	55.2	70.3	7240	10.1	557	656	3.11	3.40	3.47	3.55	3.66
230x90x32	64.3	81.9	7040	9.27	612	709	4.09	4.38	4.46	4.53	4.65
230x75x26	51.3	65.4	5500	9.17	478	557	3.29	3.58	3.66	3.73	3.85
200x90x30	59.4	75.7	5050	8.16	505	583	4.25	4.55	4.63	4.71	4.83
200x75x23	46.9	59.7	3930	8.11	393	454	3.44	3.74	3.82	3.89	4.01
180x90x26	52.1	66.4	3640	7.40	404	464	4.29	4.59	4.67	4.75	4.87
180x75x20	40.7	51.8	2740	7.27	304	352	3.39	3.68	3.76	3.84	3.95
150x90x24	47.7	60.8	2320	6.18	310	357	4.39	4.69	4.77	4.85	4.98
150x75x18	35.7	45.5	1720	6.15	230	264	3.52	3.82	3.90	3.98	4.10
125x65x15	29.5	37.6	966	5.07	155	180	3.05	3.36	3.44	3.52	3.64
100x50x10	20.4	26.0	415	4.00	83.1	97.7	2.34	2.65	2.73	2.82	2.94

Advance and UKPFC are trademarks of Corus. A fuller description of the relationship between Parallel Flange Channels (PFC) and the Advance range of sections manufactured by Corus is given on page A - 42.

Properties about y axis:

$I_y = (\text{Total Area}).(r_y)^2$

$Z_y = I_y/(B+0.5s)$

where s is the space between webs.

FOR EXPLANATION OF TABLES SEE NOTES 2 AND 3

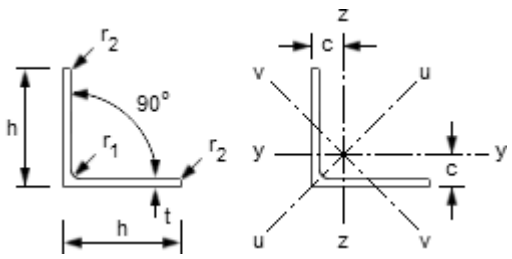
Table 2.1.5.1

SECTION PROPERTIES

EQUAL ANGLES

Advance® UKA - Equal

DIMENSIONS AND PROPERTIES



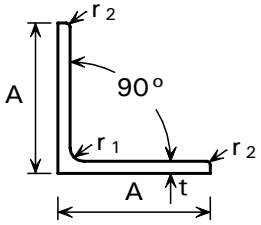
Section Designation		Mass per Metre	Radius		Area of Section	Distance to Centroid	Second Moment of Area			Radius of Gyration			Elastic Modulus	Torsional Constant	Equivalent Slenderness Coefficient
Size	Thickness		Root	Toe			Axis y-y, z-z	Axis u-u	Axis v-v	Axis y-y, z-z	Axis u-u	Axis v-v	Axis y-y, z-z		
h x h	t		r_1	r_2		c								I_T	φ_a
mm	mm	kg/m	mm	mm	cm^2	cm	cm^4	cm^4	cm^4	cm	cm	cm	cm^3	cm^4	
200 x 200	24	71.1	18.0	9.00	90.6	5.84	3330	5280	1380	6.06	7.64	3.90	235	182	2.50
	20	59.9	18.0	9.00	76.3	5.68	2850	4530	1170	6.11	7.70	3.92	199	107	3.05
	18	54.3	18.0	9.00	69.1	5.60	2600	4150	1050	6.13	7.75	3.90	181	78.9	3.43
	16	48.5	18.0	9.00	61.8	5.52	2340	3720	960	6.16	7.76	3.94	162	56.1	3.85
150 x 150	18 +	40.1	16.0	8.00	51.2	4.38	1060	1680	440	4.55	5.73	2.93	99.8	58.6	2.48
	15	33.8	16.0	8.00	43.0	4.25	898	1430	370	4.57	5.76	2.93	83.5	34.6	3.01
	12	27.3	16.0	8.00	34.8	4.12	737	1170	303	4.60	5.80	2.95	67.7	18.2	3.77
	10	23.0	16.0	8.00	29.3	4.03	624	990	258	4.62	5.82	2.97	56.9	10.8	4.51
120 x 120	15 +	26.6	13.0	6.50	34.0	3.52	448	710	186	3.63	4.57	2.34	52.8	27.0	2.37
	12	21.6	13.0	6.50	27.5	3.40	368	584	152	3.65	4.60	2.35	42.7	14.2	2.99
	10	18.2	13.0	6.50	23.2	3.31	313	497	129	3.67	4.63	2.36	36.0	8.41	3.61
	8 +	14.7	13.0	6.50	18.8	3.24	259	411	107	3.71	4.67	2.38	29.5	4.44	4.56
100 x 100	15 +	21.9	12.0	6.00	28.0	3.02	250	395	105	2.99	3.76	1.94	35.8	22.3	1.92
	12	17.8	12.0	6.00	22.7	2.90	207	328	85.7	3.02	3.80	1.94	29.1	11.8	2.44
	10	15.0	12.0	6.00	19.2	2.82	177	280	73.0	3.04	3.83	1.95	24.6	6.97	2.94
	8	12.2	12.0	6.00	15.5	2.74	145	230	59.9	3.06	3.85	1.96	19.9	3.68	3.70
90 x 90	12 +	15.9	11.0	5.50	20.3	2.66	149	235	62.0	2.71	3.40	1.75	23.5	10.5	2.17
	10	13.4	11.0	5.50	17.1	2.58	127	201	52.6	2.72	3.42	1.75	19.8	6.20	2.64
	8	10.9	11.0	5.50	13.9	2.50	104	166	43.1	2.74	3.45	1.76	16.1	3.28	3.33
	7	9.61	11.0	5.50	12.2	2.45	92.6	147	38.3	2.75	3.46	1.77	14.1	2.24	3.80

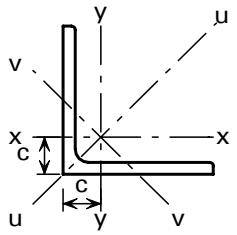
Table 2.1.5.1. Advance® UKA - Equal. Dimensions and Properties

BS 5950-1: 2000
BS EN 10056-1: 1999

EQUAL ANGLES

Advance UKA - Equal Angles





Dimensions and properties

Section Designation		Mass per	Radius		Area of	Dimension	Second Moment of Area			Radius of Gyration			Elastic Modulus	Torsional Constant	Equivalent Slenderness
Size	Thickness	Metre	Root	Toe	Section		Axis x-x, y-y	Axis u-u	Axis v-v	Axis x-x, y-y	Axis u-u	Axis v-v	Axis x-x, y-y		Coefficient
A x A	t		r_1	r_2		c								J	ϕ_a
mm	mm	kg/m	mm	mm	cm^2	cm	cm^4	cm^4	cm^4	cm	cm	cm	cm^3	cm^4	
200x200	24	71.1	18.0	9.00	90.6	5.84	3330	5280	1380	6.06	7.64	3.90	235	182	2.50
	20	59.9	18.0	9.00	76.3	5.68	2850	4530	1170	6.11	7.70	3.92	199	107	3.05
	18	54.3	18.0	9.00	69.1	5.60	2600	4150	1050	6.13	7.75	3.90	181	78.9	3.43
	16	48.5	18.0	9.00	61.8	5.52	2340	3720	960	6.16	7.76	3.94	162	56.1	3.85
150x150	18 +	40.1	16.0	8.00	51.2	4.38	1060	1680	440	4.55	5.73	2.93	99.8	58.6	2.48
	15	33.8	16.0	8.00	43.0	4.25	898	1430	370	4.57	5.76	2.93	83.5	34.6	3.01
	12	27.3	16.0	8.00	34.8	4.12	737	1170	303	4.60	5.80	2.95	67.7	18.2	3.77
	10	23.0	16.0	8.00	29.3	4.03	624	990	258	4.62	5.82	2.97	56.9	10.8	4.51
120x120	15 +	26.6	13.0	6.50	34.0	3.52	448	710	186	3.63	4.57	2.34	52.8	27.0	2.37
	12	21.6	13.0	6.50	27.5	3.40	368	584	152	3.65	4.60	2.35	42.7	14.2	2.99
	10	18.2	13.0	6.50	23.2	3.31	313	497	129	3.67	4.63	2.36	36.0	8.41	3.61
	8 +	14.7	13.0	6.50	18.8	3.24	259	411	107	3.71	4.67	2.38	29.5	4.44	4.56
100x100	15 +	21.9	12.0	6.00	28.0	3.02	250	395	105	2.99	3.76	1.94	35.8	22.3	1.92
	12	17.8	12.0	6.00	22.7	2.90	207	328	85.7	3.02	3.80	1.94	29.1	11.8	2.44
	10	15.0	12.0	6.00	19.2	2.82	177	280	73.0	3.04	3.83	1.95	24.6	6.97	2.94
	8	12.2	12.0	6.00	15.5	2.74	145	230	59.9	3.06	3.85	1.96	19.9	3.68	3.70
90x90	12 +	15.9	11.0	5.50	20.3	2.66	149	235	62.0	2.71	3.40	1.75	23.5	10.5	2.17
	10	13.4	11.0	5.50	17.1	2.58	127	201	52.6	2.72	3.42	1.75	19.8	6.20	2.64
	8	10.9	11.0	5.50	13.9	2.50	104	166	43.1	2.74	3.45	1.76	16.1	3.28	3.33
	7	9.61	11.0	5.50	12.2	2.45	92.6	147	38.3	2.75	3.46	1.77	14.1	2.24	3.80
80x80	10	11.9	10.0	5.00	15.1	2.34	87.5	139	36.4	2.41	3.03	1.55	15.4	5.45	2.33
	8	9.63	10.0	5.00	12.3	2.26	72.2	115	29.9	2.43	3.06	1.56	12.6	2.88	2.94
75x75	8	8.99	9.00	4.50	11.4	2.14	59.1	93.8	24.5	2.27	2.86	1.46	11.0	2.65	2.76
	6	6.85	9.00	4.50	8.73	2.05	45.8	72.7	18.9	2.29	2.89	1.47	8.41	1.17	3.70
70x70	7	7.38	9.00	4.50	9.40	1.97	42.3	67.1	17.5	2.12	2.67	1.36	8.41	1.69	2.92
	6	6.38	9.00	4.50	8.13	1.93	36.9	58.5	15.3	2.13	2.68	1.37	7.27	1.09	3.41
65x65	7	6.83	9.00	4.50	8.73	2.05	33.4	53.0	13.8	1.96	2.47	1.26	7.18	1.58	2.67
60x60	8	7.09	8.00	4.00	9.03	1.77	29.2	46.1	12.2	1.80	2.26	1.16	6.89	2.09	2.14
	6	5.42	8.00	4.00	6.91	1.69	22.8	36.1	9.44	1.82	2.29	1.17	5.29	0.922	2.90
	5	4.57	8.00	4.00	5.82	1.64	19.4	30.7	8.03	1.82	2.30	1.17	4.45	0.550	3.48
50x50	6	4.47	7.00	3.50	5.69	1.45	12.8	20.3	5.34	1.50	1.89	0.968	3.61	0.755	2.38
	5	3.77	7.00	3.50	4.80	1.40	11.0	17.4	4.55	1.51	1.90	0.973	3.05	0.450	2.88
	4	3.06	7.00	3.50	3.89	1.36	8.97	14.2	3.73	1.52	1.91	0.979	2.46	0.240	3.57
45x45	5	3.06	7.00	3.50	3.90	1.25	7.14	11.4	2.94	1.35	1.71	0.870	2.20	0.304	2.84
40x40	5	2.97	6.00	3.00	3.79	1.16	5.43	8.60	2.26	1.20	1.51	0.773	1.91	0.352	2.26
	4	2.42	6.00	3.00	3.08	1.12	4.47	7.09	1.86	1.21	1.52	0.777	1.55	0.188	2.83
35x35	4	2.09	5.00	2.50	2.67	1.00	2.95	4.68	1.23	1.05	1.32	0.678	1.18	0.158	2.50
30x30	4	1.78	5.00	2.50	2.27	0.878	1.80	2.85	0.754	0.892	1.12	0.577	0.850	0.137	2.07
	3	1.36	5.00	2.50	1.74	0.835	1.40	2.22	0.585	0.899	1.13	0.581	0.649	0.0613	2.75
25x25	4	1.45	3.50	1.75	1.85	0.762	1.02	1.61	0.430	0.741	0.931	0.482	0.586	0.1070	1.75
	3	1.12	3.50	1.75	1.42	0.723	0.803	1.27	0.334	0.751	0.945	0.484	0.452	0.0472	2.38
20x20	3	0.882	3.50	1.75	1.12	0.598	0.392	0.618	0.165	0.590	0.742	0.383	0.279	0.0382	1.81

Advance and UKA are trademarks of Corus. A fuller description of the relationship between Angles and the Advance range of sections manufactured by Corus is given on page A - 42.

+ These sections are in addition to the range of BS EN 10056-1 sections.

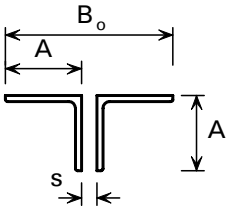
c is the distance from the back of the leg to the centre of gravity.

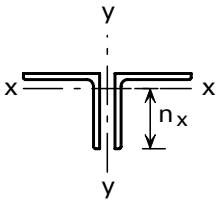
FOR EXPLANATION OF TABLES SEE NOTES 2 AND 3

BS 5950-1: 2000
BS EN 10056-1: 1999

EQUAL ANGLES BACK TO BACK

Advance UKA - Equal Angles BACK TO BACK





Dimensions and properties

Composed of Two Angles		Total Mass per Metre	Distance	Total Area	Properties about Axis x-x			Radius of Gyration r_y about Axis y-y (cm)				
								Space between angles, s, (mm)				
A x A	t		n_x		I_x	r_x	Z_x					
mm	mm	kg/m	cm	cm^2	cm^4	cm	cm^3	0	8	10	12	15
200x200	24	142	14.2	181	6660	6.06	470	8.42	8.70	8.77	8.84	8.95
	20	120	14.3	153	5700	6.11	398	8.34	8.62	8.69	8.76	8.87
	18	109	14.4	138	5200	6.13	362	8.31	8.58	8.65	8.72	8.83
	16	97.0	14.5	124	4680	6.16	324	8.27	8.54	8.61	8.68	8.79
150x150	18 +	80.2	10.6	102	2120	4.55	200	6.32	6.60	6.67	6.75	6.86
	15	67.6	10.8	86.0	1800	4.57	167	6.24	6.52	6.59	6.66	6.77
	12	54.6	10.9	69.6	1470	4.60	135	6.18	6.45	6.52	6.59	6.70
	10	46.0	11.0	58.6	1250	4.62	114	6.13	6.40	6.47	6.54	6.64
120x120	15 +	53.2	8.48	68.0	896	3.63	106	5.06	5.34	5.42	5.49	5.60
	12	43.2	8.60	55.0	736	3.65	85.4	4.99	5.27	5.35	5.42	5.53
	10	36.4	8.69	46.4	626	3.67	72.0	4.94	5.22	5.29	5.36	5.47
	8 +	29.4	8.76	37.6	518	3.71	59.0	4.93	5.20	5.27	5.34	5.45
100x100	15 +	43.8	6.98	56.0	500	2.99	71.6	4.25	4.54	4.62	4.69	4.81
	12	35.6	7.10	45.4	414	3.02	58.2	4.19	4.47	4.55	4.62	4.74
	10	30.0	7.18	38.4	354	3.04	49.2	4.14	4.43	4.50	4.57	4.69
	8	24.4	7.26	31.0	290	3.06	39.8	4.11	4.38	4.46	4.53	4.64
90x90	12 +	31.8	6.34	40.6	298	2.71	47.0	3.80	4.09	4.16	4.24	4.36
	10	26.8	6.42	34.2	254	2.72	39.6	3.75	4.04	4.11	4.19	4.30
	8	21.8	6.50	27.8	208	2.74	32.2	3.71	3.99	4.06	4.13	4.25
	7	19.2	6.55	24.4	185	2.75	28.2	3.69	3.96	4.04	4.11	4.22
80x80	10	23.8	5.66	30.2	175	2.41	30.8	3.36	3.65	3.72	3.80	3.92
	8	19.3	5.74	24.6	144	2.43	25.2	3.31	3.60	3.67	3.75	3.86
75x75	8	18.0	5.36	22.8	118	2.27	22.0	3.12	3.41	3.49	3.56	3.68
	6	13.7	5.45	17.5	91.6	2.29	16.8	3.07	3.35	3.43	3.50	3.62
70x70	7	14.8	5.03	18.8	84.6	2.12	16.8	2.89	3.18	3.26	3.33	3.45
	6	12.8	5.07	16.3	73.8	2.13	14.5	2.87	3.16	3.23	3.31	3.42
65x65	7	13.7	4.45	17.5	66.8	1.96	14.4	2.83	3.14	3.21	3.29	3.42
60x60	8	14.2	4.23	18.1	58.4	1.80	13.8	2.52	2.82	2.90	2.97	3.10
	6	10.8	4.31	13.8	45.6	1.82	10.6	2.48	2.77	2.85	2.92	3.04
	5	9.14	4.36	11.6	38.8	1.82	8.90	2.45	2.74	2.81	2.89	3.01
50x50	6	8.94	3.55	11.4	25.6	1.50	7.22	2.09	2.38	2.46	2.54	2.66
	5	7.54	3.60	9.60	22.0	1.51	6.10	2.06	2.35	2.43	2.51	2.63
	4	6.12	3.64	7.78	17.9	1.52	4.92	2.04	2.32	2.40	2.48	2.60

Advance and UKA are trademarks of Corus. A fuller description of the relationship between Angles and the Advance range of sections manufactured by Corus is given on page A - 42.

+ These sections are in addition to the range of BS EN 10056-1 sections.

Properties about y-y axis:

$I_y = (\text{Total Area}).(r_y)^2$

$Z_y = I_y / (0.5B_o)$

FOR EXPLANATION OF TABLES SEE NOTES 2 AND 3

UK EUROCODES

B-40

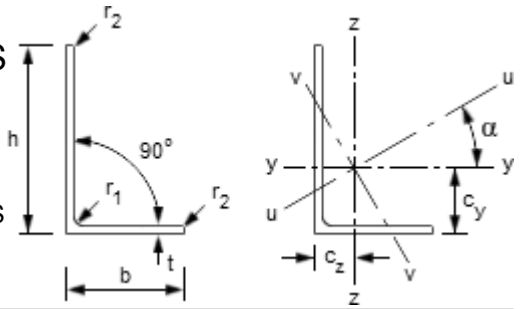
Table 2.1.6.1

SECTION PROPERTIES

UNEQUAL ANGLES

Advance® UKA - Unqual

DIMENSIONS AND PROPERTIES



Section Designation		Mass per Metre	Radius		Dimension		Second Moment of Area				Radius of Gyration			
Size	Thickness		Root	Toe			Axis y-y	Axis z-z	Axis u-u	Axis v-v	Axis y-y	Axis z-z	Axis u-u	Axis v-v
h x b	t		r_1	r_2	c_y	c_z								
mm	mm	kg/m	mm	mm	cm	cm	cm^4	cm^4	cm^4	cm^4	cm	cm	cm	cm
200 x 150	18 +	47.1	15.0	7.50	6.33	3.85	2380	1150	2920	623	6.29	4.37	6.97	3.22
	15	39.6	15.0	7.50	6.21	3.73	2020	979	2480	526	6.33	4.40	7.00	3.23
	12	32.0	15.0	7.50	6.08	3.61	1650	803	2030	430	6.36	4.44	7.04	3.25
200 x 100	15	33.8	15.0	7.50	7.16	2.22	1760	299	1860	193	6.40	2.64	6.59	2.12
	12	27.3	15.0	7.50	7.03	2.10	1440	247	1530	159	6.43	2.67	6.63	2.14
	10	23.0	15.0	7.50	6.93	2.01	1220	210	1290	135	6.46	2.68	6.65	2.15
150 x 90	15	33.9	12.0	6.00	5.21	2.23	761	205	841	126	4.74	2.46	4.98	1.93
	12	21.6	12.0	6.00	5.08	2.12	627	171	694	104	4.77	2.49	5.02	1.94
	10	18.2	12.0	6.00	5.00	2.04	533	146	591	88.3	4.80	2.51	5.05	1.95
150 x 75	15	24.8	12.0	6.00	5.52	1.81	713	119	753	78.6	4.75	1.94	4.88	1.58
	12	20.2	12.0	6.00	5.40	1.69	588	99.6	623	64.7	4.78	1.97	4.92	1.59
	10	17.0	12.0	6.00	5.31	1.61	501	85.6	531	55.1	4.81	1.99	4.95	1.60
125 x 75	12	17.8	11.0	5.50	4.31	1.84	354	95.5	391	58.5	3.95	2.05	4.15	1.61
	10	15.0	11.0	5.50	4.23	1.76	302	82.1	334	49.9	3.97	2.07	4.18	1.61
	8	12.2	11.0	5.50	4.14	1.68	247	67.6	274	40.9	4.00	2.09	4.21	1.63
100 x 75	12	15.4	10.0	5.00	3.27	2.03	189	90.2	230	49.5	3.10	2.14	3.42	1.59
	10	13.0	10.0	5.00	3.19	1.95	162	77.6	197	42.2	3.12	2.16	3.45	1.59
	8	10.6	10.0	5.00	3.10	1.87	133	64.1	162	34.6	3.14	2.18	3.47	1.60
100 x 65	10 +	12.3	10.0	5.00	3.36	1.63	154	51.0	175	30.1	3.14	1.81	3.35	1.39
	8 +	9.94	10.0	5.00	3.27	1.55	127	42.2	144	24.8	3.16	1.83	3.37	1.40
	7 +	8.77	10.0	5.00	3.23	1.51	113	37.6	128	22.0	3.17	1.83	3.39	1.40

Table 2.1.6.1. Advance® UKA - Unequal. Dimensions and Properties

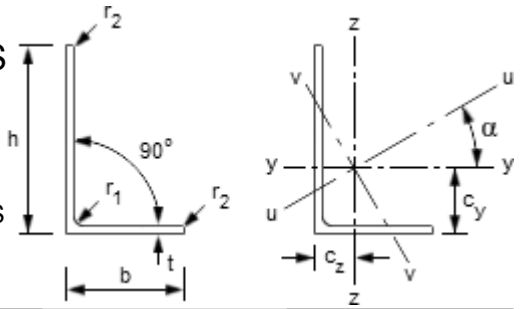
Table 2.1.6.2

SECTION PROPERTIES

UNEQUAL ANGLES

Advance® UKA - Unqual

DIMENSIONS AND PROPERTIES



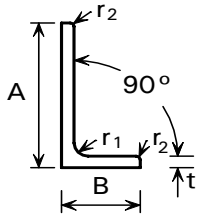
Section Designation		Elastic Modulus		Angle Axis y-y to Axis u-u Tan α	Torsional Constant	Equivalent Slenderness Coefficient		Mono-symmetry Index	Area of Section
Size	Thickness	Axis y-y	Axis z-z			Min	Max		
h x b	t				I_T	φ_a	φ_a	ψ_a	
mm	mm	cm^3	cm^3		cm^4				cm^2
200 x 150	18 +	174	103	0.549	67.9	2.93	3.72	4.60	60.0
	15	147	86.9	0.551	39.9	3.53	4.50	5.55	50.5
	12	119	70.5	0.552	20.9	4.43	5.70	6.97	40.8
200 x 100	15	137	38.5	0.260	34.3	3.54	5.17	9.19	43.0
	12	111	31.3	0.262	18.0	4.42	6.57	11.5	34.8
	10	93.2	26.3	0.263	10.66	5.26	7.92	13.9	29.2
150 x 90	15	77.7	30.4	0.354	26.8	2.58	3.59	5.96	33.9
	12	63.3	24.8	0.358	14.1	3.24	4.58	7.50	27.5
	10	53.3	21.0	0.360	8.30	3.89	5.56	9.03	23.2
150 x 75	15	75.2	21.0	0.253	25.1	2.62	3.74	6.84	31.7
	12	61.3	17.1	0.258	13.2	3.30	4.79	8.60	25.7
	10	51.6	14.5	0.261	7.80	3.95	5.83	10.4	21.7
125 x 75	12	43.2	16.9	0.354	11.6	2.66	3.73	6.23	22.7
	10	36.5	14.3	0.357	6.87	3.21	4.55	7.50	19.1
	8	29.6	11.6	0.360	3.62	4.00	5.75	9.43	15.5
100 x 75	12	28.0	16.5	0.540	10.05	2.10	2.64	3.46	19.7
	10	23.8	14.0	0.544	5.95	2.54	3.22	4.17	16.6
	8	19.3	11.4	0.547	3.13	3.18	4.08	5.24	13.5
100 x 65	10 +	23.2	10.5	0.410	5.61	2.52	3.43	5.45	15.6
	8 +	18.9	8.54	0.413	2.96	3.14	4.35	6.86	12.7
	7 +	16.6	7.53	0.415	2.02	3.58	5.00	7.85	11.2

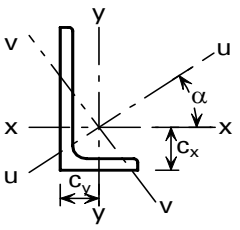
Table 2.1.6.2. Advance® UKA - Unequal. Dimensions and Properties

BS 5950-1: 2000
BS EN 10056-1: 1999

UNEQUAL ANGLES

Advance UKA - Unequal Angles





Dimensions and properties

Section Designation		Mass per	Radius		Dimension		Second Moment of Area				Radius of Gyration			
Size	Thickness	Metre	Root	Toe			Axis x-x	Axis y-y	Axis u-u	Axis v-v	Axis x-x	Axis y-y	Axis u-u	Axis v-v
A x B	t		r_1	r_2	c_x	c_y								
mm	mm	kg/m	mm	mm	cm	cm	cm^4	cm^4	cm^4	cm^4	cm	cm	cm	cm
200x150	18 +	47.1	15.0	7.50	6.33	3.85	2380	1150	2920	623	6.29	4.37	6.97	3.22
	15	39.6	15.0	7.50	6.21	3.73	2020	979	2480	526	6.33	4.40	7.00	3.23
	12	32.0	15.0	7.50	6.08	3.61	1650	803	2030	430	6.36	4.44	7.04	3.25
200x100	15	33.8	15.0	7.50	7.16	2.22	1760	299	1860	193	6.40	2.64	6.59	2.12
	12	27.3	15.0	7.50	7.03	2.10	1440	247	1530	159	6.43	2.67	6.63	2.14
	10	23.0	15.0	7.50	6.93	2.01	1220	210	1290	135	6.46	2.68	6.65	2.15
150x90	15	33.9	12.0	6.00	5.21	2.23	761	205	841	126	4.74	2.46	4.98	1.93
	12	21.6	12.0	6.00	5.08	2.12	627	171	694	104	4.77	2.49	5.02	1.94
	10	18.2	12.0	6.00	5.00	2.04	533	146	591	88.3	4.80	2.51	5.05	1.95
150x75	15	24.8	12.0	6.00	5.52	1.81	713	119	753	78.6	4.75	1.94	4.88	1.58
	12	20.2	12.0	6.00	5.40	1.69	588	99.6	623	64.7	4.78	1.97	4.92	1.59
	10	17.0	12.0	6.00	5.31	1.61	501	85.6	531	55.1	4.81	1.99	4.95	1.60
125x75	12	17.8	11.0	5.50	4.31	1.84	354	95.5	391	58.5	3.95	2.05	4.15	1.61
	10	15.0	11.0	5.50	4.23	1.76	302	82.1	334	49.9	3.97	2.07	4.18	1.61
	8	12.2	11.0	5.50	4.14	1.68	247	67.6	274	40.9	4.00	2.09	4.21	1.63
100x75	12	15.4	10.0	5.00	3.27	2.03	189	90.2	230	49.5	3.10	2.14	3.42	1.59
	10	13.0	10.0	5.00	3.19	1.95	162	77.6	197	42.2	3.12	2.16	3.45	1.59
	8	10.6	10.0	5.00	3.10	1.87	133	64.1	162	34.6	3.14	2.18	3.47	1.60
100x65	10 +	12.3	10.0	5.00	3.36	1.63	154	51.0	175	30.1	3.14	1.81	3.35	1.39
	8 +	9.94	10.0	5.00	3.27	1.55	127	42.2	144	24.8	3.16	1.83	3.37	1.40
	7 +	8.77	10.0	5.00	3.23	1.51	113	37.6	128	22.0	3.17	1.83	3.39	1.40
100x50	8	8.97	8.00	4.00	3.60	1.13	116	19.7	123	12.8	3.19	1.31	3.28	1.06
	6	6.84	8.00	4.00	3.51	1.05	89.9	15.4	95.4	9.92	3.21	1.33	3.31	1.07
80x60	7	7.36	8.00	4.00	2.51	1.52	59.0	28.4	72.0	15.4	2.51	1.74	2.77	1.28
80x40	8	7.07	7.00	3.50	2.94	0.963	57.6	9.61	60.9	6.34	2.53	1.03	2.60	0.838
	6	5.41	7.00	3.50	2.85	0.884	44.9	7.59	47.6	4.93	2.55	1.05	2.63	0.845
75x50	8	7.39	7.00	3.50	2.52	1.29	52.0	18.4	59.6	10.8	2.35	1.40	2.52	1.07
	6	5.65	7.00	3.50	2.44	1.21	40.5	14.4	46.6	8.36	2.37	1.42	2.55	1.08
70x50	6	5.41	7.00	3.50	2.23	1.25	33.4	14.2	39.7	7.92	2.20	1.43	2.40	1.07
65x50	5	4.35	6.00	3.00	1.99	1.25	23.2	11.9	28.8	6.32	2.05	1.47	2.28	1.07
60x40	6	4.46	6.00	3.00	2.00	1.01	20.1	7.12	23.1	4.16	1.88	1.12	2.02	0.855
	5	3.76	6.00	3.00	1.96	0.972	17.2	6.11	19.7	3.54	1.89	1.13	2.03	0.860
60x30	5	3.36	5.00	2.50	2.17	0.684	15.6	2.63	16.5	1.71	1.91	0.784	1.97	0.633
50x30	5	2.96	5.00	2.50	1.73	0.741	9.36	2.51	10.3	1.54	1.57	0.816	1.65	0.639
45x30	4	2.25	4.50	2.25	1.48	0.740	5.78	2.05	6.65	1.18	1.42	0.850	1.52	0.640
40x25	4	1.93	4.00	2.00	1.36	0.623	3.89	1.16	4.35	0.700	1.26	0.687	1.33	0.534
40x20	4	1.77	4.00	2.00	1.47	0.480	3.59	0.600	3.80	0.393	1.26	0.514	1.30	0.417
30x20	4	1.46	4.00	2.00	1.03	0.541	1.59	0.553	1.81	0.330	0.925	0.546	0.988	0.421
	3	1.12	4.00	2.00	0.990	0.502	1.25	0.437	1.43	0.256	0.935	0.553	1.00	0.424

Advance and UKA are trademarks of Corus. A fuller description of the relationship between Angles and the Advance range of sections manufactured by Corus is given on page A - 42.

+ These sections are in addition to the range of BS EN 10056-1 sections.

c_x is the distance from the back of the short leg to the centre of gravity.

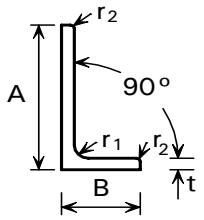
c_y is the distance from the back of the long leg to the centre of gravity.

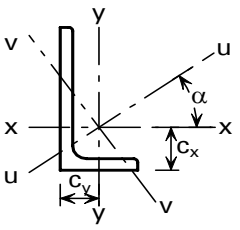
FOR EXPLANATION OF TABLES SEE NOTES 2 AND 3

BS 5950-1: 2000
BS EN 10056-1: 1999

UNEQUAL ANGLES

Advance UKA - Unequal Angles





Dimensions and properties (continued)

Section Designation		Elastic Modulus		Angle Axis x-x to Axis u-u	Torsional Constant	Equivalent Slenderness Coefficient		Mono-symmetry Index	Area of Section
Size	Thickness	Axis x-x	Axis y-y			Min	Max		
A x B	t			Tan α	J	ϕ_a	ϕ_a	ψ_a	
mm	mm	cm^3	cm^3		cm^4				cm^2
200x150	18 +	174	103	0.549	67.9	2.93	3.72	4.60	60.0
	15	147	86.9	0.551	39.9	3.53	4.50	5.55	50.5
	12	119	70.5	0.552	20.9	4.43	5.70	6.97	40.8
200x100	15	137	38.5	0.260	34.3	3.54	5.17	9.19	43.0
	12	111	31.3	0.262	18.0	4.42	6.57	11.5	34.8
	10	93.2	26.3	0.263	10.66	5.26	7.92	13.9	29.2
150x90	15	77.7	30.4	0.354	26.8	2.58	3.59	5.96	33.9
	12	63.3	24.8	0.358	14.1	3.24	4.58	7.50	27.5
	10	53.3	21.0	0.360	8.30	3.89	5.56	9.03	23.2
150x75	15	75.2	21.0	0.253	25.1	2.62	3.74	6.84	31.7
	12	61.3	17.1	0.258	13.2	3.30	4.79	8.60	25.7
	10	51.6	14.5	0.261	7.80	3.95	5.83	10.4	21.7
125x75	12	43.2	16.9	0.354	11.6	2.66	3.73	6.23	22.7
	10	36.5	14.3	0.357	6.87	3.21	4.55	7.50	19.1
	8	29.6	11.6	0.360	3.62	4.00	5.75	9.43	15.5
100x75	12	28.0	16.5	0.540	10.05	2.10	2.64	3.46	19.7
	10	23.8	14.0	0.544	5.95	2.54	3.22	4.17	16.6
	8	19.3	11.4	0.547	3.13	3.18	4.08	5.24	13.5
100x65	10 +	23.2	10.5	0.410	5.61	2.52	3.43	5.45	15.6
	8 +	18.9	8.54	0.413	2.96	3.14	4.35	6.86	12.7
	7 +	16.6	7.53	0.415	2.02	3.58	5.00	7.85	11.2
100x50	8	18.2	5.08	0.258	2.61	3.30	4.80	8.61	11.4
	6	13.8	3.89	0.262	1.14	4.38	6.52	11.6	8.71
80x60	7	10.7	6.34	0.546	1.66	2.92	3.72	4.78	9.38
80x40	8	11.4	3.16	0.253	2.05	2.61	3.73	6.85	9.01
	6	8.73	2.44	0.258	0.899	3.48	5.12	9.22	6.89
75x50	8	10.4	4.95	0.430	2.14	2.36	3.18	4.92	9.41
	6	8.01	3.81	0.435	0.935	3.18	4.34	6.60	7.19
70x50	6	7.01	3.78	0.500	0.899	2.96	3.89	5.44	6.89
65x50	5	5.14	3.19	0.577	0.498	3.38	4.26	5.08	5.54
60x40	6	5.03	2.38	0.431	0.735	2.51	3.39	5.26	5.68
	5	4.25	2.02	0.434	0.435	3.02	4.11	6.34	4.79
60x30	5	4.07	1.14	0.257	0.382	3.15	4.56	8.26	4.28
50x30	5	2.86	1.11	0.352	0.340	2.51	3.52	5.99	3.78
45x30	4	1.91	0.910	0.436	0.166	2.85	3.87	5.92	2.87
40x25	4	1.47	0.619	0.380	0.142	2.51	3.48	5.75	2.46
40x20	4	1.42	0.393	0.252	0.131	2.57	3.68	6.86	2.26
30x20	4	0.807	0.379	0.421	0.1096	1.79	2.39	3.95	1.86
	3	0.621	0.292	0.427	0.0486	2.40	3.28	5.31	1.43

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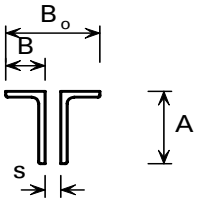
+ These sections are in addition to the range of BS EN 10056-1 sections.

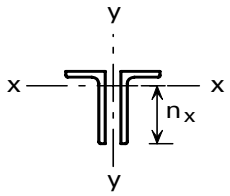
FOR EXPLANATION OF TABLES SEE NOTES 2 AND 3

BS 5950-1: 2000
BS EN 10056-1: 1999

UNEQUAL ANGLES BACK TO BACK

Advance UKA - Unequal Angles BACK TO BACK





Dimensions and properties

Composed of Two Angles		Total Mass per Metre	Distance	Total Area	Properties about Axis x-x			Radius of Gyration r_y about Axis y-y (cm)				
								Space between angles, s, (mm)				
A x B	t		n_x		I_x	r_x	Z_x					
mm	mm	kg/m	cm	cm^2	cm^4	cm	cm^3	0	8	10	12	15
200x150	18 +	94.2	13.7	120	4750	6.29	348	5.84	6.11	6.18	6.25	6.36
	15	79.2	13.8	101	4040	6.33	294	5.77	6.04	6.11	6.18	6.28
	12	64.0	13.9	81.6	3300	6.36	238	5.72	5.98	6.05	6.12	6.22
200x100	15	67.5	12.8	86.0	3520	6.40	274	3.45	3.72	3.79	3.86	3.97
	12	54.6	13.0	69.6	2880	6.43	222	3.39	3.65	3.72	3.79	3.90
	10	46.0	13.1	58.4	2440	6.46	186	3.35	3.61	3.67	3.74	3.85
150x90	15	53.2	9.79	67.8	1522	4.74	155	3.32	3.60	3.67	3.75	3.86
	12	43.2	9.92	55.0	1250	4.77	127	3.27	3.55	3.62	3.69	3.80
	10	36.4	10.0	46.4	1070	4.80	107	3.23	3.50	3.57	3.64	3.75
150x75	15	49.6	9.48	63.4	1430	4.75	150	2.65	2.94	3.01	3.09	3.21
	12	40.4	9.60	51.4	1180	4.78	123	2.59	2.87	2.94	3.02	3.14
	10	34.0	9.69	43.4	1000	4.81	103	2.56	2.83	2.90	2.97	3.08
125x75	12	35.6	8.19	45.4	708	3.95	86.4	2.76	3.04	3.11	3.19	3.30
	10	30.0	8.27	38.2	604	3.97	73.0	2.72	2.99	3.07	3.14	3.26
	8	24.4	8.36	31.0	494	4.00	59.2	2.68	2.95	3.02	3.09	3.20
100x75	12	30.8	6.73	39.4	378	3.10	56.0	2.95	3.24	3.31	3.39	3.51
	10	26.0	6.81	33.2	324	3.12	47.6	2.91	3.19	3.27	3.34	3.46
	8	21.2	6.90	27.0	266	3.14	38.6	2.87	3.15	3.22	3.29	3.41
100x65	10 +	24.6	6.64	31.2	308	3.14	46.4	2.43	2.72	2.79	2.87	2.99
	8 +	19.9	6.73	25.4	254	3.16	37.8	2.39	2.67	2.74	2.82	2.93
	7 +	17.5	6.77	22.4	226	3.17	33.2	2.37	2.65	2.72	2.79	2.91
100x50	8	17.9	6.40	22.8	232	3.19	36.4	1.73	2.02	2.09	2.17	2.29
	6	13.7	6.49	17.4	180	3.21	27.6	1.69	1.97	2.04	2.12	2.24
80x60	7	14.7	5.49	18.8	118	2.51	21.4	2.31	2.59	2.67	2.74	2.86
80x40	8	14.1	5.06	18.0	115	2.53	22.8	1.41	1.71	1.79	1.87	2.00
	6	10.8	5.15	13.8	89.8	2.55	17.5	1.37	1.66	1.74	1.82	1.94
75x50	8	14.8	4.98	18.8	104	2.35	20.8	1.90	2.19	2.27	2.35	2.47
	6	11.3	5.06	14.4	81.0	2.37	16.0	1.86	2.14	2.22	2.30	2.42
70x50	6	10.8	4.77	13.8	66.8	2.20	14.0	1.90	2.19	2.26	2.34	2.46
65x50	5	8.70	4.51	11.1	46.4	2.05	10.3	1.93	2.21	2.28	2.36	2.48
60x40	6	8.92	4.00	11.4	40.2	1.88	10.1	1.51	1.80	1.88	1.96	2.09
	5	7.52	4.04	9.58	34.4	1.89	8.50	1.49	1.78	1.86	1.94	2.06

Advance and UKA are trademarks of Corus. A fuller description of the relationship between Angles and the Advance range of sections manufactured by Corus is given on page A - 42.

+ These sections are in addition to the range of BS EN 10056-1 sections.

Properties about y-y axis:

I_y = (Total Area).$(r_y)^2$

$Z_y = I_y / (0.5B_o)$

FOR EXPLANATION OF TABLES SEE NOTES 2 AND 3

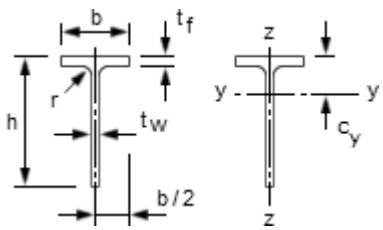
Table 2.1.7.1

SECTION PROPERTIES

STRUCTURAL TEES CUT FROM UNIVERSAL BEAMS

UKT Split from Advance® UKB

DIMENSIONS AND PROPERTIES



Section Designation	Cut from Universal Beam Section Designation	Mass per Metre	Width of Section	Depth of Section	Thickness		Root Radius	Ratios for Local Buckling		Dimension	Second Moment of Area	
					Web	Flange		Flange	Web		Axis y-y	Axis z-z
			b	h	t_w	t_f	r	c_f / t_f	c_w / t_w	c_y		
		kg/m	mm	mm	mm	mm	mm			cm	cm^4	cm^4
254 x 343 x 63	686 x 254 x 125	62.6	253.0	338.9	11.7	16.2	15.2	6.51	29.0	8.85	8980	2190
305 x 305 x 119	610 x 305 x 238	119.0	311.4	317.9	18.4	31.4	16.5	4.14	17.3	7.11	12400	7920
305 x 305 x 90	610 x 305 x 179	89.5	307.1	310.0	14.1	23.6	16.5	5.51	22.0	6.69	9040	5700
305 x 305 x 75	610 x 305 x 149	74.6	304.8	306.1	11.8	19.7	16.5	6.60	25.9	6.45	7410	4650
229 x 305 x 70	610 x 229 x 140	69.9	230.2	308.5	13.1	22.1	12.7	4.34	23.5	7.61	7740	2250
229 x 305 x 63	610 x 229 x 125	62.5	229.0	306.0	11.9	19.6	12.7	4.89	25.7	7.54	6900	1970
229 x 305 x 57	610 x 229 x 113	56.5	228.2	303.7	11.1	17.3	12.7	5.54	27.4	7.58	6270	1720
229 x 305 x 51	610 x 229 x 101	50.6	227.6	301.2	10.5	14.8	12.7	6.48	28.7	7.78	5690	1460
178 x 305 x 50 +	610 x 178 x 100	50.1	179.2	303.7	11.3	17.2	12.7	4.14	26.9	8.57	5890	829
178 x 305 x 46 +	610 x 178 x 92	46.1	178.8	301.5	10.9	15.0	12.7	4.75	27.7	8.78	5450	718
178 x 305 x 41 +	610 x 178 x 82	40.9	177.9	299.3	10.0	12.8	12.7	5.57	29.9	8.88	4840	603
312 x 267 x 136 +	533 x 312 x 272	136.6	320.2	288.8	21.1	37.6	12.7	3.64	13.7	6.28	10600	10300
312 x 267 x 110 +	533 x 312 x 219	109.4	317.4	280.4	18.3	29.2	12.7	4.69	15.3	6.09	8530	7790
312 x 267 x 91 +	533 x 312 x 182	90.7	314.5	275.6	15.2	24.4	12.7	5.61	18.1	5.78	6890	6330
312 x 267 x 75 +	533 x 312 x 151	75.3	312.0	271.5	12.7	20.3	12.7	6.75	21.4	5.54	5620	5140
210 x 267 x 69 +	533 x 210 x 138	69.1	213.9	274.5	14.7	23.6	12.7	3.68	18.7	6.94	5990	1930
210 x 267 x 61	533 x 210 x 122	61.0	211.9	272.2	12.7	21.3	12.7	4.08	21.4	6.66	5160	1690
210 x 267 x 55	533 x 210 x 109	54.5	210.8	269.7	11.6	18.8	12.7	4.62	23.3	6.61	4600	1470
210 x 267 x 51	533 x 210 x 101	50.5	210.0	268.3	10.8	17.4	12.7	4.99	24.8	6.53	4250	1350
210 x 267 x 46	533 x 210 x 92	46.0	209.3	266.5	10.1	15.6	12.7	5.57	26.4	6.55	3880	1190
210 x 267 x 41	533 x 210 x 82	41.1	208.8	264.1	9.6	13.2	12.7	6.58	27.5	6.75	3530	1000
165 x 267 x 43 +	533 x 165 x 85	42.3	166.5	267.1	10.3	16.5	12.7	3.96	25.9	7.23	3750	637
165 x 267 x 37 +	533 x 165 x 75	37.3	165.9	264.5	9.7	13.6	12.7	4.81	27.3	7.46	3350	520
165 x 267 x 33 +	533 x 165 x 66	32.8	165.1	262.4	8.9	11.4	12.7	5.74	29.5	7.59	2960	429
191 x 229 x 81 +	457 x 191 x 161	80.7	199.4	246.0	18.0	32.0	10.2	2.52	13.7	6.22	5160	2130
191 x 229 x 67 +	457 x 191 x 133	66.6	196.7	240.3	15.3	26.3	10.2	3.06	15.7	5.96	4180	1670
191 x 229 x 53 +	457 x 191 x 106	52.9	194.0	234.6	12.6	20.6	10.2	3.91	18.6	5.73	3260	1260
191 x 229 x 49	457 x 191 x 98	49.1	192.8	233.5	11.4	19.6	10.2	4.11	20.5	5.53	2970	1170
191 x 229 x 45	457 x 191 x 89	44.6	191.9	231.6	10.5	17.7	10.2	4.55	22.1	5.47	2680	1040
191 x 229 x 41	457 x 191 x 82	41.0	191.3	229.9	9.9	16.0	10.2	5.03	23.2	5.47	2470	935
191 x 229 x 37	457 x 191 x 74	37.1	190.4	228.4	9.0	14.5	10.2	5.55	25.4	5.38	2220	836
191 x 229 x 34	457 x 191 x 67	33.5	189.9	226.6	8.5	12.7	10.2	6.34	26.7	5.46	2030	726
152 x 229 x 41	457 x 152 x 82	41.0	155.3	232.8	10.5	18.9	10.2	3.29	22.2	5.96	2600	592
152 x 229 x 37	457 x 152 x 74	37.1	154.4	230.9	9.6	17.0	10.2	3.66	24.1	5.88	2330	523
152 x 229 x 34	457 x 152 x 67	33.6	153.8	228.9	9.0	15.0	10.2	4.15	25.4	5.91	2120	456
152 x 229 x 30	457 x 152 x 60	29.9	152.9	227.2	8.1	13.3	10.2	4.68	28.0	5.84	1880	397
152 x 229 x 26	457 x 152 x 52	26.1	152.4	224.8	7.6	10.9	10.2	5.71	29.6	6.04	1670	322

Table 2.1.7.1. UKT Split from Advance® UKC. Dimensions and Properties

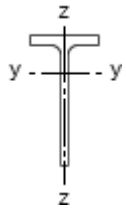
Table 2.1.7.2

SECTION PROPERTIES

STRUCTURAL TEES CUT FROM UNIVERSAL BEAMS

UKT Split from Advance® UKB

PROPERTIES



Section Designation	Radius of Gyration		Elastic Modulus			Plastic Modulus		Buckling Parameter	Torsional Index	Mono-symmetry Index	Warping Constant (*)	Torsional Constant	Area of Section
	Axis y-y	Axis z-z	Axis y-y Flange	Axis y-y Toe	Axis z-z	Axis y-y	Axis z-z	U	X	Ψ	I_w	I_T	A
	cm	cm	cm^3	cm^3	cm^3	cm^3	cm^3				cm^6	cm^4	cm^2
254 x 343 x 63	10.6	5.24	1010	358	173	643	271	0.651	21.9	0.740	2090	57.9	79.7
305 x 305 x 119	9.03	7.23	1740	501	509	894	787	0.483	10.6	0.662	11300	391	152
305 x 305 x 90	8.91	7.07	1350	372	371	656	572	0.484	13.8	0.664	4710	170	114
305 x 305 x 75	8.83	7.00	1150	307	305	538	469	0.483	16.4	0.666	2690	99.8	95.0
229 x 305 x 70	9.32	5.03	1020	333	196	592	306	0.613	15.3	0.727	2560	108	89.1
229 x 305 x 63	9.31	4.97	915	299	172	531	268	0.617	17.1	0.728	1840	76.9	79.7
229 x 305 x 57	9.33	4.88	826	275	150	489	235	0.626	19.0	0.731	1400	55.5	72.0
229 x 305 x 51	9.40	4.76	732	255	128	456	200	0.644	21.6	0.736	1080	38.3	64.4
178 x 305 x 50 +	9.60	3.60	688	270	92.5	490	148	0.694	19.4	0.768	1230	47.3	63.9
178 x 305 x 46 +	9.64	3.50	621	255	80.3	468	129	0.710	21.5	0.774	1050	35.3	58.7
178 x 305 x 41 +	9.64	3.40	545	230	67.8	425	109	0.722	24.3	0.778	780	24.3	52.1
312 x 267 x 136 +	7.81	7.69	1690	469	644	857	993	0.247	7.96	0.613	17300	642	174
312 x 267 x 110 +	7.82	7.48	1400	389	491	696	757	0.332	9.93	0.617	8730	320	139
312 x 267 x 91 +	7.72	7.40	1190	317	403	562	619	0.324	11.7	0.618	4920	186	116
312 x 267 x 75 +	7.65	7.32	1010	260	330	458	505	0.326	14.0	0.619	2780	108	95.9
210 x 267 x 69 +	8.24	4.68	862	292	181	520	284	0.609	12.5	0.719	2490	125	88.1
210 x 267 x 61	8.15	4.67	775	251	160	446	250	0.600	13.8	0.719	1660	88.9	77.7
210 x 267 x 55	8.14	4.60	697	226	140	401	218	0.605	15.5	0.721	1200	63.0	69.4
210 x 267 x 51	8.12	4.57	650	209	128	371	200	0.606	16.6	0.722	951	50.3	64.3
210 x 267 x 46	8.14	4.51	593	193	114	343	178	0.613	18.3	0.724	737	37.7	58.7
210 x 267 x 41	8.21	4.38	523	179	96.1	320	150	0.634	20.8	0.730	565	25.7	52.3
165 x 267 x 43 +	8.34	3.44	519	192	76.6	346	122	0.672	17.7	0.758	670	36.8	54.0
165 x 267 x 37 +	8.39	3.30	449	176	62.7	321	100	0.693	20.6	0.765	514	23.9	47.6
165 x 267 x 33 +	8.41	3.20	390	159	52.0	291	83.1	0.708	23.6	0.771	378	15.9	41.9
191 x 229 x 81 +	7.09	4.55	830	281	213	507	336	0.573	8.24	0.699	3780	256	103
191 x 229 x 67 +	7.01	4.44	702	231	170	414	267	0.576	9.82	0.702	2130	146	84.9
191 x 229 x 53 +	6.96	4.32	569	184	130	328	203	0.583	12.2	0.706	1070	72.6	67.4
191 x 229 x 49	6.88	4.33	536	167	122	296	189	0.573	12.9	0.705	835	60.5	62.6
191 x 229 x 45	6.87	4.29	491	152	109	269	169	0.576	14.1	0.706	628	45.2	56.9
191 x 229 x 41	6.88	4.23	452	141	97.8	250	152	0.583	15.5	0.709	494	34.5	52.2
191 x 229 x 37	6.86	4.20	413	127	87.8	225	136	0.583	16.9	0.709	365	25.8	47.3
191 x 229 x 34	6.90	4.12	372	118	76.5	209	119	0.597	18.9	0.713	280	18.5	42.7
152 x 229 x 41	7.05	3.37	436	150	76.3	267	120	0.634	13.7	0.740	534	44.5	52.3
152 x 229 x 37	7.03	3.33	397	135	67.8	242	107	0.636	15.1	0.742	396	32.9	47.2
152 x 229 x 34	7.04	3.27	359	125	59.3	223	93.3	0.646	16.8	0.745	305	23.8	42.8
152 x 229 x 30	7.02	3.23	322	111	52.0	199	81.5	0.648	18.8	0.746	217	16.9	38.1
152 x 229 x 26	7.08	3.11	276	102	42.3	183	66.6	0.671	22.0	0.753	161	10.7	33.3

Table 2.1.7.2. UKT Split from Advance® UKC. Properties

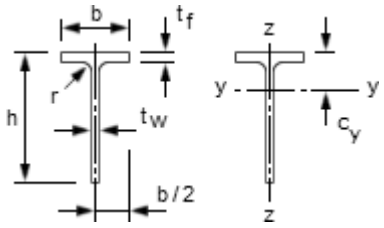
Table 2.1.7.3

SECTION PROPERTIES

STRUCTURAL TEES CUT FROM UNIVERSAL BEAMS

UKT Split from Advance® UKB

DIMENSIONS AND PROPERTIES



Section Designation	Cut from Universal Beam Section Designation	Mass per Metre	Width of Section	Depth of Section	Thickness		Root Radius	Ratios for Local Buckling		Dimension	Second Moment of Area	
					Web	Flange		Flange	Web		Axis y-y	Axis z-z
			b	h	t_w	t_f	r	c_f / t_f	c_w / t_w	c_y		
		kg/m	mm	mm	mm	mm	mm			cm	cm^4	cm^4
178 x 203 x 43 +	406 x 178 x 85	42.6	181.9	208.6	10.9	18.2	10.2	4.14	19.1	4.91	2030	915
178 x 203 x 37	406 x 178 x 74	37.1	179.5	206.3	9.5	16.0	10.2	4.68	21.7	4.76	1740	773
178 x 203 x 34	406 x 178 x 67	33.5	178.8	204.6	8.8	14.3	10.2	5.23	23.3	4.73	1570	682
178 x 203 x 30	406 x 178 x 60	30.0	177.9	203.1	7.9	12.8	10.2	5.84	25.7	4.64	1400	602
178 x 203 x 27	406 x 178 x 54	27.0	177.7	201.2	7.7	10.9	10.2	6.86	26.1	4.83	1290	511
140 x 203 x 27 +	406 x 140 x 53	26.6	143.3	203.3	7.9	12.9	10.2	4.46	25.7	5.16	1320	317
140 x 203 x 23	406 x 140 x 46	23.0	142.2	201.5	6.8	11.2	10.2	5.13	29.6	5.02	1120	269
140 x 203 x 20	406 x 140 x 39	19.5	141.8	198.9	6.4	8.6	10.2	6.69	31.1	5.32	979	205
171 x 178 x 34	356 x 171 x 67	33.5	173.2	181.6	9.1	15.7	10.2	4.58	20.0	4.00	1150	681
171 x 178 x 29	356 x 171 x 57	28.5	172.2	178.9	8.1	13.0	10.2	5.53	22.1	3.97	986	554
171 x 178 x 26	356 x 171 x 51	25.5	171.5	177.4	7.4	11.5	10.2	6.25	24.0	3.94	882	484
171 x 178 x 23	356 x 171 x 45	22.5	171.1	175.6	7.0	9.7	10.2	7.41	25.1	4.05	798	406
127 x 178 x 20	356 x 127 x 39	19.5	126.0	176.6	6.6	10.7	10.2	4.63	26.8	4.43	728	179
127 x 178 x 17	356 x 127 x 33	16.5	125.4	174.4	6.0	8.5	10.2	5.82	29.1	4.56	626	140
165 x 152 x 27	305 x 165 x 54	27.0	166.9	155.1	7.9	13.7	8.9	5.15	19.6	3.21	642	531
165 x 152 x 23	305 x 165 x 46	23.0	165.7	153.2	6.7	11.8	8.9	5.98	22.9	3.07	536	448
165 x 152 x 20	305 x 165 x 40	20.1	165.0	151.6	6.0	10.2	8.9	6.92	25.3	3.03	468	382
127 x 152 x 24	305 x 127 x 48	24.0	125.3	155.4	9.0	14.0	8.9	3.52	17.3	3.94	662	231
127 x 152 x 21	305 x 127 x 42	20.9	124.3	153.5	8.0	12.1	8.9	4.07	19.2	3.87	573	194
127 x 152 x 19	305 x 127 x 37	18.5	123.4	152.1	7.1	10.7	8.9	4.60	21.4	3.78	501	168
102 x 152 x 17	305 x 102 x 33	16.4	102.4	156.3	6.6	10.8	7.6	3.73	23.7	4.14	487	97.1
102 x 152 x 14	305 x 102 x 28	14.1	101.8	154.3	6.0	8.8	7.6	4.58	25.7	4.20	420	77.7
102 x 152 x 13	305 x 102 x 25	12.4	101.6	152.5	5.8	7.0	7.6	5.76	26.3	4.43	377	61.5
146 x 127 x 22	254 x 146 x 43	21.5	147.3	129.7	7.2	12.7	7.6	4.92	18.0	2.64	343	339
146 x 127 x 19	254 x 146 x 37	18.5	146.4	127.9	6.3	10.9	7.6	5.73	20.3	2.55	292	285
146 x 127 x 16	254 x 146 x 31	15.5	146.1	125.6	6.0	8.6	7.6	7.26	20.9	2.66	259	224
102 x 127 x 14	254 x 102 x 28	14.1	102.2	130.1	6.3	10.0	7.6	4.04	20.7	3.24	277	89.3
102 x 127 x 13	254 x 102 x 25	12.6	101.9	128.5	6.0	8.4	7.6	4.80	21.4	3.32	250	74.3
102 x 127 x 11	254 x 102 x 22	11.0	101.6	126.9	5.7	6.8	7.6	5.93	22.3	3.45	223	59.7
133 x 102 x 15	203 x 133 x 30	15.0	133.9	103.3	6.4	9.6	7.6	5.85	16.1	2.11	154	192
133 x 102 x 13	203 x 133 x 25	12.5	133.2	101.5	5.7	7.8	7.6	7.20	17.8	2.10	131	154

Table 2.1.7.3. UKT Split from Advance® UKC. Dimensions and Properties

BS EN 1993-1-1: 2005
BS 4-1: 2005

UK EUROCODES

B-47

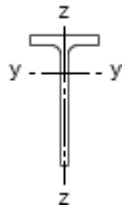
Table 2.1.7.4

SECTION PROPERTIES

STRUCTURAL TEES CUT FROM UNIVERSAL BEAMS

UKT Split from Advance® UKB

PROPERTIES



Section Designation	Radius of Gyration		Elastic Modulus			Plastic Modulus		Buckling Parameter	Torsional Index	Mono-symmetry Index	Warping Constant (*)	Torsional Constant	Area of Section
	Axis y-y	Axis z-z	Axis y-y Flange	Axis y-y Toe	Axis z-z	Axis y-y	Axis z-z	U	X	Ψ	I_w	I_T	A
	cm	cm	cm^3	cm^3	cm^3	cm^3	cm^3				cm^6	cm^4	cm^2
178 x 203 x 43 +	6.11	4.11	413	127	101	226	157	0.556	12.2	0.694	538	46.3	54.3
178 x 203 x 37	6.06	4.04	365	109	86.1	194	133	0.555	13.8	0.696	350	31.3	47.2
178 x 203 x 34	6.07	3.99	332	100	76.3	177	118	0.561	15.2	0.698	262	23.0	42.8
178 x 203 x 30	6.04	3.97	301	89.0	67.6	157	104	0.561	16.9	0.699	186	16.6	38.3
178 x 203 x 27	6.13	3.85	268	84.6	57.5	150	89.1	0.588	19.2	0.705	146	11.5	34.5
140 x 203 x 27 +	6.23	3.06	256	87.0	44.3	155	69.5	0.636	17.1	0.739	148	14.4	34.0
140 x 203 x 23	6.19	3.03	224	74.2	37.8	132	59.0	0.633	19.5	0.740	93.7	9.49	29.3
140 x 203 x 20	6.28	2.87	184	67.2	28.9	121	45.4	0.668	23.8	0.750	66.3	5.33	24.8
171 x 178 x 34	5.20	3.99	288	81.5	78.6	145	121	0.500	12.2	0.672	249	27.8	42.7
171 x 178 x 29	5.21	3.91	248	70.9	64.4	125	99.4	0.514	14.4	0.676	154	16.6	36.3
171 x 178 x 26	5.21	3.86	224	63.9	56.5	113	87.1	0.521	16.1	0.677	110	11.9	32.4
171 x 178 x 23	5.28	3.76	197	59.1	47.4	104	73.3	0.546	18.4	0.683	79.2	7.90	28.7
127 x 178 x 20	5.41	2.68	164	55.0	28.4	98.0	44.5	0.632	17.6	0.739	57.1	7.53	24.9
127 x 178 x 17	5.45	2.58	137	48.6	22.3	87.2	35.1	0.655	21.1	0.746	38.0	4.38	21.1
165 x 152 x 27	4.32	3.93	200	52.2	63.7	92.8	97.8	0.389	11.8	0.636	128	17.3	34.4
165 x 152 x 23	4.27	3.91	174	43.7	54.1	77.1	82.8	0.380	13.6	0.636	78.6	11.1	29.4
165 x 152 x 20	4.27	3.86	155	38.6	46.3	67.6	70.9	0.393	15.5	0.638	52.0	7.35	25.7
127 x 152 x 24	4.65	2.74	168	57.1	36.8	102	58.0	0.602	11.7	0.714	104	15.8	30.6
127 x 152 x 21	4.63	2.70	148	49.9	31.3	88.9	49.2	0.606	13.3	0.716	69.2	10.5	26.7
127 x 152 x 19	4.61	2.67	132	43.8	27.2	77.9	42.7	0.606	14.9	0.718	47.4	7.36	23.6
102 x 152 x 17	4.82	2.15	118	42.3	19.0	75.8	30.0	0.656	15.8	0.749	36.8	6.08	20.9
102 x 152 x 14	4.84	2.08	100.0	37.4	15.3	67.5	24.2	0.673	18.7	0.756	25.2	3.69	17.9
102 x 152 x 13	4.88	1.97	85.0	34.8	12.1	63.9	19.4	0.705	21.8	0.766	20.4	2.37	15.8
146 x 127 x 22	3.54	3.52	130	33.2	46.0	59.5	70.5	0.202	10.6	0.613	64.9	11.9	27.4
146 x 127 x 19	3.52	3.48	115	28.5	39.0	50.7	59.7	0.233	12.2	0.616	41.0	7.65	23.6
146 x 127 x 16	3.61	3.36	97.4	26.2	30.6	46.0	47.1	0.376	14.8	0.623	24.5	4.26	19.8
102 x 127 x 14	3.92	2.22	85.5	28.3	17.5	50.4	27.4	0.607	13.8	0.720	21.0	4.77	18.0
102 x 127 x 13	3.95	2.15	75.3	26.2	14.6	46.9	23.0	0.628	15.8	0.727	15.9	3.20	16.0
102 x 127 x 11	3.99	2.06	64.5	24.1	11.7	43.5	18.6	0.656	18.2	0.736	12.0	2.06	14.0
133 x 102 x 15	2.84	3.17	73.1	18.8	28.7	33.5	44.1	-	-	0.569	21.7	5.13	19.1
133 x 102 x 13	2.86	3.10	62.4	16.2	23.1	28.7	35.5	-	-	0.572	12.6	2.97	16.0

Table 2.1.7.4. UKT Split from Advance® UKC. Properties

BS EN 1993-1-1: 2005
BS 4-1: 2005

UK EUROCODES

SECTION PROPERTIES

STRUCTURAL TEES CUT FROM UNIVERSAL COLUMNS

UKT Split from Advance® UKC

DIMENSIONS AND PROPERTIES

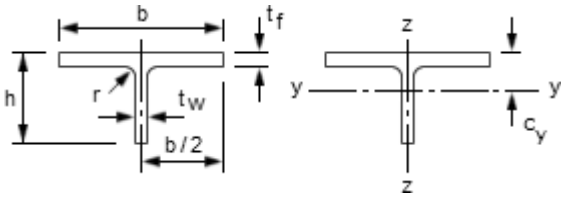


Table 2.1.8.1

B-50

Section Designation	Cut from Universal Column Section Designation	Mass per Metre kg/m	Width of Section b mm	Depth of Section h mm	Thickness		Root Radius r mm	Ratios for Local Buckling		Dimension c_y cm
					Web t_w mm	Flange t_f mm		Flange c_f / t_f	Web c_w / t_w	
305 x 152 x 79	305 x 305 x 158	79.0	311.2	163.5	15.8	25.0	15.2	5.30	10.3	3.04
305 x 152 x 69	305 x 305 x 137	68.4	309.2	160.2	13.8	21.7	15.2	6.11	11.6	2.86
305 x 152 x 59	305 x 305 x 118	58.9	307.4	157.2	12.0	18.7	15.2	7.09	13.1	2.69
305 x 152 x 49	305 x 305 x 97	48.4	305.3	153.9	9.9	15.4	15.2	8.60	15.5	2.50
254 x 127 x 84	254 x 254 x 167	83.5	265.2	144.5	19.2	31.7	12.7	3.48	7.53	3.07
254 x 127 x 66	254 x 254 x 132	66.0	261.3	138.1	15.3	25.3	12.7	4.36	9.03	2.70
254 x 127 x 54	254 x 254 x 107	53.5	258.8	133.3	12.8	20.5	12.7	5.38	10.4	2.45
254 x 127 x 45	254 x 254 x 89	44.4	256.3	130.1	10.3	17.3	12.7	6.38	12.6	2.21
254 x 127 x 37	254 x 254 x 73	36.5	254.6	127.0	8.6	14.2	12.7	7.77	14.8	2.05
203 x 102 x 64 +	203 x 203 x 127	63.7	213.9	120.7	18.1	30.1	10.2	2.91	6.67	2.73
203 x 102 x 57 +	203 x 203 x 113	56.7	212.1	117.5	16.3	26.9	10.2	3.26	7.21	2.56
203 x 102 x 50 +	203 x 203 x 100	49.8	210.3	114.3	14.5	23.7	10.2	3.70	7.88	2.38
203 x 102 x 43	203 x 203 x 86	43.0	209.1	111.0	12.7	20.5	10.2	4.29	8.74	2.20
203 x 102 x 36	203 x 203 x 71	35.5	206.4	107.8	10.0	17.3	10.2	5.09	10.8	1.95
203 x 102 x 30	203 x 203 x 60	30.0	205.8	104.7	9.4	14.2	10.2	6.20	11.1	1.89
203 x 102 x 26	203 x 203 x 52	26.0	204.3	103.0	7.9	12.5	10.2	7.04	13.0	1.75
203 x 102 x 23	203 x 203 x 46	23.0	203.6	101.5	7.2	11.0	10.2	8.00	14.1	1.69
152 x 76 x 26 +	152 x 152 x 51	25.6	157.4	85.1	11.0	15.7	7.6	4.18	7.74	1.79
152 x 76 x 22 +	152 x 152 x 44	22.0	155.9	83.0	9.5	13.6	7.6	4.82	8.74	1.66
152 x 76 x 19	152 x 152 x 37	18.5	154.4	80.8	8.0	11.5	7.6	5.70	10.1	1.53
152 x 76 x 15	152 x 152 x 30	15.0	152.9	78.7	6.5	9.4	7.6	6.98	12.1	1.41
152 x 76 x 12	152 x 152 x 23	11.5	152.2	76.1	5.8	6.8	7.6	9.65	13.1	1.39

Table 2.1.8.1. UKT Split from Advance® UKC. Dimensions and Properties

BS EN 1993-1-1: 2005
BS 4-1: 2005

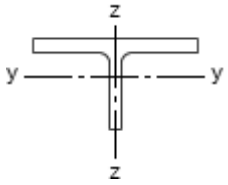
SECTION PROPERTIES

Table 2.1.8.2

STRUCTURAL TEES CUT FROM UNIVERSAL COLUMNS

UKT Split from Advance® UKC

PROPERTIES



B-51

Section Designation	Second Moment of Area		Radius of Gyration		Elastic Modulus			Plastic Modulus		Mono-symmetry Index	Warping Constant (*)	Torsional Constant	Area of Section
	Axis y-y	Axis z-z	Axis y-y	Axis z-z	Axis y-y		Axis z-z	Axis y-y	Axis z-z				
					Flange	Toe							
	cm^4	cm^4	cm	cm	cm^3	cm^3	cm^3	cm^3	cm^3	ψ	I_w cm^6	I_T cm^4	A cm^2
305 x 152 x 79	1530	6280	3.90	7.90	503	115	404	225	615	0.268	3650	188	101
305 x 152 x 69	1290	5350	3.84	7.83	450	97.7	346	188	526	0.263	2340	124	87.2
305 x 152 x 59	1080	4530	3.79	7.77	401	82.8	295	156	448	0.262	1470	80.3	75.1
305 x 152 x 49	858	3650	3.73	7.69	343	66.5	239	123	363	0.258	806	45.5	61.7
254 x 127 x 84	1200	4930	3.36	6.81	391	105	372	220	569	0.261	4540	312	106
254 x 127 x 66	871	3770	3.22	6.69	323	78.3	288	159	439	0.250	2200	159	84.1
254 x 127 x 54	676	2960	3.15	6.59	276	62.1	229	122	348	0.245	1150	85.9	68.2
254 x 127 x 45	524	2430	3.04	6.55	237	48.5	190	94.0	288	0.242	660	51.1	56.7
254 x 127 x 37	417	1950	2.99	6.48	204	39.2	153	74.0	233	0.236	359	28.8	46.5
203 x 102 x 64 +	637	2460	2.80	5.50	233	68.2	230	145	352	0.279	2050	212	81.2
203 x 102 x 57 +	540	2140	2.73	5.45	211	58.8	202	123	309	0.270	1430	152	72.3
203 x 102 x 50 +	453	1840	2.67	5.39	190	50.0	175	103	267	0.266	951	104	63.4
203 x 102 x 43	373	1560	2.61	5.34	169	41.9	150	84.6	228	0.257	605	68.1	54.8
203 x 102 x 36	280	1270	2.49	5.30	143	31.8	123	63.6	187	0.254	343	40.0	45.2
203 x 102 x 30	244	1030	2.53	5.20	129	28.4	100	54.3	153	0.245	195	23.5	38.2
203 x 102 x 26	200	889	2.46	5.18	115	23.4	87.0	44.5	132	0.243	128	15.8	33.1
203 x 102 x 23	177	774	2.45	5.13	105	20.9	76.0	39.0	115	0.242	87.2	11.0	29.4
152 x 76 x 26 +	141	511	2.08	3.96	79.0	21.0	64.9	41.4	99.5	0.281	122	24.3	32.6
152 x 76 x 22 +	116	430	2.04	3.92	70.0	17.5	55.2	34.0	84.4	0.281	76.7	15.8	28.0
152 x 76 x 19	93.1	353	1.99	3.87	60.7	14.2	45.7	27.1	69.8	0.277	44.9	9.54	23.5
152 x 76 x 15	72.2	280	1.94	3.83	51.4	11.2	36.7	20.9	55.8	0.269	23.7	5.24	19.1
152 x 76 x 12	58.5	200	2.00	3.70	41.9	9.41	26.3	16.9	40.1	0.278	9.78	2.30	14.6

Table 2.1.8.2. UKT Split from Advance® UKC. Properties

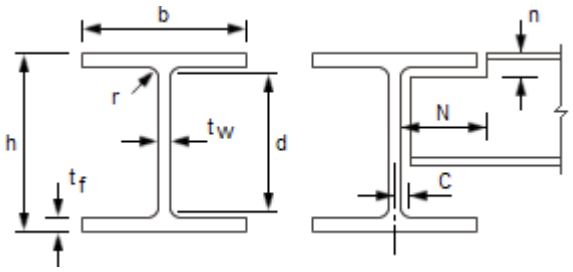
Table 2.1.3.1

SECTION PROPERTIES

UNIVERSAL BEARING PILES

Advance® UKBP

DIMENSIONS



Section Designation	Mass per Metre	Depth of Section	Width of Section	Thickness		Root Radius	Depth between Fillets	Ratios for Local Buckling		Dimensions for Detailing			Surface Area	
				Web	Flange			Flange	Web	End Clearance	Notch		Per Metre	Per Tonne
		h	b	t_w	t_f	r	d	c_f / t_f	c_w / t_w	C	N	n		
	kg/m	mm	mm	mm	mm	mm	mm			mm	mm	mm	m^2	m^2
356 x 368 x 174	173.9	361.4	378.5	20.3	20.4	15.2	290.2	8.03	14.3	12	190	36	2.17	12.5
356 x 368 x 152	152.0	356.4	376.0	17.8	17.9	15.2	290.2	9.16	16.3	11	190	34	2.16	14.2
356 x 368 x 133	133.0	352.0	373.8	15.6	15.7	15.2	290.2	10.44	18.6	10	190	32	2.14	16.1
356 x 368 x 109	108.9	346.4	371.0	12.8	12.9	15.2	290.2	12.71	22.7	8	190	30	2.13	19.5
305 x 305 x 223	222.9	337.9	325.7	30.3	30.4	15.2	246.7	4.36	8.14	17	158	46	1.89	8.49
305 x 305 x 186	186.0	328.3	320.9	25.5	25.6	15.2	246.7	5.18	9.67	15	158	42	1.86	10.0
305 x 305 x 149	149.1	318.5	316.0	20.6	20.7	15.2	246.7	6.40	12.0	12	158	36	1.83	12.3
305 x 305 x 126	126.1	312.3	312.9	17.5	17.6	15.2	246.7	7.53	14.1	11	158	34	1.82	14.4
305 x 305 x 110	110.0	307.9	310.7	15.3	15.4	15.2	246.7	8.60	16.1	10	158	32	1.80	16.4
305 x 305 x 95	94.9	303.7	308.7	13.3	13.3	15.2	246.7	9.96	18.5	9	158	30	1.79	18.9
305 x 305 x 88	88.0	301.7	307.8	12.4	12.3	15.2	246.7	10.77	19.9	8	158	28	1.78	20.3
305 x 305 x 79	78.9	299.3	306.4	11.0	11.1	15.2	246.7	11.94	22.4	8	158	28	1.78	22.5
254 x 254 x 85	85.1	254.3	260.4	14.4	14.3	12.7	200.3	7.71	13.9	9	134	28	1.50	17.6
254 x 254 x 71	71.0	249.7	258.0	12.0	12.0	12.7	200.3	9.19	16.7	8	134	26	1.49	20.9
254 x 254 x 63	63.0	247.1	256.6	10.6	10.7	12.7	200.3	10.31	18.9	7	134	24	1.48	23.5
203 x 203 x 54	53.9	204.0	207.7	11.3	11.4	10.2	160.8	7.72	14.2	8	110	22	1.20	22.2
203 x 203 x 45	44.9	200.2	205.9	9.5	9.5	10.2	160.8	9.26	16.9	7	110	20	1.19	26.4

Table 2.1.3.1. Advance® UKBP. Dimensions

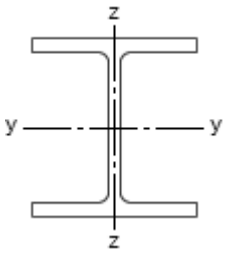
Table 2.1.3.2

SECTION PROPERTIES

UNIVERSAL BEARING PILES

Advance® UKBP

PROPERTIES



Section Designation	Second Moment of Area		Radius of Gyration		Elastic Modulus		Plastic Modulus		Buckling Parameter	Torsional Index	Warping Constant	Torsional Constant	Area of Section
	Axis y-y	Axis z-z	Axis y-y	Axis z-z	Axis y-y	Axis z-z	Axis y-y	Axis z-z					
	cm^4	cm^4	cm	cm	cm^3	cm^3	cm^3	cm^3	U	X	I_w dm^6	I_T cm^4	A cm^2
356 x 368 x 174	51000	18500	15.2	9.13	2820	976	3190	1500	0.822	15.8	5.37	330	221
356 x 368 x 152	44000	15900	15.1	9.05	2470	845	2770	1290	0.821	17.9	4.55	223	194
356 x 368 x 133	38000	13700	15.0	8.99	2160	732	2410	1120	0.823	20.1	3.87	151	169
356 x 368 x 109	30600	11000	14.9	8.90	1770	592	1960	903	0.822	24.2	3.05	84.6	139
305 x 305 x 223	52700	17600	13.6	7.87	3120	1080	3650	1680	0.827	9.5	4.15	943	284
305 x 305 x 186	42600	14100	13.4	7.73	2600	881	3000	1370	0.827	11.1	3.24	560	237
305 x 305 x 149	33100	10900	13.2	7.58	2080	691	2370	1070	0.828	13.5	2.42	295	190
305 x 305 x 126	27400	9000	13.1	7.49	1760	575	1990	885	0.829	15.7	1.95	182	161
305 x 305 x 110	23600	7710	13.0	7.42	1530	496	1720	762	0.830	17.7	1.65	122	140
305 x 305 x 95	20000	6530	12.9	7.35	1320	423	1470	648	0.829	20.2	1.38	80.0	121
305 x 305 x 88	18400	5980	12.8	7.31	1220	389	1360	595	0.831	21.6	1.25	64.2	112
305 x 305 x 79	16400	5330	12.8	7.28	1100	348	1220	531	0.833	23.8	1.11	46.9	100
254 x 254 x 85	12300	4220	10.6	6.24	966	324	1090	498	0.826	15.6	0.607	81.8	108
254 x 254 x 71	10100	3440	10.6	6.17	807	267	904	409	0.826	18.4	0.486	48.4	90.4
254 x 254 x 63	8860	3020	10.5	6.13	717	235	799	360	0.828	20.4	0.421	34.3	80.2
203 x 203 x 54	5030	1710	8.55	4.98	493	164	557	252	0.827	15.8	0.158	32.7	68.7
203 x 203 x 45	4100	1380	8.46	4.92	410	134	459	206	0.827	18.6	0.126	19.2	57.2

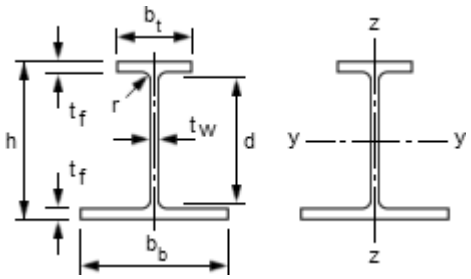
Table 2.1.3.2. Advance® UKBP. Properties

Table 2.1.9.1

SECTION PROPERTIES

ASB
(ASYMMETRIC BEAMS)

DIMENSIONS AND PROPERTIES



Section Designation	Mass per Metre	Depth of Section	Width of Flange		Thickness		Root Radius	Depth between Fillets	Ratios for Local Buckling			Second Moment of Area		Surface Area	
			Top	Bottom	Web	Flange			Flanges		Web	Axis y-y	Axis z-z	Per Metre	Per Tonne
		h	b_t	b_b	t_w	t_f	r	d	c_{ft} / t_f	c_{fb} / t_f	c_w / t_w				
	kg/m	mm	mm	mm	mm	mm	mm	mm				cm^4	cm^4	m^2	m^2
300 ASB 249 ^	249	342	203	313	40.0	40.0	27.0	208	1.36	2.74	5.20	52900	13200	1.59	6.38
300 ASB 196	196	342	183	293	20.0	40.0	27.0	208	1.36	2.74	10.4	45900	10500	1.55	7.93
300 ASB 185 ^	185	320	195	305	32.0	29.0	27.0	208	1.88	3.78	6.50	35700	8750	1.53	8.29
300 ASB 155	155	326	179	289	16.0	32.0	27.0	208	1.70	3.42	13.0	34500	7990	1.51	9.71
300 ASB 153 ^	153	310	190	300	27.0	24.0	27.0	208	2.27	4.56	7.70	28400	6840	1.50	9.81
280 ASB 136 ^	136	288	190	300	25.0	22.0	24.0	196	2.66	5.16	7.84	22200	6260	1.46	10.7
280 ASB 124	124	296	178	288	13.0	26.0	24.0	196	2.25	4.37	15.1	23500	6410	1.46	11.8
280 ASB 105	105	288	176	286	11.0	22.0	24.0	196	2.66	5.16	17.8	19200	5300	1.44	13.7
280 ASB 100 ^	100	276	184	294	19.0	16.0	24.0	196	3.66	7.09	10.3	15500	4250	1.43	14.2
280 ASB 74	73.6	272	175	285	10.0	14.0	24.0	196	4.18	8.11	19.6	12200	3330	1.40	19.1

Table 2.1.9.1. ASB - Asymmetric Beams. Dimensions and Properties

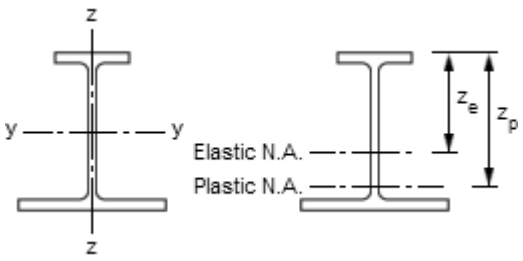
BS EN 1993-1-1: 2005
Tata Steel ASB

UK EUROCODES

SECTION PROPERTIES

ASB
(ASYMMETRIC BEAMS)

PROPERTIES



Section Designation	Radius of Gyration		Elastic Modulus			Neutral Axis Position		Plastic Modulus		Buckling Parameter	Torsional Index	Mono-symmetry Index *	Warping Constant	Torsional Constant	Area of Section
	Axis y-y	Axis z-z	Axis y-y Top	Axis y-y Bottom	Axis z-z	Elastic	Plastic	Axis y-y	Axis z-z						
						z_e	z_p			U	X	Ψ	I_w	I_T	A
	cm	cm	cm^3	cm^3	cm^3	cm	cm	cm^3	cm^3				dm^6	cm^4	cm^2
300 ASB 249 ^	12.9	6.40	2760	3530	843	19.2	22.6	3760	1510	0.820	6.80	0.663	2.00	2000	318
300 ASB 196	13.6	6.48	2320	3180	714	19.8	28.1	3060	1230	0.840	7.86	0.895	1.50	1180	249
300 ASB 185 ^	12.3	6.10	1980	2540	574	18.0	21.0	2660	1030	0.820	8.56	0.662	1.20	871	235
300 ASB 155	13.2	6.35	1830	2520	553	18.9	27.3	2360	950	0.840	9.40	0.868	1.07	620	198
300 ASB 153 ^	12.1	5.93	1630	2090	456	17.4	20.4	2160	817	0.820	9.97	0.643	0.895	513	195
280 ASB 136 ^	11.3	6.00	1370	1770	417	16.3	19.2	1810	741	0.810	10.2	0.628	0.710	379	174
280 ASB 124	12.2	6.37	1360	1900	445	17.3	25.7	1730	761	0.830	10.5	0.807	0.721	332	158
280 ASB 105	12.0	6.30	1150	1610	370	16.8	25.3	1440	633	0.830	12.1	0.777	0.574	207	133
280 ASB 100 ^	11.0	5.76	995	1290	289	15.6	18.4	1290	511	0.810	13.2	0.616	0.451	160	128
280 ASB 74	11.4	5.96	776	1060	234	15.7	21.3	978	403	0.830	16.7	0.699	0.338	72.0	93.7

Table 2.1.9.0. ASB - Asymmetric Beams. Properties

BS EN 1993-1-1: 2005
BS 4-1: 2005

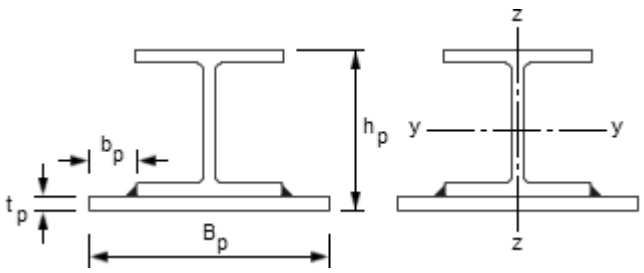
UK EUROCODES

SECTION PROPERTIES

Slimflor® Beams

DIMENSIONS

Table 2.1.10.1



Designation		Thickness of Plate	Width of Outstand	Mass per Metre of Compound Section	Depth of Compound Section	Width of Compound Section	Area of Section comp A	Second Moment of Area		Radius of Gyration	
Base Section	SFB	t_p	b_p		h_p	B_p		Axis y-y	Axis z-z	Axis y-y	Axis z-z
		mm	mm	kg/m	mm	mm	cm^2	cm^4	cm^4	cm	cm
356 x 406 x 634	356 SFB 707	15	100	707	490	624	901	325128	128496	19.0	11.9
356 x 406 x 551	356 SFB 624	15	100	624	471	619	795	272325	112246	18.5	11.9
356 x 406 x 467	356 SFB 539	15	100	539	452	612	687	223580	96514	18.0	11.9
356 x 406 x 393	356 SFB 464	15	100	464	434	607	592	182911	83323	17.6	11.9
356 x 406 x 340	356 SFB 411	15	100	411	421	603	523	155777	74260	17.3	11.9
356 x 406 x 287	356 SFB 358	15	100	358	409	599	456	129997	65543	16.9	12.0
356 x 406 x 235	356 SFB 305	15	100	305	396	595	389	106050	57297	16.5	12.1
356 x 368 x 202	356 SFB 270	15	100	270	390	575	343	90779	47415	16.3	11.8
356 x 368 x 177	356 SFB 244	15	100	244	383	573	311	79968	43997	16.0	11.9
356 x 368 x 153	356 SFB 220	15	100	220	377	571	280	69732	40763	15.8	12.1
356 x 368 x 129	356 SFB 196	15	100	196	371	569	250	59541	37590	15.4	12.3
305 x 305 x 283	305 SFB 344	15	100	344	380	522	439	102152	42435	15.3	9.83
305 x 305 x 240	305 SFB 301	15	100	301	368	518	384	85149	37729	14.9	9.92
305 x 305 x 198	305 SFB 259	15	100	259	355	515	330	69530	33323	14.5	10.1
305 x 305 x 158	305 SFB 218	15	100	218	342	511	278	55009	29268	14.1	10.3
305 x 305 x 137	305 SFB 197	15	100	197	336	509	251	47776	27203	13.8	10.4
305 x 305 x 118	305 SFB 178	15	100	178	330	507	226	41397	25388	13.5	10.6
305 x 305 x 97	305 SFB 156	15	100	156	323	505	199	34504	23435	13.2	10.8
254 x 254 x 167	254 SFB 222	15	100	222	304	465	283	42160	22454	12.2	8.91
254 x 254 x 132	254 SFB 186	15	100	186	291	461	237	32941	19802	11.8	9.13
254 x 254 x 107	254 SFB 161	15	100	161	282	459	205	26597	18000	11.4	9.37
254 x 254 x 89	254 SFB 143	15	100	143	275	456	182	22366	16733	11.1	9.60
254 x 254 x 73	254 SFB 127	15	100	127	269	455	161	18546	15651	10.7	9.85
203 x 203 x 127 +	203 SFB 176	15	100	176	256	414	225	22831	13783	10.1	7.83
203 x 203 x 113 +	203 SFB 162	15	100	162	250	412	206	20077	13034	9.86	7.95
203 x 203 x 100 +	203 SFB 148	15	100	148	244	410	188	17457	12313	9.63	8.08
203 x 203 x 86	203 SFB 134	15	100	134	237	409	171	14994	11686	9.36	8.27
203 x 203 x 71	203 SFB 119	15	100	119	231	406	151	12479	10927	9.08	8.50
203 x 203 x 60	203 SFB 108	15	100	108	225	406	137	10408	10418	8.71	8.71
203 x 203 x 52	203 SFB 100	15	100	99.6	221	404	127	9144	10038	8.49	8.89
203 x 203 x 46	203 SFB 94	15	100	93.6	218	404	119	8128	9766	8.25	9.05
152 x 152 x 51 +	152 SFB 93	15	100	93.3	185	357	119	5760	6729	6.96	7.53
152 x 152 x 44 +	152 SFB 86	15	100	85.9	181	356	109	4953	6495	6.73	7.70
152 x 152 x 37	152 SFB 79	15	100	78.7	177	354	100	4172	6270	6.45	7.91
152 x 152 x 30	152 SFB 72	15	100	71.6	173	353	91.2	3412	6054	6.12	8.15
152 x 152 x 23	152 SFB 64	15	100	64.4	167	352	82.1	2579	5861	5.61	8.45

Table 2.1.10.1. Section Properties. Slimflor® Beams. Dimensions and Properties

BS EN 1993-1-1: 2005
BS 4-1: 2005

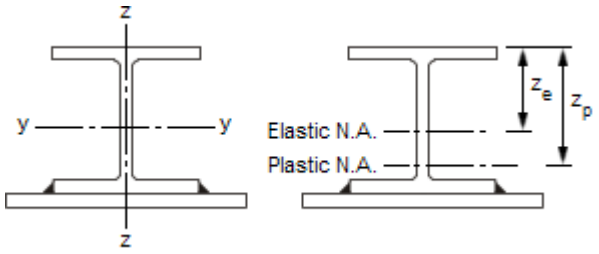
UK EUROCODES

SECTION PROPERTIES

Slimflor® Beams

PROPERTIES

Table 2.1.10.2



Designation		Elastic Modulus			Neutral Axis Position		Plastic Modulus		Buckling Parameter	Torsional Index	Warping Constant	Torsional Constant
Base Section	SFB	$W_{el,y,t}$ cm^3	$W_{el,y,b}$ cm^3	$W_{el,z}$ cm^3	Elastic z_e cm	Plastic z_p cm	$W_{pl,y}$ cm^3	$W_{pl,z}$ cm^3	U	X	I_w dm^6	I_T cm^4
356 x 406 x 634	356 SFB 707	12375	14331	4118	22.7	15.4	16065	8568	0.797	6.31	57.4	13790
356 x 406 x 551	356 SFB 624	10668	12647	3630	21.5	13.3	13747	7492	0.793	6.98	46.3	9310
356 x 406 x 467	356 SFB 539	8997	11008	3153	20.3	10.5	11486	6440	0.787	7.89	36.4	5878
356 x 406 x 393	356 SFB 464	7530	9571	2745	19.1	7.57	9520	5535	0.776	9.03	28.7	3613
356 x 406 x 340	356 SFB 411	6501	8569	2463	18.2	5.75	8139	4907	0.764	10.2	23.7	2411
356 x 406 x 287	356 SFB 358	5483	7580	2188	17.2	4.96	6788	4295	0.748	11.7	19.2	1508
356 x 406 x 235	356 SFB 305	4495	6626	1927	16.0	4.16	5491	3710	0.724	13.8	15.1	879
356 x 368 x 202	356 SFB 270	3843	5918	1650	15.3	3.78	4687	3158	0.723	15.2	11.6	623
356 x 368 x 177	356 SFB 244	3375	5468	1537	14.6	3.37	4085	2900	0.703	16.9	9.98	445
356 x 368 x 153	356 SFB 220	2923	5036	1429	13.8	2.97	3510	2655	0.677	18.8	8.51	315
356 x 368 x 129	356 SFB 196	2469	4598	1322	12.9	2.57	2943	2411	0.643	21.1	7.08	217
305 x 305 x 283	305 SFB 344	4716	6240	1625	16.4	5.88	6024	3365	0.782	8.90	10.3	2093
305 x 305 x 240	305 SFB 301	3988	5529	1456	15.4	5.08	5040	2958	0.767	10.1	8.25	1329
305 x 305 x 198	305 SFB 259	3287	4849	1295	14.3	4.29	4104	2573	0.744	11.8	6.46	792
305 x 305 x 158	305 SFB 218	2610	4187	1145	13.1	3.50	3226	2210	0.710	14.2	4.88	436
305 x 305 x 137	305 SFB 197	2261	3848	1068	12.4	3.09	2775	2025	0.685	15.9	4.12	306
305 x 305 x 118	305 SFB 178	1947	3543	1001	11.7	2.71	2374	1861	0.654	17.6	3.46	218
305 x 305 x 97	305 SFB 156	1602	3209	928	10.8	2.28	1939	1683	0.606	19.7	2.78	148
254 x 254 x 167	254 SFB 222	2315	3455	965	12.2	4.20	2936	1949	0.721	9.98	2.87	678
254 x 254 x 132	254 SFB 186	1824	2976	859	11.1	3.39	2281	1676	0.679	11.9	2.12	371
254 x 254 x 107	254 SFB 161	1473	2630	785	10.1	2.81	1826	1486	0.628	13.9	1.63	224
254 x 254 x 89	254 SFB 143	1229	2397	733	9.33	2.38	1506	1356	0.575	15.5	1.31	153
254 x 254 x 73	254 SFB 127	1008	2178	689	8.52	1.99	1228	1240	0.493	17.0	1.04	109
203 x 203 x 127 +	203 SFB 176	1462	2277	666	10.0	3.85	1890	1347	0.684	8.82	1.03	474
203 x 203 x 113 +	203 SFB 162	1296	2112	633	9.51	3.45	1664	1255	0.657	9.61	0.877	351
203 x 203 x 100 +	203 SFB 148	1133	1950	600	8.95	3.05	1445	1166	0.620	10.5	0.734	256
203 x 203 x 86	203 SFB 134	976	1795	571	8.35	2.65	1236	1084	0.566	11.6	0.608	183
203 x 203 x 71	203 SFB 119	808	1633	538	7.64	2.21	1011	993	0.477	12.9	0.481	126
203 x 203 x 60	203 SFB 108	673	1487	513	7.00	1.88	843	923	0.000	13.9	0.381	92.9
203 x 203 x 52	203 SFB 100	586	1401	497	6.53	1.64	728	877	0.000	14.5	0.324	77.3
203 x 203 x 46	203 SFB 94	518	1328	484	6.12	1.48	642	842	0.000	14.9	0.278	67.6
152 x 152 x 51 +	152 SFB 93	454	988	377	5.83	1.87	593	678	0.000	10.6	0.124	89.0
152 x 152 x 44 +	152 SFB 86	390	920	365	5.39	1.59	505	644	0.000	11.1	0.102	71.7
152 x 152 x 37	152 SFB 79	327	851	354	4.90	1.41	421	611	0.000	11.5	0.081	59.1
152 x 152 x 30	152 SFB 72	265	781	343	4.37	1.29	340	579	0.000	11.7	0.062	50.2
152 x 152 x 23	152 SFB 64	198	691	333	3.73	1.17	259	545	0.000	11.5	0.043	44.3

Table 2.1.10.2. Section Properties. Slimflor® Beams. Dimensions and Properties

BS EN 1993-1-1: 2005
BS EN 10210-2: 2006

UK EUROCODES

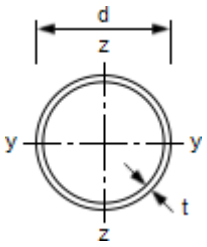
Table 2.8.1.1

SECTION PROPERTIES

HOT FINISHED CIRCULAR HOLLOW SECTIONS

Celsius® CHS

Dimensions and properties



Hot Finished

Section Designation		Mass per Metre	Area of Section	Ratio for Local Buckling	Second Moment of Area	Radius of Gyration	Elastic Modulus	Plastic Modulus	Torsional Constants		Surface Area	
Outside Diameter d	Thickness t		A	d/t	I	i	W_{el}	W_{pl}	I_T	W_t	Per Metre	Per Tonne
mm	mm	kg/m	cm^2		cm^4	cm	cm^3	cm^3	cm^4	cm^3	m^2	m^2
21.3	2.6 #	1.20	1.53	8.19	0.681	0.668	0.639	0.915	1.36	1.28	0.067	55.9
	2.9 #	1.32	1.68	7.34	0.727	0.659	0.683	0.990	1.45	1.37	0.067	50.9
	3.2	1.43	1.82	6.66	0.768	0.650	0.722	1.06	1.54	1.44	0.067	46.9
26.9	2.6 #	1.56	1.98	10.3	1.48	0.864	1.10	1.54	2.96	2.20	0.085	54.6
	2.9 #	1.72	2.19	9.28	1.60	0.855	1.19	1.68	3.19	2.38	0.085	49.6
	3.2	1.87	2.38	8.41	1.70	0.846	1.27	1.81	3.41	2.53	0.085	45.5
	3.6 #	2.07	2.64	7.47	1.83	0.834	1.36	1.97	3.66	2.72	0.085	41.1
33.7	2.6 #	1.99	2.54	13.0	3.09	1.10	1.84	2.52	6.19	3.67	0.106	53.1
	2.9 #	2.20	2.81	11.6	3.36	1.09	1.99	2.76	6.71	3.98	0.106	48.1
	3.2	2.41	3.07	10.5	3.60	1.08	2.14	2.99	7.21	4.28	0.106	44.0
	3.6 #	2.67	3.40	9.36	3.91	1.07	2.32	3.28	7.82	4.64	0.106	39.6
	4.0	2.93	3.73	8.43	4.19	1.06	2.49	3.55	8.38	4.97	0.106	36.1
	4.5 #	3.24	4.13	7.49	4.50	1.04	2.67	3.87	9.01	5.35	0.106	32.8
	5.0 #	3.54	4.51	6.74	4.78	1.03	2.84	4.16	9.57	5.68	0.106	30.0
42.4	2.6 #	2.55	3.25	16.3	6.46	1.41	3.05	4.12	12.9	6.10	0.133	52.1
	2.9 #	2.82	3.60	14.6	7.06	1.40	3.33	4.53	14.1	6.66	0.133	47.1
	3.2	3.09	3.94	13.3	7.62	1.39	3.59	4.93	15.2	7.19	0.133	43.0
	3.6 #	3.44	4.39	11.8	8.33	1.38	3.93	5.44	16.7	7.86	0.133	38.6
	4.0	3.79	4.83	10.6	8.99	1.36	4.24	5.92	18.0	8.48	0.133	35.1
	4.5 #	4.21	5.36	9.42	9.76	1.35	4.60	6.49	19.5	9.20	0.133	31.7
	5.0 #	4.61	5.87	8.48	10.5	1.33	4.93	7.04	20.9	9.86	0.133	28.9
48.3	2.6 #	2.93	3.73	18.6	9.78	1.62	4.05	5.44	19.6	8.10	0.152	51.8
	2.9 #	3.25	4.14	16.7	10.7	1.61	4.43	5.99	21.4	8.86	0.152	46.8
	3.2	3.56	4.53	15.1	11.6	1.60	4.80	6.52	23.2	9.59	0.152	42.7
	3.6 #	3.97	5.06	13.4	12.7	1.59	5.26	7.21	25.4	10.5	0.152	38.3
	4.0	4.37	5.57	12.1	13.8	1.57	5.70	7.87	27.5	11.4	0.152	34.8
	4.5 #	4.86	6.19	10.7	15.0	1.56	6.21	8.66	30.0	12.4	0.152	31.3
	5.0	5.34	6.80	9.66	16.2	1.54	6.69	9.42	32.3	13.4	0.152	28.4
	5.6 #	5.90	7.51	8.63	17.4	1.52	7.21	10.3	34.8	14.4	0.152	25.8
	6.3	6.53	8.31	7.67	18.7	1.50	7.76	11.2	37.5	15.5	0.152	23.3
60.3	2.6 #	3.70	4.71	23.2	19.7	2.04	6.52	8.66	39.3	13.0	0.189	51.0
	2.9 #	4.11	5.23	20.8	21.6	2.03	7.16	9.56	43.2	14.3	0.189	46.1
	3.2	4.51	5.74	18.8	23.5	2.02	7.78	10.4	46.9	15.6	0.189	42.0
	3.6 #	5.03	6.41	16.8	25.9	2.01	8.58	11.6	51.7	17.2	0.189	37.6
	4.0	5.55	7.07	15.1	28.2	2.00	9.34	12.7	56.3	18.7	0.189	34.0
	4.5 #	6.19	7.89	13.4	30.9	1.98	10.2	14.0	61.8	20.5	0.189	30.4
	5.0	6.82	8.69	12.1	33.5	1.96	11.1	15.3	67.0	22.2	0.189	27.8
	5.6 #	7.55	9.62	10.8	36.4	1.94	12.1	16.8	72.7	24.1	0.189	24.9
	6.3	8.39	10.7	9.57	39.5	1.92	13.1	18.5	79.0	26.2	0.189	22.5
	8.0 #	10.3	13.1	7.54	46.0	1.87	15.3	22.1	92.0	30.5	0.189	18.3

Table 2.8.1.1. Celsius® CHS. Dimensions and properties

BS EN 1993-1-1: 2005
BS EN 10210-2: 2006

UK EUROCODES

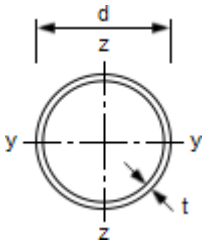
Table 2.8.1.2

SECTION PROPERTIES

HOT FINISHED
CIRCULAR HOLLOW SECTIONS

Celsius® CHS

Dimensions and properties



Hot Finished

Section Designation			Mass per Metre	Area of Section	Ratio for Local Buckling	Second Moment of Area	Radius of Gyration	Elastic Modulus	Plastic Modulus	Torsional Constants		Surface Area	
Outside Diameter d	Thickness t			A	d/t	I	i	W_{el}	W_{pl}	I_T	W_t	Per Metre	Per Tonne
mm	mm		kg/m	cm^2		cm^4	cm	cm^3	cm^3	cm^4	cm^3	m^2	m^2
76.1	2.9		5.24	6.67	26.2	44.7	2.59	11.8	15.5	89.5	23.5	0.239	45.6
	3.2		5.75	7.33	23.8	48.8	2.58	12.8	17.0	97.6	25.6	0.239	41.6
	3.6	#	6.44	8.20	21.1	54.0	2.57	14.2	18.9	108	28.4	0.239	37.0
	4.0		7.11	9.06	19.0	59.1	2.55	15.5	20.8	118	31.0	0.239	33.7
	4.5	#	7.95	10.1	16.9	65.1	2.54	17.1	23.1	130	34.2	0.239	30.1
	5.0		8.77	11.2	15.2	70.9	2.52	18.6	25.3	142	37.3	0.239	27.2
	5.6	#	9.74	12.4	13.6	77.5	2.50	20.4	27.9	155	40.8	0.239	24.6
	6.3		10.8	13.8	12.1	84.8	2.48	22.3	30.8	170	44.6	0.239	22.0
	8.0		13.4	17.1	9.51	101	2.42	26.4	37.3	201	52.9	0.239	17.8
88.9	2.9	#	6.15	7.84	30.7	72.5	3.04	16.3	21.5	145	32.6	0.279	45.5
	3.2	#	6.76	8.62	27.8	79.2	3.03	17.8	23.5	158	35.6	0.279	41.3
	3.6	#	7.57	9.65	24.7	87.9	3.02	19.8	26.2	176	39.5	0.279	36.8
	4.0		8.38	10.7	22.2	96.3	3.00	21.7	28.9	193	43.3	0.279	33.2
	4.5	#	9.37	11.9	19.8	107	2.99	24.0	32.1	213	47.9	0.279	29.9
	5.0		10.3	13.2	17.8	116	2.97	26.2	35.2	233	52.4	0.279	27.0
	5.6	#	11.5	14.7	15.9	128	2.95	28.7	38.9	255	57.5	0.279	24.2
	6.3		12.8	16.3	14.1	140	2.93	31.5	43.1	280	63.1	0.279	21.7
	8.0		16.0	20.3	11.1	168	2.87	37.8	52.5	336	75.6	0.279	17.5
	10.0	#	19.5	24.8	8.89	196	2.81	44.1	62.6	392	88.2	0.279	14.3
101.6	3.2	#	7.77	9.89	31.8	120	3.48	23.6	31.0	240	47.2	0.319	41.2
	3.6	#	8.70	11.1	28.2	133	3.47	26.2	34.6	266	52.5	0.319	36.7
	4.0	#	9.63	12.3	25.4	146	3.45	28.8	38.1	293	57.6	0.319	33.2
	4.5	#	10.8	13.7	22.6	162	3.44	31.9	42.5	324	63.8	0.319	29.6
	5.0	#	11.9	15.2	20.3	177	3.42	34.9	46.7	355	69.9	0.319	26.8
	5.6	#	13.3	16.9	18.1	195	3.40	38.4	51.7	390	76.9	0.319	24.1
	6.3	#	14.8	18.9	16.1	215	3.38	42.3	57.3	430	84.7	0.319	21.5
	8.0	#	18.5	23.5	12.7	260	3.32	51.1	70.3	519	102	0.319	17.3
	10.0	#	22.6	28.8	10.2	305	3.26	60.1	84.2	611	120	0.319	14.1
114.3	3.2	#	8.77	11.2	35.7	172	3.93	30.2	39.5	345	60.4	0.359	40.9
	3.6		9.83	12.5	31.8	192	3.92	33.6	44.1	384	67.2	0.359	36.6
	4.0		10.9	13.9	28.6	211	3.90	36.9	48.7	422	73.9	0.359	33.0
	4.5	#	12.2	15.5	25.4	234	3.89	41.0	54.3	469	82.0	0.359	29.5
	5.0		13.5	17.2	22.9	257	3.87	45.0	59.8	514	89.9	0.359	26.6
	5.6	#	15.0	19.1	20.4	283	3.85	49.6	66.2	566	99.1	0.359	23.9
	6.3		16.8	21.4	18.1	313	3.82	54.7	73.6	625	109	0.359	21.4
	8.0		21.0	26.7	14.3	379	3.77	66.4	90.6	759	133	0.359	17.1
	10.0	#	25.7	32.8	11.4	450	3.70	78.7	109	899	157	0.359	14.0

Table 2.8.1.2. Celsius® CHS. Dimensions and properties

BS EN 1993-1-1: 2005
BS EN 10210-2: 2006

UK EUROCODES

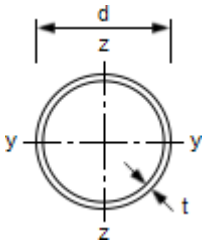
Table 2.8.1.3

SECTION PROPERTIES

HOT FINISHED
CIRCULAR HOLLOW SECTIONS

Celsius® CHS

Dimensions and properties



Hot Finished

Section Designation		Mass per Metre	Area of Section	Ratio for Local Buckling	Second Moment of Area	Radius of Gyration	Elastic Modulus	Plastic Modulus	Torsional Constants		Surface Area	
Outside Diameter d	Thickness t		A	d/t	I	i	W_{el}	W_{pl}	I_T	W_t	Per Metre	Per Tonne
mm	mm	kg/m	cm^2		cm^4	cm	cm^3	cm^3	cm^4	cm^3	m^2	m^2
139.7	3.2 #	10.8	13.7	43.7	320	4.83	45.8	59.6	640	91.6	0.439	40.7
	3.6 #	12.1	15.4	38.8	357	4.81	51.1	66.7	713	102	0.439	36.3
	4.0 #	13.4	17.1	34.9	393	4.80	56.2	73.7	786	112	0.439	32.8
	4.5 #	15.0	19.1	31.0	437	4.78	62.6	82.3	874	125	0.439	29.2
	5.0	16.6	21.2	27.9	481	4.77	68.8	90.8	961	138	0.439	26.4
	5.6 #	18.5	23.6	24.9	531	4.75	76.1	101	1060	152	0.439	23.7
	6.3	20.7	26.4	22.2	589	4.72	84.3	112	1180	169	0.439	21.2
	8.0	26.0	33.1	17.5	720	4.66	103	139	1440	206	0.439	16.9
	10.0	32.0	40.7	14.0	862	4.60	123	169	1720	247	0.439	13.7
	12.5 #	39.2	50.0	11.2	1020	4.52	146	203	2040	292	0.439	11.2
168.3	5.0	20.1	25.7	33.7	856	5.78	102	133	1710	203	0.529	26.3
	5.6 #	22.5	28.6	30.1	948	5.76	113	148	1900	225	0.529	23.5
	6.3	25.2	32.1	26.7	1050	5.73	125	165	2110	250	0.529	21.0
	8.0	31.6	40.3	21.0	1300	5.67	154	206	2600	308	0.529	16.7
	10.0	39.0	49.7	16.8	1560	5.61	186	251	3130	372	0.529	13.5
	12.5	48.0	61.2	13.5	1870	5.53	222	304	3740	444	0.529	11.0
193.7	5.0	23.3	29.6	38.7	1320	6.67	136	178	2640	273	0.609	26.2
	5.6 #	26.0	33.1	34.6	1470	6.65	151	198	2930	303	0.609	23.4
	6.3	29.1	37.1	30.7	1630	6.63	168	221	3260	337	0.609	20.9
	8.0	36.6	46.7	24.2	2020	6.57	208	276	4030	416	0.609	16.6
	10.0	45.3	57.7	19.4	2440	6.50	252	338	4880	504	0.609	13.5
	12.5	55.9	71.2	15.5	2930	6.42	303	411	5870	606	0.609	10.9
	16.0 #	70.1	89.3	12.1	3550	6.31	367	507	7110	734	0.609	8.71
219.1	4.5 #	23.8	30.3	48.7	1750	7.59	159	207	3490	319	0.688	28.9
	5.0 #	26.4	33.6	43.8	1930	7.57	176	229	3860	352	0.688	26.1
	5.6 #	29.5	37.6	39.1	2140	7.55	195	255	4280	391	0.688	23.3
	6.3	33.1	42.1	34.8	2390	7.53	218	285	4770	436	0.688	20.8
	8.0	41.6	53.1	27.4	2960	7.47	270	357	5920	540	0.688	16.5
	10.0	51.6	65.7	21.9	3600	7.40	328	438	7200	657	0.688	13.3
	12.5	63.7	81.1	17.5	4350	7.32	397	534	8690	793	0.688	10.8
	14.2 #	71.8	91.4	15.4	4820	7.26	440	597	9640	880	0.688	9.56
	16.0	80.1	102	13.7	5300	7.20	483	661	10600	967	0.688	8.60
244.5	5.0 #	29.5	37.6	48.9	2700	8.47	221	287	5400	441	0.768	26.0
	5.6 #	33.0	42.0	43.7	3000	8.45	245	320	6000	491	0.768	23.3
	6.3 #	37.0	47.1	38.8	3350	8.42	274	358	6690	547	0.768	20.7
	8.0 #	46.7	59.4	30.6	4160	8.37	340	448	8320	681	0.768	16.4
	10.0 #	57.8	73.7	24.5	5070	8.30	415	550	10100	830	0.768	13.3
	12.5	71.5	91.1	19.6	6150	8.21	503	673	12300	1010	0.768	10.8
	14.2 #	80.6	103	17.2	6840	8.16	559	754	13700	1120	0.768	9.52
	16.0	90.2	115	15.3	7530	8.10	616	837	15100	1230	0.768	8.52

Table 2.8.1.3. Celsius® CHS. Dimensions and properties

BS EN 1993-1-1: 2005
BS EN 10210-2: 2006

UK EUROCODES

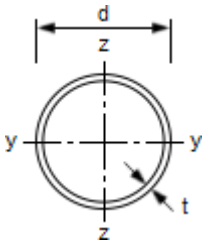
Table 2.8.1.4

SECTION PROPERTIES

HOT FINISHED
CIRCULAR HOLLOW SECTIONS

Celsius® CHS

Dimensions and properties



Hot Finished

Section Designation		Mass per Metre	Area of Section	Ratio for Local Buckling	Second Moment of Area	Radius of Gyration	Elastic Modulus	Plastic Modulus	Torsional Constants		Surface Area	
Outside Diameter d	Thickness t		A	d/t	I	i	W_{el}	W_{pl}	I_T	W_t	Per Metre	Per Tonne
mm	mm	kg/m	cm^2		cm^4	cm	cm^3	cm^3	cm^4	cm^3	m^2	m^2
273.0	5.0 #	33.0	42.1	54.6	3780	9.48	277	359	7560	554	0.858	26.0
	5.6 #	36.9	47.0	48.8	4210	9.46	308	400	8410	616	0.858	23.3
	6.3 #	41.4	52.8	43.3	4700	9.43	344	448	9390	688	0.858	20.7
	8.0 #	52.3	66.6	34.1	5850	9.37	429	562	11700	857	0.858	16.4
	10.0	64.9	82.6	27.3	7150	9.31	524	692	14300	1050	0.858	13.2
	12.5	80.3	102	21.8	8700	9.22	637	849	17400	1270	0.858	10.7
	14.2 #	90.6	115	19.2	9700	9.16	710	952	19400	1420	0.858	9.44
	16.0	101	129	17.1	10700	9.10	784	1060	21400	1570	0.858	8.46
323.9	5.0 #	39.3	50.1	64.8	6370	11.3	393	509	12700	787	1.02	25.9
	5.6 #	44.0	56.0	57.8	7090	11.3	438	567	14200	876	1.02	23.2
	6.3 #	49.3	62.9	51.4	7930	11.2	490	636	15900	979	1.02	20.7
	8.0 #	62.3	79.4	40.5	9910	11.2	612	799	19800	1220	1.02	16.3
	10.0	77.4	98.6	32.4	12200	11.1	751	986	24300	1500	1.02	13.2
	12.5	96.0	122	25.9	14800	11.0	917	1210	29700	1830	1.02	10.6
	14.2 #	108	138	22.8	16600	11.0	1030	1360	33200	2050	1.02	9.40
	16.0	121	155	20.2	18400	10.9	1140	1520	36800	2270	1.02	8.39
355.6	6.3 #	54.3	69.1	56.4	10500	12.4	593	769	21100	1190	1.12	20.6
	8.0 #	68.6	87.4	44.5	13200	12.3	742	967	26400	1490	1.12	16.4
	10.0 #	85.2	109	35.6	16200	12.2	912	1200	32400	1830	1.12	13.1
	12.5 #	106	135	28.4	19900	12.1	1120	1470	39700	2230	1.12	10.6
	14.2 #	120	152	25.0	22200	12.1	1250	1660	44500	2500	1.12	9.36
	16.0	134	171	22.2	24700	12.0	1390	1850	49300	2770	1.12	8.36
406.4	6.3 #	62.2	79.2	64.5	15800	14.1	780	1010	31700	1560	1.28	20.6
	8.0 #	78.6	100	50.8	19900	14.1	978	1270	39700	1960	1.28	16.3
	10.0	97.8	125	40.6	24500	14.0	1210	1570	49000	2410	1.28	13.1
	12.5 #	121	155	32.5	30000	13.9	1480	1940	60100	2960	1.28	10.5
	14.2 #	137	175	28.6	33700	13.9	1660	2190	67400	3320	1.28	9.32
	16.0	154	196	25.4	37400	13.8	1840	2440	74900	3690	1.28	8.31
457.0	6.3 #	70.0	89.2	72.5	22700	15.9	991	1280	45300	1980	1.44	20.6
	8.0 #	88.6	113	57.1	28400	15.9	1250	1610	56900	2490	1.44	16.3
	10.0	110	140	45.7	35100	15.8	1540	2000	70200	3070	1.44	13.1
	12.5 #	137	175	36.6	43100	15.7	1890	2470	86300	3780	1.44	10.5
	14.2 #	155	198	32.2	48500	15.7	2120	2790	96900	4240	1.44	9.29
	16.0	174	222	28.6	54000	15.6	2360	3110	108000	4720	1.44	8.28
508.0	6.3 #	77.9	99.3	80.6	31200	17.7	1230	1590	62500	2460	1.60	20.5
	8.0 #	98.6	126	63.5	39300	17.7	1550	2000	78600	3090	1.60	16.2
	10.0 #	123	156	50.8	48500	17.6	1910	2480	97000	3820	1.60	13.0
	12.5	153	195	40.6	59800	17.5	2350	3070	120000	4710	1.60	10.5
	14.2 #	173	220	35.8	67200	17.5	2650	3460	134000	5290	1.60	9.25
	16.0	194	247	31.8	74900	17.4	2950	3870	150000	5900	1.60	8.24

Table 2.8.1.4. Celsius® CHS. Dimensions and properties

BS EN 1993-1-1: 2005
BS EN 10210-2: 2006

UK EUROCODES

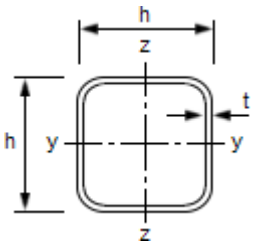
Table 2.8.2.1

SECTION PROPERTIES

HOT FINISHED
SQUARE HOLLOW SECTIONS

Celsius® SHS

Dimensions and properties



Hot Finished

Section Designation		Mass per Metre	Area of Section	Ratio for Local Buckling c/t (1)	Second Moment of Area	Radius of Gyration	Elastic Modulus	Plastic Modulus	Torsional Constants		Surface Area	
Size	Thickness										Per Metre	Per Tonne
h x h	t		A		I	i	W_{el}	W_{pl}	I_T	W_t		
mm	mm	kg/m	cm^2		cm^4	cm	cm^3	cm^3	cm^4	cm^3	m^2	m^2
40 x 40	3.0 #	3.41	4.34	10.3	9.78	1.50	4.89	5.97	15.7	7.10	0.152	44.5
	3.2	3.61	4.60	9.50	10.2	1.49	5.11	6.28	16.5	7.42	0.152	42.1
	3.6 #	4.01	5.10	8.11	11.1	1.47	5.54	6.88	18.1	8.01	0.151	37.8
	4.0	4.39	5.59	7.00	11.8	1.45	5.91	7.44	19.5	8.54	0.150	34.2
	5.0	5.28	6.73	5.00	13.4	1.41	6.68	8.66	22.5	9.60	0.147	27.8
50 x 50	3.0 #	4.35	5.54	13.7	20.2	1.91	8.08	9.70	32.1	11.8	0.192	44.2
	3.2	4.62	5.88	12.6	21.2	1.90	8.49	10.2	33.8	12.4	0.192	41.7
	3.6 #	5.14	6.54	10.9	23.2	1.88	9.27	11.3	37.2	13.5	0.191	37.2
	4.0	5.64	7.19	9.50	25.0	1.86	9.99	12.3	40.4	14.5	0.190	33.6
	5.0	6.85	8.73	7.00	28.9	1.82	11.6	14.5	47.6	16.7	0.187	27.3
	6.3	8.31	10.6	4.94	32.8	1.76	13.1	17.0	55.2	18.8	0.184	22.1
	7.1 #	9.14	11.6	4.04	34.5	1.72	13.8	18.3	58.9	19.8	0.182	19.8
	8.0 #	10.0	12.8	3.25	36.0	1.68	14.4	19.5	62.3	20.6	0.179	17.9
60 x 60	3.0 #	5.29	6.74	17.0	36.2	2.32	12.1	14.3	56.9	17.7	0.232	43.8
	3.2	5.62	7.16	15.8	38.2	2.31	12.7	15.2	60.2	18.6	0.232	41.3
	3.6 #	6.27	7.98	13.7	41.9	2.29	14.0	16.8	66.5	20.4	0.231	37.0
	4.0	6.90	8.79	12.0	45.4	2.27	15.1	18.3	72.5	22.0	0.230	33.4
	5.0	8.42	10.7	9.00	53.3	2.23	17.8	21.9	86.4	25.7	0.227	27.0
	6.3	10.3	13.1	6.52	61.6	2.17	20.5	26.0	102	29.6	0.224	21.8
	7.1 #	11.4	14.5	5.45	65.8	2.13	21.9	28.2	110	31.6	0.222	19.5
	8.0	12.5	16.0	4.50	69.7	2.09	23.2	30.4	118	33.4	0.219	17.5
70 x 70	3.0 #	6.24	7.94	20.3	59.0	2.73	16.9	19.9	92.2	24.8	0.272	43.5
	3.2	6.63	8.44	18.9	62.3	2.72	17.8	21.0	97.6	26.1	0.272	41.1
	3.6 #	7.40	9.42	16.4	68.6	2.70	19.6	23.3	108	28.7	0.271	36.6
	4.0	8.15	10.4	14.5	74.7	2.68	21.3	25.5	118	31.2	0.270	33.2
	5.0	9.99	12.7	11.0	88.5	2.64	25.3	30.8	142	36.8	0.267	26.7
	6.3	12.3	15.6	8.11	104	2.58	29.7	36.9	169	42.9	0.264	21.5
	7.1 #	13.6	17.3	6.86	112	2.54	32.0	40.3	185	46.1	0.262	19.3
	8.0	15.0	19.2	5.75	120	2.50	34.2	43.8	200	49.2	0.259	17.2
	8.8 #	16.3	20.7	4.95	126	2.46	35.9	46.6	212	51.6	0.257	15.8
80 x 80	3.0 #	7.18	9.14	23.7	89.8	3.13	22.5	26.3	140	33.0	0.312	43.4
	3.2	7.63	9.72	22.0	95.0	3.13	23.7	27.9	148	34.9	0.312	40.9
	3.6 #	8.53	10.9	19.2	105	3.11	26.2	31.0	164	38.5	0.311	36.4
	4.0	9.41	12.0	17.0	114	3.09	28.6	34.0	180	41.9	0.310	32.9
	5.0	11.6	14.7	13.0	137	3.05	34.2	41.1	217	49.8	0.307	26.6
	6.3	14.2	18.1	9.70	162	2.99	40.5	49.7	262	58.7	0.304	21.3
	7.1 #	15.8	20.2	8.27	176	2.95	43.9	54.5	286	63.5	0.302	19.1
	8.0	17.5	22.4	7.00	189	2.91	47.3	59.5	312	68.3	0.299	17.0
	8.8 #	19.0	24.2	6.09	200	2.87	50.0	63.7	332	72.0	0.297	15.6
	10.0 #	21.1	26.9	5.00	214	2.82	53.5	69.3	360	76.8	0.294	13.9
	12.5 #	25.2	32.1	3.40	234	2.70	58.6	78.9	404	83.8	0.288	11.4

Table 2.8.2.1. Celsius® SHS. Dimensions and properties

BS EN 1993-1-1: 2005
BS EN 10210-2: 2006

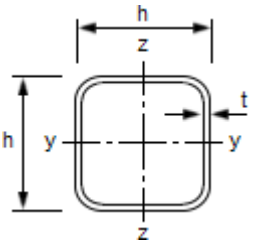
Table 2.8.2.2

SECTION PROPERTIES

HOT FINISHED
SQUARE HOLLOW SECTIONS

Celsius® SHS

Dimensions and properties



Hot Finished

Section Designation		Mass per Metre	Area of Section	Ratio for Local Buckling	Second Moment of Area	Radius of Gyration	Elastic Modulus	Plastic Modulus	Torsional Constants		Surface Area	
Size	Thickness			c/t (1)							Per Metre	Per Tonne
h x h	t		A		I	i	W_{el}	W_{pl}	I_T	W_t		
mm	mm	kg/m	cm^2		cm^4	cm	cm^3	cm^3	cm^4	cm^3	m^2	m^2
90 x 90	3.6 #	9.66	12.3	22.0	152	3.52	33.8	39.7	237	49.7	0.351	36.5
	4.0	10.7	13.6	19.5	166	3.50	37.0	43.6	260	54.2	0.350	32.8
	5.0	13.1	16.7	15.0	200	3.45	44.4	53.0	316	64.8	0.347	26.4
	6.3	16.2	20.7	11.3	238	3.40	53.0	64.3	382	77.0	0.344	21.2
	7.1 #	18.1	23.0	9.68	260	3.36	57.7	70.8	419	83.7	0.342	18.9
	8.0	20.1	25.6	8.25	281	3.32	62.6	77.6	459	90.5	0.339	16.9
	8.8 #	21.8	27.8	7.23	299	3.28	66.5	83.4	492	96.0	0.337	15.5
	10.0 #	24.3	30.9	6.00	322	3.23	71.6	91.3	536	103	0.334	13.8
	12.5 #	29.1	37.1	4.20	359	3.11	79.8	105	612	114	0.328	11.3
100 x 100	3.6	10.8	13.7	24.8	212	3.92	42.3	49.5	328	62.3	0.391	36.2
	4.0	11.9	15.2	22.0	232	3.91	46.4	54.4	361	68.2	0.390	32.7
	5.0	14.7	18.7	17.0	279	3.86	55.9	66.4	439	81.8	0.387	26.3
	6.3	18.2	23.2	12.9	336	3.80	67.1	80.9	534	97.8	0.384	21.1
	7.1 #	20.3	25.8	11.1	367	3.77	73.4	89.2	589	107	0.382	18.8
	8.0	22.6	28.8	9.50	400	3.73	79.9	98.2	646	116	0.379	16.8
	8.8 #	24.5	31.3	8.36	426	3.69	85.2	106	694	123	0.377	15.3
	10.0	27.4	34.9	7.00	462	3.64	92.4	116	761	133	0.374	13.7
	12.5 #	33.0	42.1	5.00	522	3.52	104	135	879	150	0.368	11.2
120 x 120	4.0 #	14.4	18.4	27.0	410	4.72	68.4	79.7	635	101	0.470	32.6
	5.0	17.8	22.7	21.0	498	4.68	83.0	97.6	777	122	0.467	26.2
	6.3	22.2	28.2	16.0	603	4.62	100	120	950	147	0.464	20.9
	7.1 #	24.7	31.5	13.9	663	4.59	110	133	1050	161	0.462	18.7
	8.0	27.6	35.2	12.0	726	4.55	121	146	1160	176	0.459	16.6
	8.8 #	30.1	38.3	10.6	779	4.51	130	158	1250	189	0.457	15.2
	10.0	33.7	42.9	9.00	852	4.46	142	175	1380	206	0.454	13.5
	12.5	40.9	52.1	6.60	982	4.34	164	207	1620	236	0.448	11.0
140 x 140	5.0	21.0	26.7	25.0	807	5.50	115	135	1250	170	0.547	26.1
	6.3	26.1	33.3	19.2	984	5.44	141	166	1540	206	0.544	20.8
	7.1 #	29.2	37.2	16.7	1090	5.40	155	184	1710	227	0.542	18.5
	8.0	32.6	41.6	14.5	1200	5.36	171	204	1890	249	0.539	16.5
	8.8 #	35.6	45.4	12.9	1290	5.33	184	221	2050	268	0.537	15.1
	10.0	40.0	50.9	11.0	1420	5.27	202	246	2270	294	0.534	13.4
	12.5	48.7	62.1	8.20	1650	5.16	236	293	2700	342	0.528	10.8

Table 2.8.2.2. Celsius® SHS. Dimensions and properties

BS EN 1993-1-1: 2005
BS EN 10210-2: 2006

UK EUROCODES

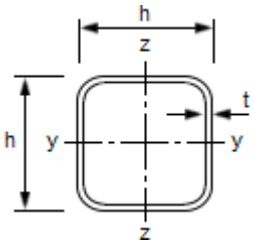
Table 2.8.2.3

SECTION PROPERTIES

HOT FINISHED
SQUARE HOLLOW SECTIONS

Celsius® SHS

Dimensions and properties



Hot Finished

Section Designation		Mass per Metre	Area of Section	Ratio for Local Buckling	Second Moment of Area	Radius of Gyration	Elastic Modulus	Plastic Modulus	Torsional Constants		Surface Area	
Size	Thickness			c/t (1)							Per Metre	Per Tonne
h x h	t		A		I	i	W_{el}	W_{pl}	I_T	W_t		
mm	mm	kg/m	cm^2		cm^4	cm	cm^3	cm^3	cm^4	cm^3	m^2	m^2
150 x 150	5.0	22.6	28.7	27.0	1000	5.90	134	156	1550	197	0.587	26.0
	6.3	28.1	35.8	20.8	1220	5.85	163	192	1910	240	0.584	20.8
	7.1 #	31.4	40.0	18.1	1350	5.81	180	213	2120	264	0.582	18.5
	8.0	35.1	44.8	15.8	1490	5.77	199	237	2350	291	0.579	16.5
	8.8 #	38.4	48.9	14.0	1610	5.74	214	257	2550	313	0.577	15.1
	10.0	43.1	54.9	12.0	1770	5.68	236	286	2830	344	0.574	13.3
	12.5	52.7	67.1	9.00	2080	5.57	277	342	3380	402	0.568	10.8
	14.2 #	58.9	75.0	7.56	2260	5.49	302	377	3710	436	0.563	9.57
	16.0 # r	65.2	83.0	6.38	2430	5.41	324	411	4030	467	0.559	8.55
160 x 160	5.0 #	24.1	30.7	29.0	1230	6.31	153	178	1890	226	0.627	26.0
	6.3	30.1	38.3	22.4	1500	6.26	187	220	2330	275	0.624	20.8
	7.1 #	33.7	42.9	19.5	1660	6.22	207	245	2600	304	0.622	18.5
	8.0	37.6	48.0	17.0	1830	6.18	229	272	2880	335	0.619	16.5
	8.8 #	41.1	52.4	15.2	1980	6.14	247	295	3130	361	0.617	15.0
	10.0	46.3	58.9	13.0	2190	6.09	273	329	3480	398	0.614	13.3
	12.5	56.6	72.1	9.80	2580	5.98	322	395	4160	467	0.608	10.8
	14.2 #	63.3	80.7	8.27	2810	5.90	351	436	4580	508	0.603	9.53
	16.0 #	70.2	89.4	7.00	3030	5.82	379	476	4990	546	0.599	8.51
180 x 180	5.0 #	27.3	34.7	33.0	1770	7.13	196	227	2720	290	0.707	25.9
	6.3	34.0	43.3	25.6	2170	7.07	241	281	3360	355	0.704	20.7
	7.1 #	38.1	48.6	22.4	2400	7.04	267	314	3740	393	0.702	18.4
	8.0	42.7	54.4	19.5	2660	7.00	296	349	4160	434	0.699	16.4
	8.8 #	46.7	59.4	17.5	2880	6.96	320	379	4520	469	0.697	14.9
	10.0	52.5	66.9	15.0	3190	6.91	355	424	5050	518	0.694	13.2
	12.5	64.4	82.1	11.4	3790	6.80	421	511	6070	613	0.688	10.7
	14.2 #	72.2	92.0	9.68	4150	6.72	462	566	6710	670	0.683	9.43
	16.0	80.2	102	8.25	4500	6.64	500	621	7340	724	0.679	8.49
200 x 200	5.0	30.4	38.7	37.0	2450	7.95	245	283	3760	362	0.787	25.9
	6.3	38.0	48.4	28.7	3010	7.89	301	350	4650	444	0.784	20.6
	7.1 #	42.6	54.2	25.2	3350	7.85	335	391	5190	493	0.782	18.4
	8.0	47.7	60.8	22.0	3710	7.81	371	436	5780	545	0.779	16.4
	8.8 #	52.2	66.5	19.7	4020	7.78	402	474	6290	590	0.777	14.9
	10.0	58.8	74.9	17.0	4470	7.72	447	531	7030	655	0.774	13.2
	12.5	72.3	92.1	13.0	5340	7.61	534	643	8490	778	0.768	10.6
	14.2 #	81.1	103	11.1	5870	7.54	587	714	9420	854	0.763	9.38
	16.0	90.3	115	9.50	6390	7.46	639	785	10300	927	0.759	8.42

Table 2.8.2.3. Celsius® SHS. Dimensions and properties

BS EN 1993-1-1: 2005
BS EN 10210-2: 2006

UK EUROCODES

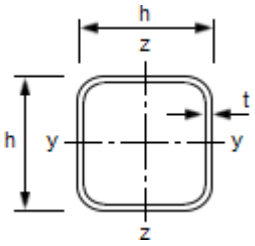
Table 2.8.2.4

SECTION PROPERTIES

HOT FINISHED
SQUARE HOLLOW SECTIONS

Celsius® SHS

Dimensions and properties



Hot Finished

Section Designation		Mass per Metre	Area of Section	Ratio for Local Buckling	Second Moment of Area	Radius of Gyration	Elastic Modulus	Plastic Modulus	Torsional Constants		Surface Area	
Size	Thickness			c/t (1)							Per Metre	Per Tonne
h x h	t		A		I	i	W_{el}	W_{pl}	I_T	W_t		
mm	mm	kg/m	cm^2		cm^4	cm	cm^3	cm^3	cm^4	cm^3	m^2	m^2
250 x 250	5.0 #	38.3	48.7	47.0	4860	9.99	389	447	7430	577	0.987	25.8
	6.3	47.9	61.0	36.7	6010	9.93	481	556	9240	712	0.984	20.6
	7.1 #	53.7	68.4	32.2	6700	9.90	536	622	10300	792	0.982	18.3
	8.0	60.3	76.8	28.3	7460	9.86	596	694	11500	880	0.979	16.3
	8.8 #	66.0	84.1	25.4	8110	9.82	649	758	12600	955	0.977	14.9
	10.0	74.5	94.9	22.0	9060	9.77	724	851	14100	1070	0.974	13.1
	12.5	91.9	117	17.0	10900	9.66	873	1040	17200	1280	0.968	10.6
	14.2 #	103	132	14.6	12100	9.58	967	1160	19100	1410	0.963	9.31
	16.0	115	147	12.6	13300	9.50	1060	1280	21100	1550	0.959	8.31
260 x 260	6.3 #	49.9	63.5	38.3	6790	10.3	522	603	10400	773	1.02	20.5
	7.1 #	56.0	71.3	33.6	7570	10.3	582	674	11600	861	1.02	18.3
	8.0 #	62.8	80.0	29.5	8420	10.3	648	753	13000	956	1.02	16.2
	8.8 #	68.8	87.6	26.5	9160	10.2	705	822	14200	1040	1.02	14.8
	10.0 #	77.7	98.9	23.0	10200	10.2	788	924	15900	1160	1.01	13.0
	12.5 #	95.8	122	17.8	12400	10.1	951	1130	19400	1390	1.01	10.5
	14.2 #	108	137	15.3	13700	9.99	1060	1260	21700	1540	1.00	9.27
	16.0 #	120	153	13.3	15100	9.91	1160	1390	23900	1690	0.999	8.29
300 x 300	6.3 #	57.8	73.6	44.6	10500	12.0	703	809	16100	1040	1.18	20.4
	7.1 #	64.9	82.6	39.3	11800	11.9	785	906	18100	1160	1.18	18.2
	8.0	72.8	92.8	34.5	13100	11.9	875	1010	20200	1290	1.18	16.2
	8.8 #	79.8	102	31.1	14300	11.9	954	1110	22100	1410	1.18	14.8
	10.0	90.2	115	27.0	16000	11.8	1070	1250	24800	1580	1.17	13.0
	12.5	112	142	21.0	19400	11.7	1300	1530	30300	1900	1.17	10.5
	14.2 #	126	160	18.1	21600	11.6	1440	1710	33900	2110	1.16	9.22
	16.0	141	179	15.8	23900	11.5	1590	1900	37600	2330	1.16	8.26
350 x 350	8.0	85.4	109	40.8	21100	13.9	1210	1390	32400	1790	1.38	16.1
	8.8 #	93.6	119	36.8	23100	13.9	1320	1520	35400	1950	1.38	14.8
	10.0	106	135	32.0	25900	13.9	1480	1720	39900	2190	1.37	12.9
	12.5	131	167	25.0	31500	13.7	1800	2110	48900	2650	1.37	10.4
	14.2 #	148	189	21.6	35200	13.7	2010	2360	54900	2960	1.36	9.19
	16.0	166	211	18.9	38900	13.6	2230	2630	61000	3260	1.36	8.21
400 x 400	8.0 #	97.9	125	47.0	31900	16.0	1590	1830	48700	2360	1.58	16.1
	8.8 #	107	137	42.5	34800	15.9	1740	2000	53300	2580	1.58	14.7
	10.0	122	155	37.0	39100	15.9	1960	2260	60100	2900	1.57	12.9
	12.5	151	192	29.0	47800	15.8	2390	2780	73900	3530	1.57	10.4
	14.2 #	170	217	25.2	53500	15.7	2680	3130	83000	3940	1.56	9.16
	16.0	191	243	22.0	59300	15.6	2970	3480	92400	4360	1.56	8.17
	20.0 ^	235	300	17.0	71500	15.4	3580	4250	112000	5240	1.55	6.59

Table 2.8.2.4. Celsius® SHS. Dimensions and properties

BS EN 1993-1-1: 2005
BS EN 10210-2: 2006

UK EUROCODES

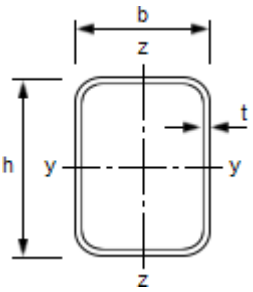
Table 2.8.3.1

SECTION PROPERTIES

HOT FINISHED
RECTANGULAR HOLLOW SECTIONS

Celsius® RHS

Dimensions and properties



Hot Finished

Section Designation		Mass per Metre	Area of Section	Ratios for Local Buckling		Second Moment of Area		Radius of Gyration		Elastic Modulus		Plastic Modulus		Torsional Constants		Surface Area	
Size h x b	Thickness		A	c_w/t (1)	c_f/t (1)	Axis y-y	Axis z-z	Axis y-y	Axis z-z	Axis y-y	Axis z-z	Axis y-y	Axis z-z	I_T	W_t	Per Metre	Per Tonne
mm	mm	kg/m	cm^2			cm^4	cm^4	cm	cm	cm^3	cm^3	cm^3	cm^3	cm^4	cm^3	m^2	m^2
50 x 30	3.0 #	3.41	4.34	13.7	7.00	13.6	5.94	1.77	1.17	5.43	3.96	6.88	4.76	13.5	6.51	0.152	44.5
	3.2	3.61	4.60	12.6	6.38	14.2	6.20	1.76	1.16	5.68	4.13	7.25	5.00	14.2	6.80	0.152	42.1
	3.6 #	4.01	5.10	10.9	5.33	15.4	6.67	1.74	1.14	6.16	4.45	7.94	5.46	15.4	7.31	0.151	37.8
	4.0	4.39	5.59	9.50	4.50	16.5	7.08	1.72	1.13	6.60	4.72	8.59	5.88	16.6	7.77	0.150	34.2
	5.0	5.28	6.73	7.00	3.00	18.7	7.89	1.67	1.08	7.49	5.26	10.0	6.80	19.0	8.67	0.147	27.8
60 x 40	3.0 #	4.35	5.54	17.0	10.3	26.5	13.9	2.18	1.58	8.82	6.95	10.9	8.19	29.2	11.2	0.192	44.2
	3.2	4.62	5.88	15.8	9.50	27.8	14.6	2.18	1.57	9.27	7.29	11.5	8.64	30.8	11.7	0.192	41.7
	3.6 #	5.14	6.54	13.7	8.11	30.4	15.9	2.16	1.56	10.1	7.93	12.7	9.50	33.8	12.8	0.191	37.2
	4.0	5.64	7.19	12.0	7.00	32.8	17.0	2.14	1.54	10.9	8.52	13.8	10.3	36.7	13.7	0.190	33.6
	5.0	6.85	8.73	9.00	5.00	38.1	19.5	2.09	1.50	12.7	9.77	16.4	12.2	43.0	15.7	0.187	27.3
	6.3	8.31	10.6	6.52	3.35	43.4	21.9	2.02	1.44	14.5	11.0	19.2	14.2	49.5	17.6	0.184	22.1
80 x 40	3.0 #	5.29	6.74	23.7	10.3	54.2	18.0	2.84	1.63	13.6	9.00	17.1	10.4	43.8	15.3	0.232	43.8
	3.2	5.62	7.16	22.0	9.50	57.2	18.9	2.83	1.63	14.3	9.46	18.0	11.0	46.2	16.1	0.232	41.3
	3.6 #	6.27	7.98	19.2	8.11	62.8	20.6	2.81	1.61	15.7	10.3	20.0	12.1	50.8	17.5	0.231	37.0
	4.0	6.90	8.79	17.0	7.00	68.2	22.2	2.79	1.59	17.1	11.1	21.8	13.2	55.2	18.9	0.230	33.4
	5.0	8.42	10.7	13.0	5.00	80.3	25.7	2.74	1.55	20.1	12.9	26.1	15.7	65.1	21.9	0.227	27.0
	6.3	10.3	13.1	9.70	3.35	93.3	29.2	2.67	1.49	23.3	14.6	31.1	18.4	75.6	24.8	0.224	21.8
	7.1 #	11.4	14.5	8.27	2.63	99.8	30.7	2.63	1.46	25.0	15.4	33.8	19.8	80.9	26.2	0.222	19.5
	8.0	12.5	16.0	7.00	2.00	106	32.1	2.58	1.42	26.5	16.1	36.5	21.2	85.8	27.4	0.219	17.5
90 x 50	3.0 #	6.24	7.94	27.0	13.7	84.4	33.5	3.26	2.05	18.8	13.4	23.2	15.3	76.5	22.4	0.272	43.5
	3.2	6.63	8.44	25.1	12.6	89.1	35.3	3.25	2.04	19.8	14.1	24.6	16.2	80.9	23.6	0.272	41.1
	3.6 #	7.40	9.42	22.0	10.9	98.3	38.7	3.23	2.03	21.8	15.5	27.2	18.0	89.4	25.9	0.271	36.6
	4.0	8.15	10.4	19.5	9.50	107	41.9	3.21	2.01	23.8	16.8	29.8	19.6	97.5	28.0	0.270	33.2
	5.0	9.99	12.7	15.0	7.00	127	49.2	3.16	1.97	28.3	19.7	36.0	23.5	116	32.9	0.267	26.7
	6.3	12.3	15.6	11.3	4.94	150	57.0	3.10	1.91	33.3	22.8	43.2	28.0	138	38.1	0.264	21.5
	7.1 #	13.6	17.3	9.68	4.04	162	60.9	3.06	1.88	36.0	24.4	47.2	30.5	149	40.7	0.262	19.3
	8.0	15.0	19.2	8.25	3.25	174	64.6	3.01	1.84	38.6	25.8	51.4	32.9	160	43.2	0.259	17.2
100 x 50	3.0 #	6.71	8.54	30.3	13.7	110	36.8	3.58	2.08	21.9	14.7	27.3	16.8	88.4	25.0	0.292	43.5
	3.2	7.13	9.08	28.3	12.6	116	38.8	3.57	2.07	23.2	15.5	28.9	17.7	93.4	26.4	0.292	40.9
	3.6 #	7.96	10.1	24.8	10.9	128	42.6	3.55	2.05	25.6	17.0	32.1	19.6	103	29.0	0.291	36.7
	4.0	8.78	11.2	22.0	9.50	140	46.2	3.53	2.03	27.9	18.5	35.2	21.5	113	31.4	0.290	33.1
	5.0	10.8	13.7	17.0	7.00	167	54.3	3.48	1.99	33.3	21.7	42.6	25.8	135	36.9	0.287	26.6
	6.3	13.3	16.9	12.9	4.94	197	63.0	3.42	1.93	39.4	25.2	51.3	30.8	160	42.9	0.284	21.4
	7.1 #	14.7	18.7	11.1	4.04	214	67.5	3.38	1.90	42.7	27.0	56.3	33.5	173	46.0	0.282	19.2
	8.0	16.3	20.8	9.50	3.25	230	71.7	3.33	1.86	46.0	28.7	61.4	36.3	186	48.9	0.279	17.1
	8.8 #	17.6	22.5	8.36	2.68	243	74.8	3.29	1.82	48.5	29.9	65.6	38.5	197	51.1	0.277	15.7
	10.0 #	19.6	24.9	7.00	2.00	259	78.4	3.22	1.77	51.8	31.4	71.2	41.4	209	53.6	0.274	14.0

Table 2.8.3.1. Celsius® RHS. Dimensions and properties

BS EN 1993-1-1: 2005
BS EN 10210-2: 2006

UK EUROCODES

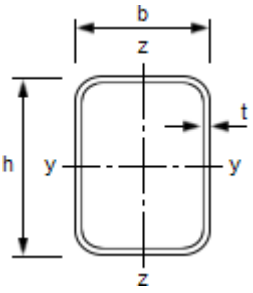
Table 2.8.3.2

SECTION PROPERTIES

HOT FINISHED
RECTANGULAR HOLLOW SECTIONS

Celsius® RHS

Dimensions and properties



Hot Finished

Section Designation		Mass per Metre	Area of Section	Ratios for Local Buckling		Second Moment of Area		Radius of Gyration		Elastic Modulus		Plastic Modulus		Torsional Constants		Surface Area	
Size h x b	Thickness		A	c_w/t (1)	c_f/t (1)	Axis y-y	Axis z-z	Axis y-y	Axis z-z	Axis y-y	Axis z-z	Axis y-y	Axis z-z	I_T	W_t	Per Metre	Per Tonne
mm	mm	kg/m	cm^2			cm^4	cm^4	cm	cm	cm^3	cm^3	cm^3	cm^3	cm^4	cm^3	m^2	m^2
100 x 60	3.0 #	7.18	9.14	30.3	17.0	124	55.7	3.68	2.47	24.7	18.6	30.2	21.2	121	30.7	0.312	43.4
	3.2	7.63	9.72	28.3	15.8	131	58.8	3.67	2.46	26.2	19.6	32.0	22.4	129	32.4	0.312	40.9
	3.6 #	8.53	10.9	24.8	13.7	145	64.8	3.65	2.44	28.9	21.6	35.6	24.9	142	35.6	0.311	36.4
	4.0	9.41	12.0	22.0	12.0	158	70.5	3.63	2.43	31.6	23.5	39.1	27.3	156	38.7	0.310	32.9
	5.0	11.6	14.7	17.0	9.00	189	83.6	3.58	2.38	37.8	27.9	47.4	32.9	188	45.9	0.307	26.6
	6.3	14.2	18.1	12.9	6.52	225	98.1	3.52	2.33	45.0	32.7	57.3	39.5	224	53.8	0.304	21.3
	7.1 #	15.8	20.2	11.1	5.45	244	106	3.48	2.29	48.8	35.3	62.9	43.2	245	58.0	0.302	19.1
	8.0	17.5	22.4	9.50	4.50	264	113	3.44	2.25	52.8	37.8	68.7	47.1	265	62.2	0.299	17.0
	8.8 #	19.0	24.2	8.36	3.82	279	119	3.40	2.22	55.9	39.7	73.6	50.2	282	65.4	0.297	15.6
	10.0 #	21.1	26.9	7.00	3.00	299	126	3.33	2.16	59.9	42.1	80.2	54.4	304	69.3	0.294	13.9
120 x 60	3.0 #	8.12	10.3	37.0	17.0	194	65.5	4.33	2.52	32.3	21.8	40.0	24.6	156	37.2	0.352	43.3
	3.2 #	8.64	11.0	34.5	15.8	205	69.2	4.32	2.51	34.2	23.1	42.4	26.1	165	39.2	0.352	40.8
	3.6 #	9.66	12.3	30.3	13.7	227	76.3	4.30	2.49	37.9	25.4	47.2	28.9	183	43.3	0.351	36.5
	4.0	10.7	13.6	27.0	12.0	249	83.1	4.28	2.47	41.5	27.7	51.9	31.7	201	47.1	0.350	32.8
	5.0	13.1	16.7	21.0	9.00	299	98.8	4.23	2.43	49.9	32.9	63.1	38.4	242	56.0	0.347	26.4
	6.3	16.2	20.7	16.0	6.52	358	116	4.16	2.37	59.7	38.8	76.7	46.3	290	65.9	0.344	21.2
	7.1 #	18.1	23.0	13.9	5.45	391	126	4.12	2.34	65.2	41.9	84.4	50.8	317	71.3	0.342	18.9
	8.0	20.1	25.6	12.0	4.50	425	135	4.08	2.30	70.8	45.0	92.7	55.4	344	76.6	0.339	16.9
	8.8 #	21.8	27.8	10.6	3.82	452	142	4.04	2.27	75.3	47.5	99.6	59.2	366	80.8	0.337	15.5
	10.0 #	24.3	30.9	9.00	3.00	488	152	3.97	2.21	81.4	50.5	109	64.4	396	86.1	0.334	13.8
	12.5 #	29.1	37.1	6.60	1.80	546	165	3.84	2.11	91.1	54.9	126	73.1	442	93.8	0.328	11.3
120 x 80	3.6 #	10.8	13.7	30.3	19.2	276	147	4.48	3.27	46.0	36.7	55.6	42.0	301	59.5	0.391	36.2
	4.0	11.9	15.2	27.0	17.0	303	161	4.46	3.25	50.4	40.2	61.2	46.1	330	65.0	0.390	32.7
	5.0	14.7	18.7	21.0	13.0	365	193	4.42	3.21	60.9	48.2	74.6	56.1	401	77.9	0.387	26.3
	6.3	18.2	23.2	16.0	9.70	440	230	4.36	3.15	73.3	57.6	91.0	68.2	487	92.9	0.384	21.1
	7.1 #	20.3	25.8	13.9	8.27	482	251	4.32	3.12	80.3	62.8	100	75.2	535	101	0.382	18.8
	8.0	22.6	28.8	12.0	7.00	525	273	4.27	3.08	87.5	68.1	111	82.6	587	110	0.379	16.8
	8.8 #	24.5	31.3	10.6	6.09	561	290	4.24	3.04	93.5	72.4	119	88.7	629	117	0.377	15.3
	10.0	27.4	34.9	9.00	5.00	609	313	4.18	2.99	102	78.1	131	97.3	688	126	0.374	13.7
	12.5 #	33.0	42.1	6.60	3.40	692	349	4.05	2.88	115	87.4	153	113	789	141	0.368	11.2
150 x 100	4.0 #	15.1	19.2	34.5	22.0	607	324	5.63	4.11	81.0	64.8	97.4	73.6	660	105	0.490	32.5
	5.0	18.6	23.7	27.0	17.0	739	392	5.58	4.07	98.5	78.5	119	90.1	807	127	0.487	26.2
	6.3	23.1	29.5	20.8	12.9	898	474	5.52	4.01	120	94.8	147	110	986	153	0.484	20.9
	7.1 #	25.9	32.9	18.1	11.1	990	520	5.48	3.97	132	104	163	122	1090	168	0.482	18.7
	8.0	28.9	36.8	15.8	9.50	1090	569	5.44	3.94	145	114	180	135	1200	183	0.479	16.6
	8.8 #	31.5	40.1	14.0	8.36	1170	610	5.40	3.90	156	122	195	146	1300	196	0.477	15.2
	10.0	35.3	44.9	12.0	7.00	1280	665	5.34	3.85	171	133	216	161	1430	214	0.474	13.5
	12.5	42.8	54.6	9.00	5.00	1490	763	5.22	3.74	198	153	256	190	1680	246	0.468	10.9

Table 2.8.3.2. Celsius® RHS. Dimensions and properties

BS EN 1993-1-1: 2005
BS EN 10210-2: 2006

UK EUROCODES

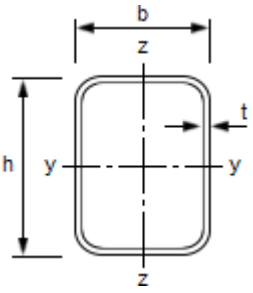
Table 2.8.3.3

SECTION PROPERTIES

HOT FINISHED
RECTANGULAR HOLLOW SECTIONS

Celsius® RHS

Dimensions and properties



Hot Finished

Section Designation		Mass per Metre	Area of Section	Ratios for Local Buckling		Second Moment of Area		Radius of Gyration		Elastic Modulus		Plastic Modulus		Torsional Constants		Surface Area	
Size	Thickness					Axis y-y	Axis z-z	Axis y-y	Axis z-z	Axis y-y	Axis z-z	Axis y-y	Axis z-z			Per Metre	Per Tonne
h x b			A	c_w/t (1)	c_f/t (1)									I_T	W_t		
mm	mm	kg/m	cm^2			cm^4	cm^4	cm	cm	cm^3	cm^3	cm^3	cm^3	cm^4	cm^3	m^2	m^2
160 x 80	4.0 #	14.4	18.4	37.0	17.0	612	207	5.77	3.35	76.5	51.7	94.7	58.3	493	88.1	0.470	32.6
	5.0	17.8	22.7	29.0	13.0	744	249	5.72	3.31	93.0	62.3	116	71.1	600	106	0.467	26.2
	6.3	22.2	28.2	22.4	9.70	903	299	5.66	3.26	113	74.8	142	86.8	730	127	0.464	20.9
	7.1 #	24.7	31.5	19.5	8.27	994	327	5.62	3.22	124	81.7	158	95.9	804	139	0.462	18.7
	8.0	27.6	35.2	17.0	7.00	1090	356	5.57	3.18	136	89.0	175	106	883	151	0.459	16.6
	8.8 #	30.1	38.3	15.2	6.09	1170	379	5.53	3.15	147	94.9	189	114	949	161	0.457	15.2
	10.0	33.7	42.9	13.0	5.00	1280	411	5.47	3.10	161	103	209	125	1040	175	0.454	13.5
	12.5	40.9	52.1	9.80	3.40	1490	465	5.34	2.99	186	116	247	146	1200	198	0.448	11.0
180 x 60	4.0 #	14.4	18.4	42.0	12.0	697	121	6.16	2.56	77.4	40.3	99.8	45.2	341	72.2	0.470	32.6
	5.0 #	17.8	22.7	33.0	9.00	846	144	6.10	2.52	94.0	48.1	122	54.9	411	86.3	0.467	26.2
	6.3 #	22.2	28.2	25.6	6.52	1030	171	6.03	2.46	114	57.0	150	66.6	495	102	0.464	20.9
	7.1 #	24.7	31.5	22.4	5.45	1130	186	5.99	2.43	126	61.9	166	73.3	542	111	0.462	18.7
	8.0 #	27.6	35.2	19.5	4.50	1240	201	5.94	2.39	138	66.9	184	80.4	590	120	0.459	16.6
	8.8 #	30.1	38.3	17.5	3.82	1330	212	5.89	2.35	148	70.8	199	86.2	630	127	0.457	15.2
	10.0 #	33.7	42.9	15.0	3.00	1460	228	5.83	2.30	162	75.8	220	94.4	683	137	0.454	13.5
	12.5 #	40.9	52.1	11.4	1.80	1680	251	5.68	2.20	187	83.7	260	109	770	151	0.448	11.0
180 x 100	4.0 #	16.9	21.6	42.0	22.0	945	379	6.61	4.19	105	75.9	128	85.2	852	127	0.550	32.5
	5.0 #	21.0	26.7	33.0	17.0	1150	460	6.57	4.15	128	92.0	157	104	1040	154	0.547	26.1
	6.3 #	26.1	33.3	25.6	12.9	1410	557	6.50	4.09	156	111	194	128	1280	186	0.544	20.8
	7.1 #	29.2	37.2	22.4	11.1	1560	613	6.47	4.06	173	123	215	142	1410	205	0.542	18.5
	8.0 #	32.6	41.6	19.5	9.50	1710	671	6.42	4.02	190	134	239	157	1560	224	0.539	16.5
	8.8 #	35.6	45.4	17.5	8.36	1850	720	6.38	3.98	205	144	259	170	1690	240	0.537	15.1
	10.0 #	40.0	50.9	15.0	7.00	2040	787	6.32	3.93	226	157	288	188	1860	263	0.534	13.4
	12.5 #	48.7	62.1	11.4	5.00	2390	908	6.20	3.82	265	182	344	223	2190	303	0.528	10.8
200 x 100	4.0 #	18.2	23.2	47.0	22.0	1220	416	7.26	4.24	122	83.2	150	92.8	983	142	0.590	32.4
	5.0	22.6	28.7	37.0	17.0	1500	505	7.21	4.19	149	101	185	114	1200	172	0.587	26.0
	6.3	28.1	35.8	28.7	12.9	1830	613	7.15	4.14	183	123	228	140	1480	208	0.584	20.8
	7.1 #	31.4	40.0	25.2	11.1	2020	674	7.11	4.10	202	135	254	155	1630	229	0.582	18.5
	8.0	35.1	44.8	22.0	9.50	2230	739	7.06	4.06	223	148	282	172	1800	251	0.579	16.5
	8.8 #	38.4	48.9	19.7	8.36	2410	793	7.02	4.03	241	159	306	186	1950	270	0.577	15.1
	10.0	43.1	54.9	17.0	7.00	2660	869	6.96	3.98	266	174	341	206	2160	295	0.574	13.3
	12.5	52.7	67.1	13.0	5.00	3140	1000	6.84	3.87	314	201	408	245	2540	341	0.568	10.8
	14.2 #	58.9	75.0	11.1	4.04	3420	1080	6.75	3.80	342	216	450	268	2770	368	0.563	9.57
	16.0 # r	65.2	83.0	9.50	3.25	3680	1150	6.66	3.72	368	229	491	290	2980	391	0.559	8.55

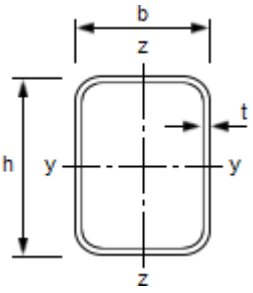
Table 2.8.3.3. Celsius® RHS. Dimensions and properties

SECTION PROPERTIES

HOT FINISHED
RECTANGULAR HOLLOW SECTIONS

Celsius® RHS

Dimensions and properties



Hot Finished

Section Designation		Mass per Metre	Area of Section	Ratios for Local Buckling		Second Moment of Area		Radius of Gyration		Elastic Modulus		Plastic Modulus		Torsional Constants		Surface Area	
Size h x b	Thickness		A	c_w/t (1)	c_f/t (1)	Axis y-y	Axis z-z	Axis y-y	Axis z-z	Axis y-y	Axis z-z	Axis y-y	Axis z-z	I_T	W_t	Per Metre	Per Tonne
mm	mm	kg/m	cm^2			cm^4	cm^4	cm	cm	cm^3	cm^3	cm^3	cm^3	cm^4	cm^3	m^2	m^2
200 x 120	5.0 #	24.1	30.7	37.0	21.0	1690	762	7.40	4.98	168	127	205	144	1650	210	0.627	26.0
	6.3	30.1	38.3	28.7	16.0	2070	929	7.34	4.92	207	155	253	177	2030	255	0.624	20.8
	7.1 #	33.7	42.9	25.2	13.9	2290	1030	7.30	4.89	229	171	281	197	2250	282	0.622	18.5
	8.0	37.6	48.0	22.0	12.0	2530	1130	7.26	4.85	253	188	313	218	2500	310	0.619	16.5
	8.8 #	41.1	52.4	19.7	10.6	2730	1220	7.22	4.82	273	203	340	237	2700	334	0.617	15.0
	10.0	46.3	58.9	17.0	9.00	3030	1340	7.17	4.76	303	223	379	263	3000	367	0.614	13.3
	12.5 #	56.6	72.1	13.0	6.60	3580	1560	7.04	4.66	358	260	455	314	3570	428	0.608	10.8
	14.2 #	63.3	80.7	11.1	5.45	3910	1690	6.96	4.58	391	282	503	346	3920	464	0.603	9.53
	16.0 #	70.2	89.4	9.50	4.50	4220	1810	6.87	4.50	422	302	550	377	4250	497	0.599	8.51
200 x 150	5.0 #	26.5	33.7	37.0	27.0	1970	1270	7.64	6.12	197	169	234	192	2390	267	0.687	26.0
	6.3 #	33.0	42.1	28.7	20.8	2420	1550	7.58	6.07	242	207	289	237	2950	326	0.684	20.7
	7.1 #	37.0	47.1	25.2	18.1	2690	1720	7.55	6.03	268	229	322	264	3280	361	0.682	18.4
	8.0	41.4	52.8	22.0	15.8	2970	1890	7.50	5.99	297	253	359	294	3640	398	0.679	16.4
	8.8 #	45.3	57.7	19.7	14.0	3220	2050	7.47	5.96	322	273	390	319	3960	430	0.677	15.0
	10.0	51.0	64.9	17.0	12.0	3570	2260	7.41	5.91	357	302	436	356	4410	475	0.674	13.2
	12.5 #	62.5	79.6	13.0	9.00	4240	2670	7.30	5.80	424	356	525	428	5290	559	0.668	10.7
	14.2 #	70.0	89.2	11.1	7.56	4640	2920	7.22	5.72	464	389	582	473	5830	610	0.663	9.48
	16.0 #	77.7	99.0	9.50	6.38	5040	3150	7.13	5.64	504	420	638	518	6370	658	0.659	8.50
220 x 120	5.0 #	25.7	32.7	41.0	21.0	2130	829	8.06	5.03	193	138	236	155	1880	232	0.667	25.9
	6.3 #	32.0	40.8	31.9	16.0	2610	1010	8.00	4.98	237	168	292	191	2320	283	0.664	20.7
	7.1 #	35.9	45.7	28.0	13.9	2900	1120	7.96	4.94	263	186	326	213	2570	312	0.662	18.5
	8.0 #	40.2	51.2	24.5	12.0	3200	1230	7.91	4.90	291	205	362	236	2850	343	0.659	16.4
	8.8 #	43.9	55.9	22.0	10.6	3470	1320	7.87	4.87	315	221	394	256	3090	370	0.657	15.0
	10.0 #	49.4	62.9	19.0	9.00	3840	1460	7.82	4.81	349	243	440	285	3430	407	0.654	13.2
	12.5 #	60.5	77.1	14.6	6.60	4560	1710	7.69	4.71	415	285	530	341	4090	476	0.648	10.7
	14.2 #	67.8	86.3	12.5	5.45	5000	1850	7.61	4.63	454	309	586	376	4490	517	0.643	9.52
	16.0 #	75.2	95.8	10.8	4.50	5410	1990	7.52	4.55	492	331	643	410	4870	555	0.639	8.50
250 x 100	5.0 #	26.5	33.7	47.0	17.0	2610	618	8.80	4.28	209	124	263	138	1620	217	0.687	26.0
	6.3 #	33.0	42.1	36.7	12.9	3210	751	8.73	4.22	257	150	326	169	1980	264	0.684	20.7
	7.1 #	37.0	47.1	32.2	11.1	3560	827	8.69	4.19	285	165	363	188	2200	291	0.682	18.4
	8.0 #	41.4	52.8	28.3	9.50	3940	909	8.64	4.15	315	182	404	209	2430	319	0.679	16.4
	8.8 #	45.3	57.7	25.4	8.36	4270	977	8.60	4.12	341	195	439	226	2630	343	0.677	15.0
	10.0 #	51.0	64.9	22.0	7.00	4730	1070	8.54	4.06	379	214	491	251	2910	376	0.674	13.2
	12.5 #	62.5	79.6	17.0	5.00	5620	1250	8.41	3.96	450	249	592	299	3440	438	0.668	10.7
	14.2 #	70.0	89.2	14.6	4.04	6170	1340	8.31	3.88	493	269	655	329	3750	473	0.663	9.48
	16.0 #	77.7	99.0	12.6	3.25	6690	1430	8.22	3.80	535	287	719	358	4050	505	0.659	8.50

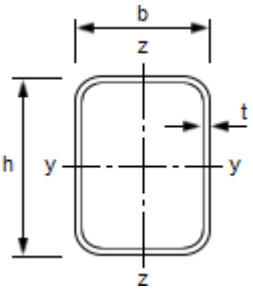
Table 2.8.3.4. Celsius® RHS. Dimensions and properties

SECTION PROPERTIES

HOT FINISHED
RECTANGULAR HOLLOW SECTIONS

Celsius® RHS

Dimensions and properties



Hot Finished

Section Designation		Mass per Metre	Area of Section	Ratios for Local Buckling		Second Moment of Area		Radius of Gyration		Elastic Modulus		Plastic Modulus		Torsional Constants		Surface Area	
Size	Thickness					Axis y-y	Axis z-z	Axis y-y	Axis z-z	Axis y-y	Axis z-z	Axis y-y	Axis z-z			Per Metre	Per Tonne
h x b			A	c_w/t (1)	c_f/t (1)									I_T	W_t		
mm	mm	kg/m	cm^2			cm^4	cm^4	cm	cm	cm^3	cm^3	cm^3	cm^3	cm^4	cm^3	m^2	m^2
250 x 150	5.0 #	30.4	38.7	47.0	27.0	3360	1530	9.31	6.28	269	204	324	228	3280	337	0.787	25.9
	6.3	38.0	48.4	36.7	20.8	4140	1870	9.25	6.22	331	250	402	283	4050	413	0.784	20.6
	7.1 #	42.6	54.2	32.2	18.1	4610	2080	9.22	6.19	368	277	449	315	4520	457	0.782	18.4
	8.0	47.7	60.8	28.3	15.8	5110	2300	9.17	6.15	409	306	501	350	5020	506	0.779	16.4
	8.8 #	52.2	66.5	25.4	14.0	5550	2490	9.13	6.12	444	331	545	381	5460	547	0.777	14.9
	10.0	58.8	74.9	22.0	12.0	6170	2760	9.08	6.06	494	367	611	426	6090	605	0.774	13.2
	12.5	72.3	92.1	17.0	9.00	7390	3270	8.96	5.96	591	435	740	514	7330	717	0.768	10.6
	14.2 #	81.1	103	14.6	7.56	8140	3580	8.87	5.88	651	477	823	570	8100	784	0.763	9.38
	16.0	90.3	115	12.6	6.38	8880	3870	8.79	5.80	710	516	906	625	8870	849	0.759	8.42
260 x 140	5.0 #	30.4	38.7	49.0	25.0	3530	1350	9.55	5.91	272	193	331	216	3080	326	0.787	25.9
	6.3 #	38.0	48.4	38.3	19.2	4360	1660	9.49	5.86	335	237	411	267	3800	399	0.784	20.6
	7.1 #	42.6	54.2	33.6	16.7	4840	1840	9.45	5.82	372	263	459	298	4230	442	0.782	18.4
	8.0 #	47.7	60.8	29.5	14.5	5370	2030	9.40	5.78	413	290	511	331	4700	488	0.779	16.4
	8.8 #	52.2	66.5	26.5	12.9	5830	2200	9.37	5.75	449	314	557	360	5110	527	0.777	14.9
	10.0 #	58.8	74.9	23.0	11.0	6490	2430	9.31	5.70	499	347	624	402	5700	584	0.774	13.2
	12.5 #	72.3	92.1	17.8	8.20	7770	2880	9.18	5.59	597	411	756	485	6840	690	0.768	10.6
	14.2 #	81.1	103	15.3	6.86	8560	3140	9.10	5.52	658	449	840	537	7560	754	0.763	9.38
	16.0 #	90.3	115	13.3	5.75	9340	3400	9.01	5.44	718	486	925	588	8260	815	0.759	8.42
300 x 100	5.0 #	30.4	38.7	57.0	17.0	4150	731	10.3	4.34	276	146	354	161	2040	262	0.787	25.9
	6.3 #	38.0	48.4	44.6	12.9	5110	890	10.3	4.29	341	178	439	199	2500	319	0.784	20.6
	7.1 #	42.6	54.2	39.3	11.1	5680	981	10.2	4.25	379	196	490	221	2780	352	0.782	18.4
	8.0	47.7	60.8	34.5	9.50	6310	1080	10.2	4.21	420	216	546	245	3070	387	0.779	16.4
	8.8 #	52.2	66.5	31.1	8.36	6840	1160	10.1	4.18	456	232	594	266	3320	416	0.777	14.9
	10.0	58.8	74.9	27.0	7.00	7610	1280	10.1	4.13	508	255	666	296	3680	458	0.774	13.2
	12.5 #	72.3	92.1	21.0	5.00	9100	1490	9.94	4.02	607	297	806	354	4350	534	0.768	10.6
	14.2 #	81.1	103	18.1	4.04	10000	1610	9.85	3.94	669	321	896	390	4760	578	0.763	9.38
	16.0 #	90.3	115	15.8	3.25	10900	1720	9.75	3.87	729	344	986	425	5140	619	0.759	8.42
300 x 150	8.0 # rr	54.0	68.8	34.5	15.8	8010	2700	10.8	6.27	534	360	663	407	6450	613	0.879	16.3
	8.8 # rr	59.1	75.3	31.1	14.0	8710	2930	10.8	6.23	580	390	723	443	7020	664	0.877	14.8
	10.0 # rr	66.7	84.9	27.0	12.0	9720	3250	10.7	6.18	648	433	811	496	7840	736	0.874	13.1
	12.5 # rr	82.1	105	21.0	9.00	11700	3860	10.6	6.07	779	514	986	600	9450	874	0.868	10.6
	14.2 # rr	92.3	118	18.1	7.56	12900	4230	10.5	6.00	862	564	1100	666	10500	959	0.863	9.32
	16.0 # rr	103	131	15.8	6.38	14200	4600	10.4	5.92	944	613	1210	732	11500	1040	0.859	8.35

Table 2.8.3.5. Celsius® RHS. Dimensions and properties

BS EN 1993-1-1: 2005
BS EN 10210-2: 2006

UK EUROCODES

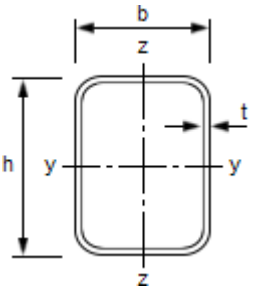
Table 2.8.3.6

SECTION PROPERTIES

HOT FINISHED
RECTANGULAR HOLLOW SECTIONS

Celsius® RHS

Dimensions and properties



Hot Finished

Section Designation		Mass per Metre	Area of Section	Ratios for Local Buckling		Second Moment of Area		Radius of Gyration		Elastic Modulus		Plastic Modulus		Torsional Constants		Surface Area	
Size h x b	Thickness		A	c_w/t (1)	c_f/t (1)	Axis y-y	Axis z-z	Axis y-y	Axis z-z	Axis y-y	Axis z-z	Axis y-y	Axis z-z	I_T	W_t	Per Metre	Per Tonne
mm	mm	kg/m	cm^2			cm^4	cm^4	cm	cm	cm^3	cm^3	cm^3	cm^3	cm^4	cm^3	m^2	m^2
300 x 200	5.0 #	38.3	48.7	57.0	37.0	6320	3400	11.4	8.35	421	340	501	380	6820	552	0.987	25.8
	6.3	47.9	61.0	44.6	28.7	7830	4190	11.3	8.29	522	419	624	472	8480	681	0.984	20.6
	7.1 #	53.7	68.4	39.3	25.2	8730	4670	11.3	8.26	582	467	698	528	9470	757	0.982	18.3
	8.0	60.3	76.8	34.5	22.0	9720	5180	11.3	8.22	648	518	779	589	10600	840	0.979	16.3
	8.8 #	66.0	84.1	31.1	19.7	10600	5630	11.2	8.18	705	563	851	643	11500	912	0.977	14.9
	10.0	74.5	94.9	27.0	17.0	11800	6280	11.2	8.13	788	628	956	721	12900	1020	0.974	13.1
	12.5	91.9	117	21.0	13.0	14300	7540	11.0	8.02	952	754	1170	877	15700	1220	0.968	10.6
	14.2 #	103	132	18.1	11.1	15800	8330	11.0	7.95	1060	833	1300	978	17500	1340	0.963	9.31
	16.0	115	147	15.8	9.50	17400	9110	10.9	7.87	1160	911	1440	1080	19300	1470	0.959	8.31
300 x 250	5.0 #	42.2	53.7	57.0	47.0	7410	5610	11.7	10.2	494	449	575	508	9770	697	1.09	25.8
	6.3 #	52.8	67.3	44.6	36.7	9190	6950	11.7	10.2	613	556	716	633	12200	862	1.08	20.4
	7.1 #	59.3	75.5	39.3	32.2	10300	7750	11.6	10.1	683	620	802	708	13600	960	1.08	18.3
	8.0	66.5	84.8	34.5	28.3	11400	8630	11.6	10.1	761	690	896	791	15200	1070	1.08	16.2
	8.8 #	72.9	92.9	31.1	25.4	12400	9390	11.6	10.1	829	751	979	864	16600	1160	1.08	14.8
	10.0 #	82.4	105	27.0	22.0	13900	10500	11.5	10.0	928	840	1100	971	18600	1300	1.07	12.9
	12.5 #	102	130	21.0	17.0	16900	12700	11.4	9.89	1120	1010	1350	1190	22700	1560	1.07	10.5
	14.2 #	115	146	18.1	14.6	18700	14100	11.3	9.82	1250	1130	1510	1330	25400	1730	1.06	9.25
	16.0 #	128	163	15.8	12.6	20600	15500	11.2	9.74	1380	1240	1670	1470	28100	1900	1.06	8.28
340 x 100	10.0	65.1	82.9	31.0	7.00	10600	1440	11.3	4.16	623	288	823	332	4300	523	0.854	13.2
350 x 150	5.0 #	38.3	48.7	67.0	27.0	7660	2050	12.5	6.49	437	274	543	301	5160	477	0.987	25.8
	6.3 #	47.9	61.0	52.6	20.8	9480	2530	12.5	6.43	542	337	676	373	6390	586	0.984	20.6
	7.1 #	53.7	68.4	46.3	18.1	10600	2800	12.4	6.40	604	374	756	416	7120	651	0.982	18.3
	8.0 #	60.3	76.8	40.8	15.8	11800	3110	12.4	6.36	673	414	844	464	7930	721	0.979	16.3
	8.8 #	66.0	84.1	36.8	14.0	12800	3360	12.3	6.33	732	449	922	506	8620	781	0.977	14.9
	10.0 #	74.5	94.9	32.0	12.0	14300	3740	12.3	6.27	818	498	1040	566	9630	867	0.974	13.1
	12.5 #	91.9	117	25.0	9.00	17300	4450	12.2	6.17	988	593	1260	686	11600	1030	0.968	10.6
	14.2 #	103	132	21.6	7.56	19200	4890	12.1	6.09	1100	652	1410	763	12900	1130	0.963	9.31
	16.0 #	115	147	18.9	6.38	21100	5320	12.0	6.01	1210	709	1560	840	14100	1230	0.959	8.31
350 x 250	6.3 #	57.8	73.6	52.6	36.7	13200	7890	13.4	10.4	754	631	892	709	15200	1010	1.18	20.4
	7.1 #	64.9	82.6	46.3	32.2	14700	8800	13.4	10.3	843	704	999	794	17000	1130	1.18	18.2
	8.0 #	72.8	92.8	40.8	28.3	16400	9800	13.3	10.3	940	784	1120	888	19000	1250	1.18	16.2
	8.8 #	79.8	102	36.8	25.4	17900	10700	13.3	10.2	1030	853	1220	970	20800	1370	1.18	14.8
	10.0 #	90.2	115	32.0	22.0	20100	11900	13.2	10.2	1150	955	1380	1090	23400	1530	1.17	13.0
	12.5 #	112	142	25.0	17.0	24400	14400	13.1	10.1	1400	1160	1690	1330	28500	1840	1.17	10.5
	14.2 #	126	160	21.6	14.6	27200	16000	13.0	10.0	1550	1280	1890	1490	31900	2040	1.16	9.22
	16.0 #	141	179	18.9	12.6	30000	17700	12.9	9.93	1720	1410	2100	1660	35300	2250	1.16	8.26

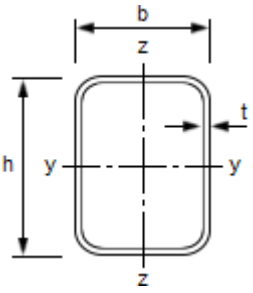
Table 2.8.3.6. Celsius® RHS. Dimensions and properties

SECTION PROPERTIES

HOT FINISHED
RECTANGULAR HOLLOW SECTIONS

Celsius® RHS

Dimensions and properties



Hot Finished

Section Designation		Mass per Metre	Area of Section	Ratios for Local Buckling		Second Moment of Area		Radius of Gyration		Elastic Modulus		Plastic Modulus		Torsional Constants		Surface Area	
Size h x b	Thickness		A	c_w/t (1)	c_f/t (1)	Axis y-y	Axis z-z	Axis y-y	Axis z-z	Axis y-y	Axis z-z	Axis y-y	Axis z-z	I_T	W_t	Per Metre	Per Tonne
mm	mm	kg/m	cm^2			cm^4	cm^4	cm	cm	cm^3	cm^3	cm^3	cm^3	cm^4	cm^3	m^2	m^2
400 x 150	6.3 #	52.8	67.3	60.5	20.8	13300	2850	14.0	6.51	663	380	836	418	7600	673	1.08	20.4
	7.1 #	59.3	75.5	53.3	18.1	14800	3170	14.0	6.47	740	422	936	467	8470	748	1.08	18.3
	8.0 #	66.5	84.8	47.0	15.8	16500	3510	13.9	6.43	824	468	1050	521	9420	828	1.08	16.2
	8.8 #	72.9	92.9	42.5	14.0	18000	3800	13.9	6.40	898	507	1140	568	10300	898	1.08	14.8
	10.0 #	82.4	105	37.0	12.0	20100	4230	13.8	6.35	1010	564	1290	636	11500	998	1.07	12.9
	12.5 #	102	130	29.0	9.00	24400	5040	13.7	6.24	1220	672	1570	772	13800	1190	1.07	10.5
	14.2 #	115	146	25.2	7.56	27100	5550	13.6	6.16	1360	740	1760	859	15300	1310	1.06	9.25
	16.0	128	163	22.0	6.38	29800	6040	13.5	6.09	1490	805	1950	947	16800	1430	1.06	8.28
400 x 200	6.3 #	57.8	73.6	60.5	28.7	15700	5380	14.6	8.55	785	538	960	594	12600	917	1.18	20.4
	7.1 #	64.9	82.6	53.3	25.2	17500	5990	14.6	8.51	877	599	1080	665	14100	1020	1.18	18.2
	8.0	72.8	92.8	47.0	22.0	19600	6660	14.5	8.47	978	666	1200	743	15700	1140	1.18	16.2
	8.8 #	79.8	102	42.5	19.7	21300	7240	14.5	8.44	1070	724	1320	811	17200	1230	1.18	14.8
	10.0	90.2	115	37.0	17.0	23900	8080	14.4	8.39	1200	808	1480	911	19300	1380	1.17	13.0
	12.5	112	142	29.0	13.0	29100	9740	14.3	8.28	1450	974	1810	1110	23400	1660	1.17	10.5
	14.2 #	126	160	25.2	11.1	32400	10800	14.2	8.21	1620	1080	2030	1240	26100	1830	1.16	9.22
	16.0	141	179	22.0	9.50	35700	11800	14.1	8.13	1790	1180	2260	1370	28900	2010	1.16	8.26
400 x 300	8.0 #	85.4	109	47.0	34.5	25700	16500	15.4	12.3	1290	1100	1520	1250	31000	1750	1.38	16.1
	8.8 #	93.6	119	42.5	31.1	28100	18000	15.3	12.3	1400	1200	1660	1360	33900	1910	1.38	14.8
	10.0 #	106	135	37.0	27.0	31500	20200	15.3	12.2	1580	1350	1870	1540	38200	2140	1.37	12.9
	12.5 #	131	167	29.0	21.0	38500	24600	15.2	12.1	1920	1640	2300	1880	46800	2590	1.37	10.4
	14.2 #	148	189	25.2	18.1	43000	27400	15.1	12.1	2150	1830	2580	2110	52500	2890	1.36	9.19
	16.0 #	166	211	22.0	15.8	47500	30300	15.0	12.0	2380	2020	2870	2350	58300	3180	1.36	8.21
450 x 250	8.0	85.4	109	53.3	28.3	30100	12100	16.6	10.6	1340	971	1620	1080	27100	1630	1.38	16.1
	8.8 #	93.6	119	48.1	25.4	32800	13200	16.6	10.5	1460	1060	1770	1180	29600	1770	1.38	14.8
	10.0	106	135	42.0	22.0	36900	14800	16.5	10.5	1640	1190	2000	1330	33300	1990	1.37	12.9
	12.5	131	167	33.0	17.0	45000	18000	16.4	10.4	2000	1440	2460	1630	40700	2410	1.37	10.4
	14.2 #	148	189	28.7	14.6	50300	20000	16.3	10.3	2240	1600	2760	1830	45600	2680	1.36	9.19
	16.0	166	211	25.1	12.6	55700	22000	16.2	10.2	2480	1760	3070	2030	50500	2950	1.36	8.21
500 x 200	8.0 #	85.4	109	59.5	22.0	34000	8140	17.7	8.65	1360	814	1710	896	21100	1430	1.38	16.1
	8.8 #	93.6	119	53.8	19.7	37200	8850	17.7	8.61	1490	885	1870	979	23000	1560	1.38	14.8
	10.0 #	106	135	47.0	17.0	41800	9890	17.6	8.56	1670	989	2110	1100	25900	1740	1.37	12.9
	12.5 #	131	167	37.0	13.0	51000	11900	17.5	8.45	2040	1190	2590	1350	31500	2100	1.37	10.4
	14.2 #	148	189	32.2	11.1	56900	13200	17.4	8.38	2280	1320	2900	1510	35200	2320	1.36	9.19
	16.0 #	166	211	28.3	9.50	63000	14500	17.3	8.30	2520	1450	3230	1670	38900	2550	1.36	8.21
500 x 300	8.0 #	97.9	125	59.5	34.5	43700	20000	18.7	12.6	1750	1330	2100	1480	42600	2200	1.58	16.1
	8.8 #	107	137	53.8	31.1	47800	21800	18.7	12.6	1910	1450	2300	1620	46600	2400	1.58	14.7
	10.0	122	155	47.0	27.0	53800	24400	18.6	12.6	2150	1630	2600	1830	52500	2700	1.57	12.9
	12.5 #	151	192	37.0	21.0	65800	29800	18.5	12.5	2630	1990	3200	2240	64400	3280	1.57	10.4
	14.2 #	170	217	32.2	18.1	73700	33200	18.4	12.4	2950	2220	3590	2520	72200	3660	1.56	9.16
	16.0	191	243	28.3	15.8	81800	36800	18.3	12.3	3270	2450	4010	2800	80300	4040	1.56	8.17
	20.0 ^	235	300	22.0	12.0	98800	44100	18.2	12.1	3950	2940	4890	3410	97400	4840	1.55	6.59

Table 2.8.3.7. Celsius® RHS. Dimensions and properties

BS EN 1993-1-1: 2005
BS EN 10210-2: 2006

UK EUROCODES

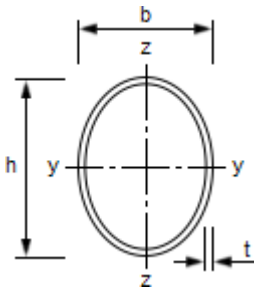
Table 2.8.4.1

SECTION PROPERTIES

HOT FINISHED
ELLIPTICAL HOLLOW SECTIONS

Celsius® OHS

Dimensions and properties



Hot Finished

Section Designation		Mass per Metre	Area of Section	Second Moment of Area		Radius of Gyration		Elastic Modulus		Plastic Modulus		Torsional Constants		Surface Area	
Size	Thickness			Axis y-y	Axis z-z	Axis y-y	Axis z-z	Axis y-y	Axis z-z	Axis y-y	Axis z-z			Per Metre	Per Tonne
h x b	t		A									I_T	W_t		
mm	mm	kg/m	cm^2	cm^4	cm^4	cm	cm	cm^3	cm^3	cm^3	cm^3	cm^4	cm^3	m^2	m^2
150 x 75	4.0 #	10.7	13.6	301	101	4.70	2.72	40.1	26.9	56.1	34.4	303	60.1	0.363	33.9
	5.0 #	13.3	16.9	367	122	4.66	2.69	48.9	32.5	68.9	42.0	367	72.2	0.363	27.4
	6.3 #	16.5	21.0	448	147	4.62	2.64	59.7	39.1	84.9	51.5	443	86.3	0.363	22.0
200 x 100	5.0 #	17.9	22.8	897	302	6.27	3.64	89.7	60.4	125	76.8	905	135	0.484	27.1
	6.3 #	22.3	28.4	1100	368	6.23	3.60	110	73.5	155	94.7	1110	163	0.484	21.7
	8.0 #	28.0	35.7	1360	446	6.17	3.54	136	89.3	193	117	1350	197	0.484	17.3
	10.0 #	34.5	44.0	1640	529	6.10	3.47	164	106	235	141	1610	232	0.484	14.0
	12.5 #	42.4	54.0	1950	619	6.02	3.39	195	124	284	169	1890	269	0.484	11.4
250 x 125	6.3 #	28.2	35.9	2210	742	7.84	4.55	176	119	246	151	2220	265	0.605	21.5
	8.0 #	35.4	45.1	2730	909	7.78	4.49	219	145	307	188	2730	323	0.605	17.1
	10.0 #	43.8	55.8	3320	1090	7.71	4.42	265	174	376	228	3290	385	0.605	13.8
	12.5 #	53.9	68.7	4000	1290	7.63	4.34	320	207	458	276	3920	453	0.605	11.2
300 x 150	8.0 #	42.8	54.5	4810	1620	9.39	5.44	321	215	449	275	4850	481	0.726	17.0
	10.0 #	53.0	67.5	5870	1950	9.32	5.37	391	260	551	336	5870	577	0.726	13.7
	12.5	65.5	83.4	7120	2330	9.24	5.29	475	311	674	409	7050	686	0.726	11.1
	16.0 #	82.5	105	8730	2810	9.12	5.17	582	374	837	503	8530	818	0.726	8.78
400 x 200	8.0 #	57.6	73.4	11700	3970	12.6	7.35	584	397	811	500	11900	890	0.969	16.9
	10.0 #	71.5	91.1	14300	4830	12.5	7.28	717	483	1000	615	14500	1080	0.969	13.6
	12.5	88.6	113	17500	5840	12.5	7.19	877	584	1230	753	17600	1300	0.969	10.9
	16.0	112	143	21700	7140	12.3	7.07	1090	714	1540	936	21600	1580	0.969	8.64
500 x 250	10.0 #	90.0	115	28500	9680	15.8	9.19	1140	775	1590	976	29000	1740	1.21	13.4
	12.5 #	112	142	35000	11800	15.7	9.10	1400	943	1960	1200	35300	2110	1.21	10.8
	16.0 #	142	180	43700	14500	15.6	8.98	1750	1160	2460	1500	43700	2590	1.21	8.54

Table 2.8.4.1. Celsius® OHS. Dimensions and properties

BS EN 1993-1-1: 2005
BS EN 10219-2: 2006

UK EUROCODES

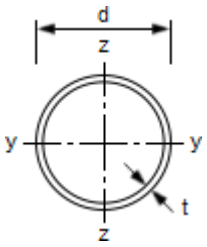
Table 2.8.5.1

SECTION PROPERTIES

COLD FORMED CIRCULAR HOLLOW SECTIONS

Hybox® CHS

Dimensions and properties



Cold Formed

Section Designation		Mass per Metre	Area of Section	Ratio for Local Buckling	Second Moment of Area	Radius of Gyration	Elastic Modulus	Plastic Modulus	Torsional Constants		Surface Area	
Outside Diameter d	Thickness t		A	d/t	I	i	W_{el}	W_{pl}	I_T	W_t	Per Metre	Per Tonne
mm	mm	kg/m	cm^2		cm^4	cm	cm^3	cm^3	cm^4	cm^3	m^2	m^2
33.7	3.0	2.27	2.89	11.2	3.44	1.09	2.04	2.84	6.88	4.08	0.106	46.6
42.4	3.0	2.91	3.71	14.1	7.25	1.40	3.42	4.67	14.5	6.84	0.133	45.6
48.3	3.0	3.35	4.27	16.1	11.0	1.61	4.55	6.17	22.0	9.11	0.152	45.3
	4.0 #	4.37	5.57	12.1	13.8	1.57	5.70	7.87	27.5	11.4	0.152	34.8
60.3	3.0 #	4.24	5.40	20.1	22.2	2.03	7.37	9.86	44.4	14.7	0.189	44.6
	4.0	5.55	7.07	15.1	28.2	2.00	9.34	12.7	56.3	18.7	0.189	34.0
76.1	3.0	5.41	6.89	25.4	46.1	2.59	12.1	16.0	92.2	24.2	0.239	44.2
	4.0	7.11	9.06	19.0	59.1	2.55	15.5	20.8	118	31.0	0.239	33.7
88.9	3.0	6.36	8.10	29.6	74.8	3.04	16.8	22.1	150	33.6	0.279	43.8
	3.5 #	7.37	9.39	25.4	85.7	3.02	19.3	25.5	171	38.6	0.279	37.9
	4.0	8.38	10.7	22.2	96.3	3.00	21.7	28.9	193	43.3	0.279	33.2
	5.0	10.3	13.2	17.8	116	2.97	26.2	35.2	233	52.4	0.279	27.0
	6.3	12.8	16.3	14.1	140	2.93	31.5	43.1	280	63.1	0.279	21.7
114.3	3.0 #	8.23	10.5	38.1	163	3.94	28.4	37.2	325	56.9	0.359	43.4
	3.5	9.56	12.2	32.7	187	3.92	32.7	43.0	374	65.5	0.359	37.7
	4.0 #	10.9	13.9	28.6	211	3.90	36.9	48.7	422	73.9	0.359	33.0
	5.0	13.5	17.2	22.9	257	3.87	45.0	59.8	514	89.9	0.359	26.6
	6.0	16.0	20.4	19.1	300	3.83	52.5	70.4	600	105	0.359	22.4
	6.3	16.8	21.4	18.1	313	3.82	54.7	73.6	625	109	0.359	21.4
139.7	3.0 #	10.1	12.9	46.6	301	4.83	43.1	56.1	602	86.2	0.439	43.4
	4.0 #	13.4	17.1	34.9	393	4.80	56.2	73.7	786	112	0.439	32.8
	5.0	16.6	21.2	27.9	481	4.77	68.8	90.8	961	138	0.439	26.4
	6.0	19.8	25.2	23.3	564	4.73	80.8	107	1130	162	0.439	22.2
	6.3	20.7	26.4	22.2	589	4.72	84.3	112	1180	169	0.439	21.2
	8.0	26.0	33.1	17.5	720	4.66	103	139	1440	206	0.439	16.9
	10.0	32.0	40.7	14.0	862	4.60	123	169	1720	247	0.439	13.7
168.3	4.0	16.2	20.6	42.1	697	5.81	82.8	108	1390	166	0.529	32.6
	4.5 #	18.2	23.2	37.4	777	5.79	92.4	121	1550	185	0.529	29.1
	5.0	20.1	25.7	33.7	856	5.78	102	133	1710	203	0.529	26.3
	6.0	24.0	30.6	28.1	1010	5.74	120	158	2020	240	0.529	22.0
	6.3	25.2	32.1	26.7	1050	5.73	125	165	2110	250	0.529	21.0
	8.0	31.6	40.3	21.0	1300	5.67	154	206	2600	308	0.529	16.7
	10.0	39.0	49.7	16.8	1560	5.61	186	251	3130	372	0.529	13.5
	12.5	48.0	61.2	13.5	1870	5.53	222	304	3740	444	0.529	11.0
193.7	4.0 #	18.7	23.8	48.4	1070	6.71	111	144	2150	222	0.609	32.5
	4.5 #	21.0	26.7	43.0	1200	6.69	124	161	2400	247	0.609	29.0
	5.0	23.3	29.6	38.7	1320	6.67	136	178	2640	273	0.609	26.2
	6.0	27.8	35.4	32.3	1560	6.64	161	211	3120	322	0.609	21.9
	6.3	29.1	37.1	30.7	1630	6.63	168	221	3260	337	0.609	20.9
	8.0	36.6	46.7	24.2	2020	6.57	208	276	4030	416	0.609	16.6
	10.0	45.3	57.7	19.4	2440	6.50	252	338	4880	504	0.609	13.5
	12.5	55.9	71.2	15.5	2930	6.42	303	411	5870	606	0.609	10.9

Table 2.8.5.1. Hybox® CHS. Dimensions and properties

BS EN 1993-1-1: 2005
BS EN 10219-2: 2006

UK EUROCODES

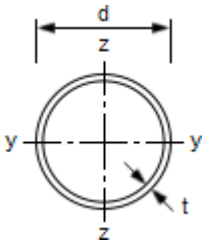
Table 2.8.5.2

SECTION PROPERTIES

COLD FORMED CIRCULAR HOLLOW SECTIONS

Hybox® CHS

Dimensions and properties



Cold Formed

Section Designation		Mass per Metre	Area of Section	Ratio for Local Buckling	Second Moment of Area	Radius of Gyration	Elastic Modulus	Plastic Modulus	Torsional Constants		Surface Area	
Outside Diameter d	Thickness t		A	d/t	I	i	W_{el}	W_{pl}	I_T	W_t	Per Metre	Per Tonne
mm	mm	kg/m	cm^2		cm^4	cm	cm^3	cm^3	cm^4	cm^3	m^2	m^2
219.1	4.5 #	23.8	30.3	48.7	1750	7.59	159	207	3490	319	0.688	28.9
	5.0	26.4	33.6	43.8	1930	7.57	176	229	3860	352	0.688	26.1
	6.0	31.5	40.2	36.5	2280	7.54	208	273	4560	417	0.688	21.8
	6.3	33.1	42.1	34.8	2390	7.53	218	285	4770	436	0.688	20.8
	8.0	41.6	53.1	27.4	2960	7.47	270	357	5920	540	0.688	16.5
	10.0	51.6	65.7	21.9	3600	7.40	328	438	7200	657	0.688	13.3
	12.0 #	61.3	78.1	18.3	4200	7.33	383	515	8400	767	0.688	11.2
	12.5	63.7	81.1	17.5	4350	7.32	397	534	8690	793	0.688	10.8
	16.0	80.1	102	13.7	5300	7.20	483	661	10600	967	0.688	8.60
244.5	5.0 #	29.5	37.6	48.9	2700	8.47	221	287	5400	441	0.768	26.0
	6.0	35.3	45.0	40.8	3200	8.43	262	341	6400	523	0.768	21.7
	6.3	37.0	47.1	38.8	3350	8.42	274	358	6690	547	0.768	20.7
	8.0	46.7	59.4	30.6	4160	8.37	340	448	8320	681	0.768	16.4
	10.0	57.8	73.7	24.5	5070	8.30	415	550	10100	830	0.768	13.3
	12.0 #	68.8	87.7	20.4	5940	8.23	486	649	11900	972	0.768	11.1
	12.5	71.5	91.1	19.6	6150	8.21	503	673	12300	1010	0.768	10.8
	16.0	90.2	115	15.3	7530	8.10	616	837	15100	1230	0.768	8.52
273.0	4.0 #	26.5	33.8	68.3	3060	9.51	224	289	6120	448	0.858	32.3
	4.5 #	29.8	38.0	60.7	3420	9.49	251	324	6840	501	0.858	28.8
	5.0 #	33.0	42.1	54.6	3780	9.48	277	359	7560	554	0.858	26.0
	6.0	39.5	50.3	45.5	4490	9.44	329	428	8970	657	0.858	21.7
	6.3	41.4	52.8	43.3	4700	9.43	344	448	9390	688	0.858	20.7
	8.0	52.3	66.6	34.1	5850	9.37	429	562	11700	857	0.858	16.4
	10.0	64.9	82.6	27.3	7150	9.31	524	692	14300	1050	0.858	13.2
	12.0 #	77.2	98.4	22.8	8400	9.24	615	818	16800	1230	0.858	11.1
	12.5	80.3	102	21.8	8700	9.22	637	849	17400	1270	0.858	10.7
	16.0	101	129	17.1	10700	9.10	784	1060	21400	1570	0.858	8.46
323.9	5.0 #	39.3	50.1	64.8	6370	11.3	393	509	12700	787	1.02	25.9
	6.0	47.0	59.9	54.0	7570	11.2	468	606	15100	935	1.02	21.7
	6.3 #	49.3	62.9	51.4	7930	11.2	490	636	15900	979	1.02	20.7
	8.0	62.3	79.4	40.5	9910	11.2	612	799	19800	1220	1.02	16.3
	10.0	77.4	98.6	32.4	12200	11.1	751	986	24300	1500	1.02	13.2
	12.0 #	92.3	118	27.0	14300	11.0	884	1170	28600	1770	1.02	11.0
	12.5	96.0	122	25.9	14800	11.0	917	1210	29700	1830	1.02	10.6
	16.0	121	155	20.2	18400	10.9	1140	1520	36800	2270	1.02	8.39
355.6	5.0 #	43.2	55.1	71.1	8460	12.4	476	615	16900	952	1.12	25.9
	6.0	51.7	65.9	59.3	10100	12.4	566	733	20100	1130	1.12	21.6
	6.3 #	54.3	69.1	56.4	10500	12.4	593	769	21100	1190	1.12	20.6
	8.0	68.6	87.4	44.5	13200	12.3	742	967	26400	1490	1.12	16.4
	10.0	85.2	109	35.6	16200	12.2	912	1200	32400	1830	1.12	13.1
	12.0 #	102	130	29.6	19100	12.2	1080	1420	38300	2150	1.12	11.0
	12.5	106	135	28.4	19900	12.1	1120	1470	39700	2230	1.12	10.6
	16.0	134	171	22.2	24700	12.0	1390	1850	49300	2770	1.12	8.36

Table 2.8.5.2. Hybox® CHS. Dimensions and properties

BS EN 1993-1-1: 2005
BS EN 10219-2: 2006

UK EUROCODES

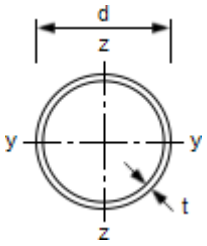
Table 2.8.5.3

SECTION PROPERTIES

COLD FORMED
CIRCULAR HOLLOW SECTIONS

Hybox® CHS

Dimensions and properties



Cold Formed

Section Designation		Mass per Metre	Area of Section	Ratio for Local Buckling	Second Moment of Area	Radius of Gyration	Elastic Modulus	Plastic Modulus	Torsional Constants		Surface Area	
Outside Diameter d	Thickness t		A	d/t	I	i	W_{el}	W_{pl}	I_T	W_t	Per Metre	Per Tonne
mm	mm	kg/m	cm^2		cm^4	cm	cm^3	cm^3	cm^4	cm^3	m^2	m^2
406.4	6.0 #	59.2	75.5	67.7	15100	14.2	745	962	30300	1490	1.28	21.6
	6.3 #	62.2	79.2	64.5	15800	14.1	780	1010	31700	1560	1.28	20.6
	8.0	78.6	100	50.8	19900	14.1	978	1270	39700	1960	1.28	16.3
	10.0	97.8	125	40.6	24500	14.0	1210	1570	49000	2410	1.28	13.1
	12.0 #	117	149	33.9	28900	14.0	1420	1870	57900	2850	1.28	11.0
	12.5	121	155	32.5	30000	13.9	1480	1940	60100	2960	1.28	10.5
	16.0	154	196	25.4	37400	13.8	1840	2440	74900	3690	1.28	8.31
457.0	6.0 #	66.7	85.0	76.2	21600	15.9	946	1220	43200	1890	1.44	21.6
	6.3 #	70.0	89.2	72.5	22700	15.9	991	1280	45300	1980	1.44	20.6
	8.0	88.6	113	57.1	28400	15.9	1250	1610	56900	2490	1.44	16.3
	10.0	110	140	45.7	35100	15.8	1540	2000	70200	3070	1.44	13.1
	12.0 #	132	168	38.1	41600	15.7	1820	2380	83100	3640	1.44	10.9
	12.5	137	175	36.6	43100	15.7	1890	2470	86300	3780	1.44	10.5
	16.0	174	222	28.6	54000	15.6	2360	3110	108000	4720	1.44	8.28
508.0	6.0 #	74.3	94.6	84.7	29800	17.7	1170	1510	59600	2350	1.60	21.6
	6.3 #	77.9	99.3	80.6	31200	17.7	1230	1590	62500	2460	1.60	20.5
	8.0 #	98.6	126	63.5	39300	17.7	1550	2000	78600	3090	1.60	16.2
	10.0	123	156	50.8	48500	17.6	1910	2480	97000	3820	1.60	13.0
	12.0 #	147	187	42.3	57500	17.5	2270	2950	115000	4530	1.60	10.9
	12.5	153	195	40.6	59800	17.5	2350	3070	120000	4710	1.60	10.5
	16.0 #	194	247	31.8	74900	17.4	2950	3870	150000	5900	1.60	8.24

Table 2.8.5.3. Hybox® CHS. Dimensions and properties

BS EN 1993-1-1: 2005
BS EN 10219-2: 2006

UK EUROCODES

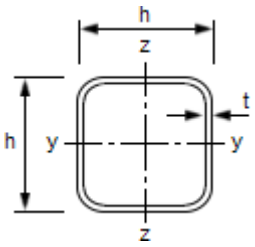
Table 2.8.6.1

SECTION PROPERTIES

COLD FORMED SQUARE HOLLOW SECTIONS

Hybox® SHS

Dimensions and properties



Cold Formed

Section Designation		Mass per Metre	Area of Section	Ratio for Local Buckling c/t (1)	Second Moment of Area	Radius of Gyration	Elastic Modulus	Plastic Modulus	Torsional Constants		Surface Area	
Size	Thickness										Per Metre	Per Tonne
h x h	t		A		I	i	W_{el}	W_{pl}	I_T	W_t		
mm	mm	kg/m	cm^2		cm^4	cm	cm^3	cm^3	cm^4	cm^3	m^2	m^2
25 x 25	2.0 #	1.36	1.74	9.50	1.48	0.924	1.19	1.47	2.53	1.80	0.093	68.2
	2.5	1.64	2.09	7.00	1.69	0.899	1.35	1.71	2.97	2.07	0.091	55.5
30 x 30	2.0 #	1.68	2.14	12.0	2.72	1.13	1.81	2.21	4.54	2.75	0.113	67.3
	2.5 #	2.03	2.59	9.00	3.16	1.10	2.10	2.61	5.40	3.20	0.111	54.6
	3.0	2.36	3.01	7.00	3.50	1.08	2.34	2.96	6.15	3.58	0.110	46.5
40 x 40	2.0 #	2.31	2.94	17.0	6.94	1.54	3.47	4.13	11.3	5.23	0.153	66.4
	2.5	2.82	3.59	13.0	8.22	1.51	4.11	4.97	13.6	6.21	0.151	53.6
	3.0	3.30	4.21	10.3	9.32	1.49	4.66	5.72	15.8	7.07	0.150	45.5
	4.0	4.20	5.35	7.00	11.1	1.44	5.54	7.01	19.4	8.48	0.146	34.7
50 x 50	2.5	3.60	4.59	17.0	16.9	1.92	6.78	8.07	27.5	10.2	0.191	53.1
	3.0	4.25	5.41	13.7	19.5	1.90	7.79	9.39	32.1	11.8	0.190	44.8
	4.0	5.45	6.95	9.50	23.7	1.85	9.49	11.7	40.4	14.4	0.186	34.0
	5.0	6.56	8.36	7.00	27.0	1.80	10.8	13.7	47.5	16.6	0.183	27.8
60 x 60	3.0	5.19	6.61	17.0	35.1	2.31	11.7	14.0	57.1	17.7	0.230	44.4
	4.0	6.71	8.55	12.0	43.6	2.26	14.5	17.6	72.6	22.0	0.226	33.7
	5.0	8.13	10.4	9.00	50.5	2.21	16.8	20.9	86.4	25.6	0.223	27.4
	6.0 #	9.45	12.0	7.00	56.1	2.16	18.7	23.7	98.4	28.6	0.219	23.2
70 x 70	3.0	6.13	7.81	20.3	57.5	2.71	16.4	19.4	92.4	24.7	0.270	44.0
	3.5	7.06	8.99	17.0	65.1	2.69	18.6	22.2	106	28.0	0.268	38.1
	4.0	7.97	10.1	14.5	72.1	2.67	20.6	24.8	119	31.1	0.266	33.5
	5.0	9.70	12.4	11.0	84.6	2.62	24.2	29.6	142	36.7	0.263	27.1
	6.0 #	11.3	14.4	8.67	95.2	2.57	27.2	33.8	163	41.4	0.259	22.9
80 x 80	3.0	7.07	9.01	23.7	87.8	3.12	22.0	25.8	140	33.0	0.310	43.7
	3.5	8.16	10.4	19.9	99.8	3.10	25.0	29.5	161	37.6	0.308	37.9
	4.0	9.22	11.7	17.0	111	3.07	27.8	33.1	180	41.8	0.306	33.0
	5.0	11.3	14.4	13.0	131	3.03	32.9	39.7	218	49.7	0.303	26.9
	6.0	13.2	16.8	10.3	149	2.98	37.3	45.8	252	56.6	0.299	22.6
90 x 90	3.0	8.01	10.2	27.0	127	3.53	28.3	33.0	201	42.5	0.350	43.8
	3.5	9.26	11.8	22.7	145	3.51	32.2	37.9	232	48.5	0.348	37.6
	4.0	10.5	13.3	19.5	162	3.48	36.0	42.6	261	54.2	0.346	33.0
	5.0	12.8	16.4	15.0	193	3.43	42.9	51.4	316	64.7	0.343	26.7
	6.0 #	15.1	19.2	12.0	220	3.39	49.0	59.5	368	74.2	0.339	22.4
100 x 100	3.0	8.96	11.4	30.3	177	3.94	35.4	41.2	279	53.2	0.390	43.7
	4.0	11.7	14.9	22.0	226	3.89	45.3	53.3	362	68.1	0.386	32.9
	5.0	14.4	18.4	17.0	271	3.84	54.2	64.6	441	81.7	0.383	26.6
	6.0	17.0	21.6	13.7	311	3.79	62.3	75.1	514	94.1	0.379	22.3
	8.0	21.4	27.2	9.50	366	3.67	73.2	91.1	645	114	0.366	17.1
120 x 120	3.0 #	10.8	13.8	37.0	312	4.76	52.1	60.2	488	78.2	0.470	43.4
	4.0	14.2	18.1	27.0	402	4.71	67.0	78.3	637	101	0.466	32.7
	5.0	17.5	22.4	21.0	485	4.66	80.9	95.4	778	122	0.463	26.4
	6.0	20.7	26.4	17.0	562	4.61	93.7	112	913	141	0.459	22.1
	8.0	26.4	33.6	12.0	677	4.49	113	138	1160	175	0.446	16.9
	10.0	31.8	40.6	9.00	777	4.38	129	162	1380	203	0.437	13.7

Table 2.8.6.1. Hybox® SHS. Dimensions and properties

BS EN 1993-1-1: 2005
BS EN 10219-2: 2006

UK EUROCODES

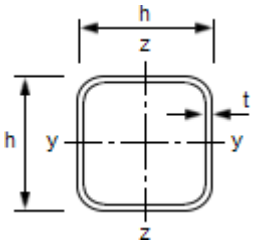
Table 2.8.6.2

SECTION PROPERTIES

COLD FORMED SQUARE HOLLOW SECTIONS

Hybox® SHS

Dimensions and properties



Cold Formed

Section Designation		Mass per Metre	Area of Section	Ratio for Local Buckling	Second Moment of Area	Radius of Gyration	Elastic Modulus	Plastic Modulus	Torsional Constants		Surface Area	
Size	Thickness			c/t (1)							Per Metre	Per Tonne
h x h	t		A		I	i	W_{el}	W_{pl}	I_T	W_t		
mm	mm	kg/m	cm^2		cm^4	cm	cm^3	cm^3	cm^4	cm^3	m^2	m^2
140 x 140	4.0	16.8	21.3	32.0	652	5.52	93.1	108	1020	140	0.546	32.6
	5.0	20.7	26.4	25.0	791	5.48	113	132	1260	170	0.543	26.2
	6.0	24.5	31.2	20.3	920	5.43	131	155	1480	198	0.539	22.0
	8.0	31.4	40.0	14.5	1130	5.30	161	194	1900	248	0.526	16.7
	10.0	38.1	48.6	11.0	1310	5.20	187	230	2270	291	0.517	13.5
150 x 150	4.0 #	18.0	22.9	34.5	808	5.93	108	125	1270	162	0.586	32.5
	5.0	22.3	28.4	27.0	982	5.89	131	153	1550	197	0.583	26.2
	6.0	26.4	33.6	22.0	1150	5.84	153	180	1830	230	0.579	21.9
	8.0	33.9	43.2	15.8	1410	5.71	188	226	2360	289	0.566	16.7
	10.0	41.3	52.6	12.0	1650	5.61	220	269	2840	341	0.557	13.5
160 x 160	4.0 #	19.3	24.5	37.0	987	6.34	123	143	1540	185	0.626	32.5
	5.0	23.8	30.4	29.0	1200	6.29	150	175	1900	226	0.623	26.2
	6.0	28.3	36.0	23.7	1410	6.25	176	206	2240	264	0.619	21.9
	8.0	36.5	46.4	17.0	1740	6.12	218	260	2900	334	0.606	16.6
	10.0	44.4	56.6	13.0	2050	6.02	256	311	3490	395	0.597	13.4
180 x 180	5.0	27.0	34.4	33.0	1740	7.11	193	224	2720	290	0.703	26.1
	6.0	32.1	40.8	27.0	2040	7.06	226	264	3220	340	0.699	21.8
	6.3 #	33.3	42.4	25.6	2100	7.03	233	273	3380	354	0.693	20.8
	8.0	41.5	52.8	19.5	2550	6.94	283	336	4190	432	0.686	16.5
	10.0	50.7	64.6	15.0	3020	6.84	335	404	5070	515	0.677	13.3
	12.0 #	58.5	74.5	12.0	3320	6.68	369	454	5870	584	0.658	11.3
	12.5	60.5	77.0	11.4	3410	6.65	378	467	6050	600	0.656	10.8
200 x 200	5.0	30.1	38.4	37.0	2410	7.93	241	279	3760	362	0.783	26.0
	6.0	35.8	45.6	30.3	2830	7.88	283	330	4460	426	0.779	21.7
	6.3 #	37.2	47.4	28.7	2920	7.85	292	341	4680	444	0.773	20.7
	8.0	46.5	59.2	22.0	3570	7.76	357	421	5820	544	0.766	16.5
	10.0	57.0	72.6	17.0	4250	7.65	425	508	7070	651	0.757	13.3
	12.0 #	66.0	84.1	13.7	4730	7.50	473	576	8230	743	0.738	11.2
	12.5	68.3	87.0	13.0	4860	7.47	486	594	8500	765	0.736	10.7
250 x 250	6.0	45.2	57.6	38.7	5670	9.92	454	524	8840	681	0.979	21.6
	6.3 #	47.1	60.0	36.7	5870	9.89	470	544	9290	711	0.973	20.6
	8.0	59.1	75.2	28.3	7230	9.80	578	676	11600	878	0.966	16.3
	10.0	72.7	92.6	22.0	8710	9.70	697	822	14200	1060	0.957	13.2
	12.0 #	84.8	108	17.8	9860	9.55	789	944	16700	1230	0.938	11.1
	12.5	88.0	112	17.0	10200	9.52	813	975	17300	1270	0.936	10.7
300 x 300	6.0	54.7	69.6	47.0	9960	12.0	664	764	15400	997	1.18	21.6
	6.3 #	57.0	72.6	44.6	10300	11.9	689	795	16200	1040	1.17	20.5
	8.0	71.6	91.2	34.5	12800	11.8	853	991	20300	1290	1.17	16.4
	10.0	88.4	113	27.0	15500	11.7	1040	1210	25000	1570	1.16	13.1
	12.0 #	104	132	22.0	17800	11.6	1180	1400	29500	1830	1.14	11.0
	12.5	108	137	21.0	18300	11.6	1220	1450	30600	1890	1.14	10.6

Table 2.8.6.2. Hybox® SHS. Dimensions and properties

BS EN 1993-1-1: 2005
BS EN 10219-2: 2006

UK EUROCODES

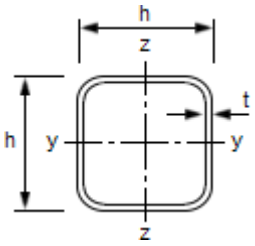
Table 2.8.6.3

SECTION PROPERTIES

COLD FORMED SQUARE HOLLOW SECTIONS

Hybox® SHS

Dimensions and properties



Cold Formed

Section Designation		Mass per Metre	Area of Section	Ratio for Local Buckling	Second Moment of Area	Radius of Gyration	Elastic Modulus	Plastic Modulus	Torsional Constants		Surface Area	
Size	Thickness										Per Metre	Per Tonne
h x h	t		A	c/t (1)	I	i	W_{el}	W_{pl}	I_T	W_t		
mm	mm	kg/m	cm^2		cm^4	cm	cm^3	cm^3	cm^4	cm^3	m^2	m^2
350 x 350	6.0 #	64.1	81.6	55.3	16000	14.0	915	1050	24700	1370	1.38	21.5
	6.3 #	66.9	85.2	52.6	16600	14.0	951	1090	25900	1440	1.37	20.4
	8.0	84.2	107	40.8	20700	13.9	1180	1370	32600	1790	1.37	16.3
	10.0	104	133	32.0	25200	13.8	1440	1680	40100	2180	1.36	13.1
	12.0 #	123	156	26.2	29100	13.6	1660	1950	47600	2550	1.34	10.9
	12.5	127	162	25.0	30000	13.6	1720	2020	49400	2640	1.34	10.5
400 x 400	6.0 #	73.5	93.6	63.7	24100	16.0	1210	1380	37000	1810	1.58	21.5
	6.3 #	76.8	97.8	60.5	25100	16.0	1260	1440	38900	1890	1.57	20.4
	8.0	96.7	123	47.0	31300	15.9	1560	1800	48900	2360	1.57	16.2
	10.0	120	153	37.0	38200	15.8	1910	2210	60400	2890	1.56	13.0
	12.0 #	141	180	30.3	44300	15.7	2220	2590	71800	3400	1.54	10.9
	12.5	147	187	29.0	45900	15.7	2290	2680	74600	3520	1.54	10.5

Table 2.8.6.3. Hybox® SHS. Dimensions and properties

BS EN 1993-1-1: 2005
BS EN 10219-2: 2006

UK EUROCODES

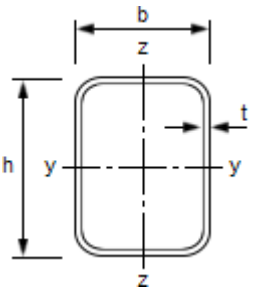
Table 2.8.7.1

SECTION PROPERTIES

COLD FORMED RECTANGULAR HOLLOW SECTIONS

Hybox® RHS

Dimensions and properties



Cold Formed

Section Designation		Mass per Metre	Area of Section	Ratios for Local Buckling		Second Moment of Area		Radius of Gyration		Elastic Modulus		Plastic Modulus		Torsional Constants		Surface Area	
Size	Thickness					Axis y-y	Axis z-z	Axis y-y	Axis z-z	Axis y-y	Axis z-z	Axis y-y	Axis z-z			Per Metre	Per Tonne
h x b			A	c_w/t (1)	c_f/t (1)									I_T	W_t		
mm	mm	kg/m	cm^2			cm^4	cm^4	cm	cm	cm^3	cm^3	cm^3	cm^3	cm^4	cm^3	m^2	m^2
50 x 25	2.0 #	2.15	2.74	22.0	9.50	8.38	2.81	1.75	1.01	3.35	2.25	4.26	2.62	7.06	3.92	0.143	66.5
	2.5	2.62	3.34	17.0	7.00	9.89	3.28	1.72	0.991	3.95	2.62	5.11	3.12	8.43	4.60	0.141	53.9
	3.0	3.07	3.91	13.7	5.33	11.2	3.67	1.69	0.969	4.47	2.93	5.86	3.56	9.64	5.18	0.140	45.6
50 x 30	2.0 #	2.31	2.94	22.0	12.0	9.54	4.29	1.80	1.21	3.81	2.86	4.74	3.33	9.77	4.84	0.153	66.4
	2.5	2.82	3.59	17.0	9.00	11.3	5.05	1.77	1.19	4.52	3.37	5.70	3.98	11.7	5.72	0.151	53.6
	3.0	3.30	4.21	13.7	7.00	12.8	5.70	1.75	1.16	5.13	3.80	6.57	4.58	13.5	6.49	0.150	45.5
	4.0	4.20	5.35	9.50	4.50	15.3	6.69	1.69	1.12	6.10	4.46	8.05	5.58	16.5	7.71	0.146	34.7
60 x 40	2.5 #	3.60	4.59	21.0	13.0	22.1	11.7	2.19	1.60	7.36	5.87	9.06	6.84	25.1	9.72	0.191	53.1
	3.0	4.25	5.41	17.0	10.3	25.4	13.4	2.17	1.58	8.46	6.72	10.5	7.94	29.3	11.2	0.190	44.8
	4.0	5.45	6.95	12.0	7.00	31.0	16.3	2.11	1.53	10.3	8.14	13.2	9.89	36.7	13.7	0.186	34.0
	5.0	6.56	8.36	9.00	5.00	35.3	18.4	2.06	1.48	11.8	9.21	15.4	11.5	42.8	15.6	0.183	27.8
70 x 40	3.0	4.72	6.01	20.3	10.3	37.3	15.5	2.49	1.61	10.7	7.75	13.4	9.05	36.5	13.2	0.210	44.5
	4.0	6.08	7.75	14.5	7.00	46.0	18.9	2.44	1.56	13.1	9.44	16.8	11.3	45.8	16.2	0.206	33.8
	5.0	7.34	9.36	11.0	5.00	52.9	21.5	2.38	1.52	15.1	10.8	19.8	13.3	53.8	18.7	0.203	27.6
70 x 50	3.0 #	5.19	6.61	20.3	13.7	44.1	26.1	2.58	1.99	12.6	10.4	15.4	12.2	53.6	17.1	0.230	44.4
	4.0	6.71	8.55	14.5	9.50	54.7	32.2	2.53	1.94	15.6	12.9	19.5	15.4	68.1	21.2	0.226	33.7
	5.0	8.13	10.4	11.0	7.00	63.5	37.2	2.48	1.90	18.1	14.9	23.1	18.2	80.8	24.6	0.223	27.4
80 x 40	3.0	5.19	6.61	23.7	10.3	52.3	17.6	2.81	1.63	13.1	8.78	16.5	10.2	43.9	15.3	0.230	44.4
	4.0	6.71	8.55	17.0	7.00	64.8	21.5	2.75	1.59	16.2	10.7	20.9	12.8	55.2	18.8	0.226	33.7
	5.0	8.13	10.4	13.0	5.00	75.1	24.6	2.69	1.54	18.8	12.3	24.7	15.0	65.0	21.7	0.223	27.4
80 x 50	3.0	5.66	7.21	23.7	13.7	61.1	29.4	2.91	2.02	15.3	11.8	18.8	13.6	65.0	19.7	0.250	44.3
	4.0	7.34	9.35	17.0	9.50	76.4	36.5	2.86	1.98	19.1	14.6	24.0	17.2	82.7	24.6	0.246	33.5
	5.0	8.91	11.4	13.0	7.00	89.2	42.3	2.80	1.93	22.3	16.9	28.5	20.5	98.4	28.7	0.243	27.2
80 x 60	3.0	6.13	7.81	23.7	17.0	70.0	44.9	3.00	2.40	17.5	15.0	21.2	17.4	88.3	24.1	0.270	44.0
	3.5	7.06	8.99	19.9	14.1	79.3	50.7	2.97	2.37	19.8	16.9	24.1	19.8	101	27.3	0.268	38.1
	4.0	7.97	10.1	17.0	12.0	87.9	56.1	2.94	2.35	22.0	18.7	27.0	22.1	113	30.3	0.266	33.5
	5.0	9.70	12.4	13.0	9.00	103	65.7	2.89	2.31	25.8	21.9	32.2	26.4	136	35.7	0.263	27.1
90 x 50	3.0 #	6.13	7.81	27.0	13.7	81.9	32.7	3.24	2.05	18.2	13.1	22.6	15.0	76.7	22.4	0.270	44.0
	4.0 #	7.97	10.1	19.5	9.50	103	40.7	3.18	2.00	22.8	16.3	28.8	19.1	97.7	28.0	0.266	33.5
	5.0	9.70	12.4	15.0	7.00	121	47.4	3.12	1.96	26.8	18.9	34.4	22.7	116	32.7	0.263	27.1

Table 2.8.7.1. Hybox® RHS. Dimensions and properties

BS EN 1993-1-1: 2005
BS EN 10219-2: 2006

UK EUROCODES

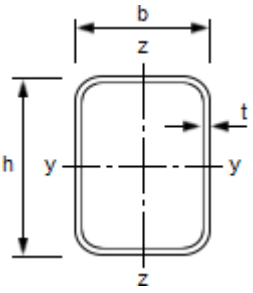
Table 2.8.7.2

SECTION PROPERTIES

COLD FORMED RECTANGULAR HOLLOW SECTIONS

Hybox® RHS

Dimensions and properties



Cold Formed

Section Designation		Mass per Metre	Area of Section	Ratios for Local Buckling		Second Moment of Area		Radius of Gyration		Elastic Modulus		Plastic Modulus		Torsional Constants		Surface Area	
Size h x b	Thickness		A	c_w/t (1)	c_f/t (1)	Axis y-y	Axis z-z	Axis y-y	Axis z-z	Axis y-y	Axis z-z	Axis y-y	Axis z-z	I_T	W_t	Per Metre	Per Tonne
mm	mm	kg/m	cm^2			cm^4	cm^4	cm	cm	cm^3	cm^3	cm^3	cm^3	cm^4	cm^3	m^2	m^2
100 x 40	3.0	6.13	7.81	30.3	10.3	92.3	21.7	3.44	1.67	18.5	10.8	23.7	12.4	59.0	19.4	0.270	44.0
	4.0	7.97	10.1	22.0	7.00	116	26.7	3.38	1.62	23.1	13.3	30.3	15.7	74.5	24.0	0.266	33.5
	5.0 #	9.70	12.4	17.0	5.00	136	30.8	3.31	1.58	27.1	15.4	36.1	18.5	87.9	27.9	0.263	27.1
100 x 50	3.0	6.60	8.41	30.3	13.7	106	36.1	3.56	2.07	21.3	14.4	26.7	16.4	88.6	25.0	0.290	44.1
	4.0	8.59	10.9	22.0	9.50	134	44.9	3.50	2.03	26.8	18.0	34.1	20.9	113	31.3	0.286	33.2
	5.0	10.5	13.4	17.0	7.00	158	52.5	3.44	1.98	31.6	21.0	40.8	25.0	135	36.8	0.283	27.0
	6.0	12.3	15.6	13.7	5.33	179	58.7	3.38	1.94	35.8	23.5	46.9	28.5	154	41.4	0.279	22.7
100 x 60	3.0	7.07	9.01	30.3	17.0	121	54.6	3.66	2.46	24.1	18.2	29.6	20.8	122	30.6	0.310	43.7
	3.5	8.16	10.4	25.6	14.1	137	61.9	3.63	2.44	27.4	20.6	33.8	23.8	139	34.8	0.308	37.9
	4.0	9.22	11.7	22.0	12.0	153	68.7	3.60	2.42	30.5	22.9	37.9	26.6	156	38.7	0.306	33.0
	5.0	11.3	14.4	17.0	9.00	181	80.8	3.55	2.37	36.2	26.9	45.6	31.9	188	45.8	0.303	26.9
	6.0	13.2	16.8	13.7	7.00	205	91.2	3.49	2.33	41.1	30.4	52.5	36.6	216	51.9	0.299	22.6
100 x 80	3.0 #	8.01	10.2	30.3	23.7	149	106	3.82	3.22	29.8	26.4	35.4	30.4	196	41.9	0.350	43.8
	4.0	10.5	13.3	22.0	17.0	189	134	3.77	3.17	37.9	33.5	45.6	39.2	254	53.4	0.346	33.0
	5.0	12.8	16.4	17.0	13.0	226	160	3.72	3.12	45.2	39.9	55.1	47.2	308	63.7	0.343	26.7
	6.0	15.1	19.2	13.7	10.3	258	182	3.67	3.08	51.7	45.5	63.8	54.7	357	73.0	0.339	22.4
120 x 40	3.0 #	7.07	9.01	37.0	10.3	148	25.8	4.05	1.69	24.7	12.9	32.2	14.6	74.6	23.5	0.310	43.7
	4.0 #	9.22	11.7	27.0	7.00	187	31.9	3.99	1.65	31.1	15.9	41.2	18.5	94.2	29.2	0.306	33.0
	5.0 #	11.3	14.4	21.0	5.00	221	36.9	3.92	1.60	36.8	18.5	49.4	22.0	111	34.1	0.303	26.9
120 x 60	3.0	8.01	10.2	37.0	17.0	189	64.4	4.30	2.51	31.5	21.5	39.2	24.2	156	37.1	0.350	43.8
	3.5	9.26	11.8	31.3	14.1	216	73.1	4.28	2.49	35.9	24.4	44.9	27.7	179	42.2	0.348	37.6
	4.0	10.5	13.3	27.0	12.0	241	81.2	4.25	2.47	40.1	27.1	50.5	31.1	201	47.0	0.346	33.0
	5.0	12.8	16.4	21.0	9.00	287	96.0	4.19	2.42	47.8	32.0	60.9	37.4	242	55.8	0.343	26.7
	6.0	15.1	19.2	17.0	7.00	328	109	4.13	2.38	54.7	36.3	70.6	43.1	280	63.6	0.339	22.4
120 x 80	3.0	8.96	11.4	37.0	23.7	230	123	4.49	3.29	38.4	30.9	46.2	35.0	255	50.8	0.390	43.7
	4.0	11.7	14.9	27.0	17.0	295	157	4.44	3.24	49.1	39.3	59.8	45.2	331	64.9	0.386	32.9
	5.0	14.4	18.4	21.0	13.0	353	188	4.39	3.20	58.9	46.9	72.4	54.7	402	77.8	0.383	26.6
	6.0	17.0	21.6	17.0	10.3	406	215	4.33	3.15	67.7	53.8	84.3	63.5	469	89.4	0.379	22.3
	8.0	21.4	27.2	12.0	7.00	476	252	4.18	3.04	79.3	62.9	102	76.9	584	108	0.366	17.1
140 x 80	3.0 #	9.90	12.6	43.7	23.7	334	141	5.15	3.35	47.8	35.3	58.2	39.6	317	59.7	0.430	43.4
	4.0	13.0	16.5	32.0	17.0	430	180	5.10	3.30	61.4	45.1	75.5	51.3	412	76.5	0.426	32.8
	5.0 #	16.0	20.4	25.0	13.0	517	216	5.04	3.26	73.9	54.0	91.8	62.2	501	91.8	0.423	26.5
	6.0	18.9	24.0	20.3	10.3	597	248	4.98	3.21	85.3	62.0	107	72.4	584	106	0.419	22.2
	8.0	23.9	30.4	14.5	7.00	708	293	4.82	3.10	101	73.3	131	88.4	731	129	0.406	17.0
	10.0	28.7	36.6	11.0	5.00	804	330	4.69	3.01	115	82.6	152	103	851	147	0.397	13.8

Table 2.8.7.2. Hybox® RHS. Dimensions and properties

BS EN 1993-1-1: 2005
BS EN 10219-2: 2006

UK EUROCODES

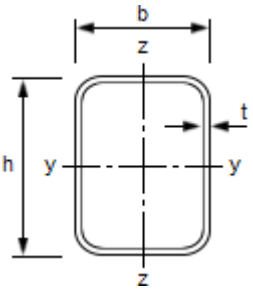
Table 2.8.7.3

SECTION PROPERTIES

COLD FORMED RECTANGULAR HOLLOW SECTIONS

Hybox® RHS

Dimensions and properties



Cold Formed

Section Designation		Mass per Metre	Area of Section	Ratios for Local Buckling		Second Moment of Area		Radius of Gyration		Elastic Modulus		Plastic Modulus		Torsional Constants		Surface Area	
Size h x b	Thickness		A	c_w/t (1)	c_f/t (1)	Axis y-y	Axis z-z	Axis y-y	Axis z-z	Axis y-y	Axis z-z	Axis y-y	Axis z-z	I_T	W_t	Per Metre	Per Tonne
mm	mm	kg/m	cm^2			cm^4	cm^4	cm	cm	cm^3	cm^3	cm^3	cm^3	cm^4	cm^3	m^2	m^2
150 x 100	3.0 #	11.3	14.4	47.0	30.3	461	248	5.65	4.15	61.4	49.5	73.5	55.8	507	81.4	0.490	43.3
	4.0	14.9	18.9	34.5	22.0	595	319	5.60	4.10	79.3	63.7	95.7	72.5	662	105	0.486	32.7
	5.0	18.3	23.4	27.0	17.0	719	384	5.55	4.05	95.9	76.8	117	88.3	809	127	0.483	26.3
	6.0	21.7	27.6	22.0	13.7	835	444	5.50	4.01	111	88.8	137	103	948	147	0.479	22.1
	8.0	27.7	35.2	15.8	9.50	1010	536	5.35	3.90	134	107	169	128	1210	182	0.466	16.8
	10.0	33.4	42.6	12.0	7.00	1160	614	5.22	3.80	155	123	199	150	1430	211	0.457	13.7
160 x 80	3.0 #	10.8	13.8	50.3	23.7	464	159	5.80	3.39	58.0	39.8	71.4	44.3	380	68.6	0.470	43.4
	4.0	14.2	18.1	37.0	17.0	598	204	5.74	3.35	74.7	50.9	92.9	57.4	494	88.0	0.466	32.7
	5.0	17.5	22.4	29.0	13.0	722	244	5.68	3.30	90.2	61.0	113	69.7	601	106	0.463	26.4
	6.0	20.7	26.4	23.7	10.3	836	281	5.62	3.26	105	70.2	132	81.3	702	122	0.459	22.1
	8.0	26.4	33.6	17.0	7.00	1000	335	5.46	3.16	125	83.7	163	100	882	150	0.446	16.9
	10.0 #	31.8	40.6	13.0	5.00	1150	380	5.32	3.06	143	95.0	191	117	1030	172	0.437	13.7
180 x 80	3.0	11.8	15.0	57.0	23.7	621	177	6.43	3.43	69.0	44.2	85.8	48.9	445	77.5	0.510	43.3
	4.0	15.5	19.7	42.0	17.0	802	227	6.37	3.39	89.1	56.7	112	63.5	578	99.6	0.506	32.6
	5.0	19.1	24.4	33.0	13.0	971	272	6.31	3.34	108	68.1	137	77.2	704	120	0.503	26.3
	6.0 #	22.6	28.8	27.0	10.3	1130	314	6.25	3.30	125	78.5	160	90.2	823	139	0.499	22.1
	8.0	28.9	36.8	19.5	7.00	1360	377	6.08	3.20	151	94.1	198	111	1040	170	0.486	16.8
	10.0 #	35.0	44.6	15.0	5.00	1570	429	5.94	3.10	174	107	234	131	1210	196	0.477	13.6
180 x 100	4.0 #	16.8	21.3	42.0	22.0	926	374	6.59	4.18	103	74.8	126	84.0	854	127	0.546	32.6
	5.0	20.7	26.4	33.0	17.0	1120	452	6.53	4.14	125	90.4	154	103	1050	154	0.543	26.2
	6.0	24.5	31.2	27.0	13.7	1310	524	6.48	4.10	146	105	181	120	1230	179	0.539	22.0
	8.0	31.4	40.0	19.5	9.50	1600	637	6.32	3.99	178	127	226	150	1570	222	0.526	16.7
	10.0	38.1	48.6	15.0	7.00	1860	736	6.19	3.89	207	147	268	177	1860	260	0.517	13.5
200 x 100	4.0	18.0	22.9	47.0	22.0	1200	411	7.23	4.23	120	82.2	148	91.7	985	142	0.586	32.5
	5.0	22.3	28.4	37.0	17.0	1460	497	7.17	4.19	146	99.4	181	112	1210	172	0.583	26.2
	6.0	26.4	33.6	30.3	13.7	1700	577	7.12	4.14	170	115	213	132	1420	200	0.579	21.9
	8.0	33.9	43.2	22.0	9.50	2090	705	6.95	4.04	209	141	267	165	1810	250	0.566	16.7
	10.0	41.3	52.6	17.0	7.00	2440	818	6.82	3.94	244	164	318	195	2150	292	0.557	13.5
200 x 120	4.0	19.3	24.5	47.0	27.0	1350	618	7.43	5.02	135	103	164	115	1350	172	0.626	32.5
	5.0	23.8	30.4	37.0	21.0	1650	750	7.37	4.97	165	125	201	141	1650	210	0.623	26.2
	6.0	28.3	36.0	30.3	17.0	1930	874	7.32	4.93	193	146	237	166	1950	245	0.619	21.9
	8.0	36.5	46.4	22.0	12.0	2390	1080	7.17	4.82	239	180	298	209	2510	308	0.606	16.6
	10.0	44.4	56.6	17.0	9.00	2810	1260	7.04	4.72	281	210	356	250	3010	364	0.597	13.4
200 x 150	4.0 #	21.2	26.9	47.0	34.5	1580	1020	7.67	6.16	158	136	187	154	1940	219	0.686	32.4
	5.0 #	26.2	33.4	37.0	27.0	1940	1250	7.62	6.11	193	166	230	189	2390	267	0.683	26.1
	6.0	31.1	39.6	30.3	22.0	2270	1460	7.56	6.06	227	194	271	223	2830	313	0.679	21.8
	8.0	40.2	51.2	22.0	15.8	2830	1820	7.43	5.95	283	242	344	283	3670	396	0.666	16.6
	10.0	49.1	62.6	17.0	12.0	3350	2140	7.31	5.85	335	286	413	339	4430	471	0.657	13.4

Table 2.8.7.3. Hybox® RHS. Dimensions and properties

BS EN 1993-1-1: 2005
BS EN 10219-2: 2006

UK EUROCODES

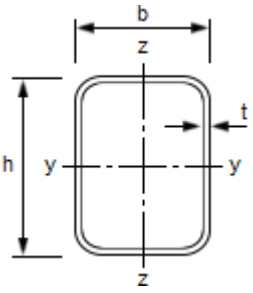
Table 2.8.7.4

SECTION PROPERTIES

COLD FORMED
RECTANGULAR HOLLOW SECTIONS

Hybox® RHS

Dimensions and properties



Cold Formed

Section Designation		Mass per Metre	Area of Section	Ratios for Local Buckling		Second Moment of Area		Radius of Gyration		Elastic Modulus		Plastic Modulus		Torsional Constants		Surface Area	
Size	Thickness					Axis y-y	Axis z-z	Axis y-y	Axis z-z	Axis y-y	Axis z-z	Axis y-y	Axis z-z			Per Metre	Per Tonne
h x b			A	c_w/t (1)	c_f/t (1)									I_T	W_t		
mm	mm	kg/m	cm^2			cm^4	cm^4	cm	cm	cm^3	cm^3	cm^3	cm^3	cm^4	cm^3	m^2	m^2
250 x 150	5.0	30.1	38.4	47.0	27.0	3300	1510	9.28	6.27	264	201	320	225	3290	337	0.783	26.0
	6.0	35.8	45.6	38.7	22.0	3890	1770	9.23	6.23	311	236	378	266	3890	396	0.779	21.7
	6.3 #	37.2	47.4	36.7	20.8	4000	1830	9.18	6.20	320	243	391	276	4080	412	0.773	20.7
	8.0	46.5	59.2	28.3	15.8	4890	2220	9.08	6.12	391	296	482	340	5050	504	0.766	16.5
	10.0	57.0	72.6	22.0	12.0	5830	2630	8.96	6.02	466	351	582	409	6120	602	0.757	13.3
	12.0	66.0	84.1	17.8	9.50	6460	2930	8.77	5.90	517	390	658	463	7090	684	0.738	11.2
	12.5	68.3	87.0	17.0	9.00	6630	3000	8.73	5.87	531	400	678	477	7320	704	0.736	10.7
300 x 100	8.0	46.5	59.2	34.5	9.50	5980	1050	10.0	4.20	399	209	523	238	3080	385	0.766	16.5
	10.0	57.0	72.6	27.0	7.00	7110	1220	9.90	4.11	474	245	631	285	3680	455	0.757	13.3
300 x 200	6.0	45.2	57.6	47.0	30.3	7370	3960	11.3	8.29	491	396	588	446	8120	651	0.979	21.6
	6.3 #	47.1	60.0	44.6	28.7	7620	4100	11.3	8.27	508	410	610	463	8520	680	0.973	20.6
	8.0	59.1	75.2	34.5	22.0	9390	5040	11.2	8.19	626	504	757	574	10600	838	0.966	16.3
	10.0	72.7	92.6	27.0	17.0	11300	6060	11.1	8.09	754	606	921	698	13000	1010	0.957	13.2
	12.0 #	84.8	108	22.0	13.7	12800	6850	10.9	7.96	853	685	1060	801	15200	1170	0.938	11.1
	12.5	88.0	112	21.0	13.0	13200	7060	10.8	7.94	879	706	1090	828	15800	1200	0.936	10.7
400 x 200	6.0 #	54.7	69.6	63.7	30.3	14800	5090	14.6	8.55	739	509	906	562	12100	877	1.18	21.6
	6.3 #	57.0	72.6	60.5	28.7	15300	5290	14.5	8.53	766	529	942	585	12700	916	1.17	20.5
	8.0	71.6	91.2	47.0	22.0	19000	6520	14.4	8.45	949	652	1170	728	15800	1130	1.17	16.4
	10.0	88.4	113	37.0	17.0	23000	7860	14.3	8.36	1150	786	1430	888	19400	1370	1.16	13.1
	12.0 #	104	132	30.3	13.7	26200	8980	14.1	8.24	1310	898	1660	1030	22800	1590	1.14	11.0
	12.5	108	137	29.0	13.0	27100	9260	14.1	8.22	1360	926	1710	1060	23600	1640	1.14	10.6
450 x 250	6.0 #	64.1	81.6	72.0	38.7	22700	9250	16.7	10.6	1010	740	1220	817	20700	1250	1.38	21.5
	6.3 #	66.9	85.2	68.4	36.7	23600	9620	16.6	10.6	1050	769	1270	851	21700	1310	1.37	20.4
	8.0 #	84.2	107	53.3	28.3	29300	11900	16.5	10.5	1300	953	1590	1060	27200	1630	1.37	16.3
	10.0 #	104	133	42.0	22.0	35700	14500	16.4	10.4	1590	1160	1950	1300	33500	1980	1.36	13.1
	12.0 #	123	156	34.5	17.8	41100	16700	16.2	10.3	1830	1330	2260	1520	39600	2310	1.34	10.9
	12.5 #	127	162	33.0	17.0	42500	17200	16.2	10.3	1890	1380	2350	1570	41100	2390	1.34	10.5
500 x 300	6.0 #	73.5	93.6	80.3	47.0	33000	15200	18.8	12.7	1320	1010	1580	1120	32400	1690	1.58	21.5
	6.3 #	76.8	97.8	76.4	44.6	34300	15800	18.7	12.7	1370	1050	1650	1170	34100	1770	1.57	20.4
	8.0 #	96.7	123	59.5	34.5	42800	19600	18.6	12.6	1710	1310	2060	1460	42800	2200	1.57	16.2
	10.0 #	120	153	47.0	27.0	52300	23900	18.5	12.5	2090	1600	2540	1790	52700	2690	1.56	13.0
	12.0 #	141	180	38.7	22.0	60600	27700	18.3	12.4	2420	1850	2960	2090	62600	3160	1.54	10.9
	12.5 #	147	187	37.0	21.0	62700	28700	18.3	12.4	2510	1910	3070	2170	65000	3270	1.54	10.5

Table 2.8.7.4. Hybox® RHS. Dimensions and properties

BS EN 1993-1-8: 2005
BS EN ISO 4016
BS EN ISO 4018

BOLT RESISTANCES

NON-PRELOADED BOLTS

Class 4.6 Countersunk Bolts

S275

C-305

Table 2.14.4.1

Diameter of Bolt	Tensile Stress Area	Tension Resistance	Shear Resistance		Bolts in Tension
			Single Shear	Double Shear	Min Thickness for Punching Shear
d	A_s	$F_{t,Rd}$	$F_{v,Rd}$	$2 \times F_{v,Rd}$	t_{min}
mm	mm^2	kN	kN	kN	mm
12	84.3	17.0	13.8	27.5	1.5
16	157	31.7	30.1	60.3	2.2
20	245	49.4	47.0	94.1	2.7
24	353	71.2	67.8	136	3.3
30	561	113	108	215	4.1

Table 2.14.4.1. Bolt Resistances.
Non-preloaded Class 4.6 countersunk bolts in S275

Table 2.14.4.2

Diameter of Bolt	Minimum				Bearing Resistance (kN)										
	Edge Distance	End Distance	Pitch	Gauge	Thickness in mm of ply,t										
d	e_2	e_1	p_1	p_2											
mm	mm	mm	mm	mm	5	6	7	8	9	10	12	15	20	25	30
12	20	25	35	40	**10.3**	15.5	20.7	25.9	*31.0*	*36.2*	*46.6*	*62.1*	*87.9*	*114*	*140*
16	25	35	50	50	**6.81**	**13.6**	**20.4**	**27.2**	34.0	40.8	54.5	*74.9*	*109*	*143*	*177*
20	30	40	60	60	**0**	**8.42**	**16.8**	**25.3**	**33.7**	**42.1**	58.9	84.2	*126*	*168*	*211*
24	35	50	70	70	**0**	**0**	**10.0**	**20.0**	**30.1**	**40.1**	**60.1**	90.2	*140*	*190*	*241*
30	45	60	85	90	**0**	**0**	**0**	**6.32**	**18.9**	**31.6**	**56.8**	**94.7**	158	*221*	*284*

Table 2.14.4.1. Bolt Resistances.
Non-preloaded Class 4.6 countersunk bolts in S275

BS EN 1993-1-8: 2005
BS EN ISO 4014
BS EN ISO 4017

UK EUROCODES

BOLT RESISTANCES

NON-PRELOADED BOLTS

Class 8.8 Countersunk Bolts

S275

C-306

Table 2.14.4.3

Diameter of Bolt	Tensile Stress Area	Tension Resistance	Shear Resistance		Bolts in Tension
			Single Shear	Double Shear	Min Thickness for Punching Shear
d	A_s	$F_{t,Rd}$	$F_{v,Rd}$	$2 \times F_{v,Rd}$	t_{min}
mm	mm^2	kN	kN	kN	mm
12	84.3	34.0	27.5	55.0	3.0
16	157	63.3	60.3	121	4.4
20	245	98.8	94.1	188	5.5
24	353	142	136	271	6.6
30	561	226	215	431	8.1

Table 2.14.4.5. Bolt Resistances.
Non-preloaded Class 8.8 countersunk bolts in S275

Table 2.14.4.4

Diameter of Bolt	Minimum				Bearing Resistance (kN)										
	Edge Distance	End Distance	Pitch	Gauge											
d	e_2	e_1	p_1	p_2	Thickness in mm of ply,t										
mm	mm	mm	mm	mm	5	6	7	8	9	10	12	15	20	25	30
12	20	25	35	40	**10.3**	**15.5**	**20.7**	**25.9**	31.0	36.2	46.6	*62.1*	*87.9*	*114*	*140*
16	25	35	50	50	**6.81**	**13.6**	**20.4**	**27.2**	**34.0**	**40.8**	**54.5**	74.9	109	*143*	*177*
20	30	40	60	60	**0**	**8.42**	**16.8**	**25.3**	**33.7**	**42.1**	**58.9**	**84.2**	126	168	*211*
24	35	50	70	70	**0**	**0**	**10.0**	**20.0**	**30.1**	**40.1**	**60.1**	**90.2**	140	190	241
30	45	60	85	90	**0**	**0**	**0**	**6.32**	**18.9**	**31.6**	**56.8**	**94.7**	**158**	221	284

Table 2.14.4.4. Bolt Resistances.
Non-preloaded Class 8.8 countersunk bolts in S275

Table 2.14.4.5

Diameter of Bolt	Minimum				Bearing Resistance (kN)										
	Edge Distance	End Distance	Pitch	Gauge											
d	e_2	e_1	p_1	p_2	Thickness in mm of ply,t										
mm	mm	mm	mm	mm	5	6	7	8	9	10	12	15	20	25	30
12	25	45	55	45	**19.7**	29.5	39.4	49.2	*59.0*	*68.9*	*88.6*	*118*	*167*	*216*	*266*
16	30	55	70	55	**13.1**	**26.2**	**39.4**	**52.5**	65.6	78.7	105	*144*	*210*	*276*	*341*
20	35	70	85	70	**0**	**16.4**	**32.8**	**49.2**	**65.6**	**82.0**	115	164	*246*	*328*	*410*
24	40	80	100	80	**0**	**0**	**19.7**	**39.4**	**59.0**	**78.7**	**118**	177	*276*	*374*	*472*
30	50	100	125	100	**0**	**0**	**0**	**12.3**	**36.9**	**61.5**	**111**	**185**	308	431	*554*

Table 2.14.4.4. Bolt Resistances.
Non-preloaded Class 8.8 countersunk bolts in S275

BS EN 1993-1-8: 2005
BS EN ISO 4014
BS EN ISO 4017

UK EUROCODES

BOLT RESISTANCES

NON-PRELOADED BOLTS

Class 10.9 Countersunk Bolts

S275

C-307

Table 2.14.4.6

Diameter of Bolt	Tensile Stress Area	Tension Resistance	Shear Resistance		Bolts in Tension
			Single Shear	Double Shear	Min Thickness for Punching Shear
d	A_s	$F_{t,Rd}$	$F_{v,Rd}$	$2 \times F_{v,Rd}$	t_{min}
mm	mm^2	kN	kN	kN	mm
12	84.3	42.5	28.7	57.3	3.7
16	157	79.1	62.8	126	5.5
20	245	123	98.0	196	6.9
24	353	178	141	282	8.2
30	561	283	224	449	10.2

Table 2.14.4.8. Bolt Resistances.
Non-preloaded Class 10.9 countersunk bolts in S275

Table 2.14.4.7

Diameter of Bolt	Minimum				Bearing Resistance (kN)										
	Edge Distance	End Distance	Pitch	Gauge											
d	e_2	e_1	p_1	p_2	Thickness in mm of ply,t										
mm	mm	mm	mm	mm	5	6	7	8	9	10	12	15	20	25	30
12	20	25	35	40	**10.3**	**15.5**	**20.7**	**25.9**	31.0	36.2	46.6	*62.1*	*87.9*	*114*	*140*
16	25	35	50	50	**6.81**	**13.6**	**20.4**	**27.2**	**34.0**	**40.8**	**54.5**	74.9	109	*143*	*177*
20	30	40	60	60	**0**	**8.42**	**16.8**	**25.3**	**33.7**	**42.1**	**58.9**	**84.2**	126	168	*211*
24	35	50	70	70	**0**	**0**	**10.0**	**20.0**	**30.1**	**40.1**	**60.1**	**90.2**	**140**	190	241
30	45	60	85	90	**0**	**0**	**0**	**6.32**	**18.9**	**31.6**	**56.8**	**94.7**	**158**	**221**	284

Table 2.14.4.7. Bolt Resistances.
Non-preloaded Class 10.9 countersunk bolts in S275

Table 2.14.4.8

Diameter of Bolt	Minimum				Bearing Resistance (kN)										
	Edge Distance	End Distance	Pitch	Gauge											
d	e_2	e_1	p_1	p_2	Thickness in mm of ply,t										
mm	mm	mm	mm	mm	5	6	7	8	9	10	12	15	20	25	30
12	25	45	55	45	**19.7**	29.5	39.4	49.2	*59.0*	*68.9*	*88.6*	*118*	*167*	*216*	*266*
16	30	55	70	55	**13.1**	**26.2**	**39.4**	**52.5**	65.6	78.7	105	*144*	*210*	*276*	*341*
20	35	70	85	70	**0**	**16.4**	**32.8**	**49.2**	**65.6**	**82.0**	115	164	*246*	*328*	*410*
24	40	80	100	80	**0**	**0**	**19.7**	**39.4**	**59.0**	**78.7**	**118**	177	276	*374*	*472*
30	50	100	125	100	**0**	**0**	**0**	**12.3**	**36.9**	**61.5**	**111**	**185**	308	431	*554*

Table 2.14.4.7. Bolt Resistances.
Non-preloaded Class 10.9 countersunk bolts in S275

BS EN 1993-1-8: 2005
BS EN ISO 4016
BS EN ISO 4018

UK EUROCODES

BOLT RESISTANCES

NON-PRELOADED BOLTS

Class 4.6 Countersunk Bolts

S355

D-305

Table 2.14.3.1

Diameter of Bolt	Tensile Stress Area	Tension Resistance	Shear Resistance		Bolts in Tension
			Single Shear	Double Shear	Min Thickness for Punching Shear
d	A_s	$F_{t,Rd}$	$F_{v,Rd}$	$2 \times F_{v,Rd}$	t_{min}
mm	mm^2	kN	kN	kN	mm
12	84.3	17.0	13.8	27.5	1.3
16	157	31.7	30.1	60.3	1.9
20	245	49.4	47.0	94.1	2.4
24	353	71.2	67.8	136	2.9
30	561	113	108	215	3.6

Table 2.14.3.1. Bolt Resistances.
Non-preloaded Class 4.6 countersunk bolts in S355

Table 2.14.3.2

Diameter of Bolt	Minimum				Bearing Resistance (kN)										
	Edge Distance	End Distance	Pitch	Gauge											
d	e_2	e_1	p_1	p_2	Thickness in mm of ply,t										
mm	mm	mm	mm	mm	5	6	7	8	9	10	12	15	20	25	30
12	20	25	35	40	**11.9**	17.8	23.7	*29.7*	*35.6*	*41.5*	*53.4*	*71.2*	*101*	*130*	*160*
16	25	35	50	50	**7.80**	**15.6**	**23.4**	31.2	39.0	46.8	*62.4*	*85.8*	*125*	*164*	*203*
20	30	40	60	60	**0**	**9.65**	**19.3**	**29.0**	**38.6**	48.3	67.6	*96.5*	*145*	*193*	*241*
24	35	50	70	70	**0**	**0**	**11.5**	**23.0**	**34.5**	**46.0**	68.9	103	*161*	*218*	*276*
30	45	60	85	90	**0**	**0**	**0**	**7.24**	**21.7**	**36.2**	**65.2**	109	181	*253*	*326*

Table 2.14.3.1. Bolt Resistances.
Non-preloaded Class 4.6 countersunk bolts in S355

BS EN 1993-1-8: 2005
BS EN ISO 4014
BS EN ISO 4017

UK EUROCODES

BOLT RESISTANCES

NON-PRELOADED BOLTS

Class 8.8 Countersunk Bolts

S355

D-306

Table 2.14.3.3

Diameter of Bolt	Tensile Stress Area	Tension Resistance	Shear Resistance		Bolts in Tension
			Single Shear	Double Shear	Min Thickness for Punching Shear
d	A_s	$F_{t,Rd}$	$F_{v,Rd}$	$2 \times F_{v,Rd}$	t_{min}
mm	mm^2	kN	kN	kN	mm
12	84.3	34.0	27.5	55.0	2.6
16	157	63.3	60.3	121	3.9
20	245	98.8	94.1	188	4.8
24	353	142	136	271	5.7
30	561	226	215	431	7.1

Table 2.14.3.5. Bolt Resistances.
Non-preloaded Class 8.8 countersunk bolts in S355

Table 2.14.3.4

Diameter of Bolt	Minimum				Bearing Resistance (kN)										
	Edge Distance	End Distance	Pitch	Gauge											
d	e_2	e_1	p_1	p_2	Thickness in mm of ply,t										
mm	mm	mm	mm	mm	5	6	7	8	9	10	12	15	20	25	30
12	20	25	35	40	**11.9**	**17.8**	**23.7**	29.7	35.6	41.5	53.4	*71.2*	*101*	*130*	*160*
16	25	35	50	50	**7.80**	**15.6**	**23.4**	**31.2**	**39.0**	**46.8**	62.4	85.8	*125*	*164*	*203*
20	30	40	60	60	**0**	**9.65**	**19.3**	**29.0**	**38.6**	**48.3**	**67.6**	96.5	145	*193*	*241*
24	35	50	70	70	**0**	**0**	**11.5**	**23.0**	**34.5**	**46.0**	**68.9**	**103**	161	218	*276*
30	45	60	85	90	**0**	**0**	**0**	**7.24**	**21.7**	**36.2**	**65.2**	**109**	**181**	253	326

Table 2.14.3.4. Bolt Resistances.
Non-preloaded Class 8.8 countersunk bolts in S355

Table 2.14.3.5

Diameter of Bolt	Minimum				Bearing Resistance (kN)										
	Edge Distance	End Distance	Pitch	Gauge											
d	e_2	e_1	p_1	p_2	Thickness in mm of ply,t										
mm	mm	mm	mm	mm	5	6	7	8	9	10	12	15	20	25	30
12	25	45	55	45	**22.6**	33.8	45.1	*56.4*	*67.7*	*79.0*	*102*	*135*	*192*	*248*	*305*
16	30	55	70	55	**15.0**	**30.1**	**45.1**	**60.2**	75.2	90.2	120	*165*	*241*	*316*	*391*
20	35	70	85	70	**0**	**18.8**	**37.6**	**56.4**	**75.2**	**94.0**	132	188	*282*	*376*	*470*
24	40	80	100	80	**0**	**0**	**22.6**	**45.1**	**67.7**	**90.2**	**135**	203	*316*	*429*	*541*
30	50	100	125	100	**0**	**0**	**0**	**14.1**	**42.3**	**70.5**	**127**	**212**	353	*494*	*635*

Table 2.14.3.4. Bolt Resistances.
Non-preloaded Class 8.8 countersunk bolts in S355

BS EN 1993-1-8: 2005
BS EN ISO 4014
BS EN ISO 4017

UK EUROCODES

BOLT RESISTANCES

NON-PRELOADED BOLTS

Class 10.9 Countersunk Bolts

S355

D-307

Table 2.14.3.6

Diameter of Bolt	Tensile Stress Area	Tension Resistance	Shear Resistance		Bolts in Tension
			Single Shear	Double Shear	Min Thickness for Punching Shear
d	A_s	$F_{t,Rd}$	$F_{v,Rd}$	$2 \times F_{v,Rd}$	t_{min}
mm	mm^2	kN	kN	kN	mm
12	84.3	42.5	28.7	57.3	3.2
16	157	79.1	62.8	126	4.8
20	245	123	98.0	196	6.0
24	353	178	141	282	7.2
30	561	283	224	449	8.9

Table 2.14.3.8. Bolt Resistances.
Non-preloaded Class 10.9 countersunk bolts in S355

Table 2.14.3.7

Diameter of Bolt	Minimum				Bearing Resistance (kN)										
	Edge Distance	End Distance	Pitch	Gauge											
d	e_2	e_1	p_1	p_2	Thickness in mm of ply,t										
mm	mm	mm	mm	mm	5	6	7	8	9	10	12	15	20	25	30
12	20	25	35	40	**11.9**	**17.8**	**23.7**	29.7	35.6	41.5	53.4	*71.2*	*101*	*130*	*160*
16	25	35	50	50	**7.80**	**15.6**	**23.4**	**31.2**	**39.0**	**46.8**	**62.4**	85.8	125	*164*	*203*
20	30	40	60	60	**0**	**9.65**	**19.3**	**29.0**	**38.6**	**48.3**	**67.6**	**96.5**	145	193	*241*
24	35	50	70	70	**0**	**0**	**11.5**	**23.0**	**34.5**	**46.0**	**68.9**	**103**	161	218	276
30	45	60	85	90	**0**	**0**	**0**	**7.24**	**21.7**	**36.2**	**65.2**	**109**	**181**	253	326

Table 2.14.3.7. Bolt Resistances.
Non-preloaded Class 10.9 countersunk bolts in S355

Table 2.14.3.8

Diameter of Bolt	Minimum				Bearing Resistance (kN)										
	Edge Distance	End Distance	Pitch	Gauge											
d	e_2	e_1	p_1	p_2	Thickness in mm of ply,t										
mm	mm	mm	mm	mm	5	6	7	8	9	10	12	15	20	25	30
12	25	45	55	45	**22.6**	33.8	45.1	56.4	*67.7*	*79.0*	*102*	*135*	*192*	*248*	*305*
16	30	55	70	55	**15.0**	**30.1**	**45.1**	**60.2**	75.2	90.2	120	*165*	*241*	*316*	*391*
20	35	70	85	70	**0**	**18.8**	**37.6**	**56.4**	**75.2**	**94.0**	132	188	*282*	*376*	*470*
24	40	80	100	80	**0**	**0**	**22.6**	**45.1**	**67.7**	**90.2**	**135**	203	*316*	*429*	*541*
30	50	100	125	100	**0**	**0**	**0**	**14.1**	**42.3**	**70.5**	**127**	**212**	353	*494*	*635*

Table 2.14.3.7. Bolt Resistances.
Non-preloaded Class 10.9 countersunk bolts in S355

BS EN 1993-1-8: 2005
BS EN ISO 4016
BS EN ISO 4018

BOLT RESISTANCES

NON-PRELOADED BOLTS

Class 4.6 Hexagon Head Bolts

S275

C-302

Table 2.14.2.1

Diameter of Bolt	Tensile Stress Area	Tension Resistance	Shear Resistance		Bolts in Tension
			Single Shear	Double Shear	Min Thickness for Punching Shear
d	A_s	$F_{t,Rd}$	$F_{v,Rd}$	$2 \times F_{v,Rd}$	t_{min}
mm	mm^2	kN	kN	kN	mm
12	84.3	24.3	13.8	27.5	2.1
16	157	45.2	30.1	60.3	3.2
20	245	70.6	47.0	94.1	3.9
24	353	102	67.8	136	4.7
30	561	162	108	215	5.8

Table 2.14.2.1. Bolt Resistances.
Non-preloaded Class 4.6 hexagon head bolts in S275

Table 2.14.2.2

Diameter of Bolt	Minimum				Bearing Resistance (kN)										
	Edge Distance	End Distance	Pitch	Gauge											
d	e_2	e_1	p_1	p_2	Thickness in mm of ply,t										
mm	mm	mm	mm	mm	5	6	7	8	9	10	12	15	20	25	30
12	20	25	35	40	25.9	*31.0*	*36.2*	*41.4*	*46.6*	*51.7*	*62.1*	*77.6*	*103*	*129*	*155*
16	25	35	50	50	34.0	40.8	47.7	54.5	*61.3*	*68.1*	*81.7*	*102*	*136*	*170*	*204*
20	30	40	60	60	**42.1**	50.5	58.9	67.4	75.8	84.2	*101*	*126*	*168*	*211*	*253*
24	35	50	70	70	**50.1**	**60.1**	70.2	80.2	90.2	100	120	*150*	*200*	*251*	*301*
30	45	60	85	90	**63.2**	**75.8**	**88.4**	**101**	114	126	152	189	*253*	*316*	*379*

Table 2.14.2.1. Bolt Resistances.
Non-preloaded Class 4.6 hexagon head bolts in S275

BS EN 1993-1-8: 2005
BS EN ISO 4014
BS EN ISO 4017

UK EUROCODES

BOLT RESISTANCES

NON-PRELOADED BOLTS

Class 8.8 Hexagon Head Bolts

S275

C-303

Table 2.14.2.3

Diameter of Bolt	Tensile Stress Area	Tension Resistance	Shear Resistance		Bolts in Tension
			Single Shear	Double Shear	Min Thickness for Punching Shear
d	A_s	$F_{t,Rd}$	$F_{v,Rd}$	$2 \times F_{v,Rd}$	t_{min}
mm	mm^2	kN	kN	kN	mm
12	84.3	48.6	27.5	55.0	4.3
16	157	90.4	60.3	121	6.3
20	245	141	94.1	188	7.8
24	353	203	136	271	9.4
30	561	323	215	431	11.6

Table 2.14.2.5. Bolt Resistances.
Non-preloaded Class 8.8 hexagon head bolts in S275

Table 2.14.2.4

Diameter of Bolt	Minimum				Bearing Resistance (kN)										
	Edge Distance	End Distance	Pitch	Gauge											
d	e_2	e_1	p_1	p_2	Thickness in mm of ply,t										
mm	mm	mm	mm	mm	5	6	7	8	9	10	12	15	20	25	30
12	20	25	35	40	**25.9**	31.0	36.2	41.4	46.6	51.7	*62.1*	*77.6*	*103*	*129*	*155*
16	25	35	50	50	**34.0**	**40.8**	**47.7**	**54.5**	61.3	68.1	81.7	102	*136*	*170*	*204*
20	30	40	60	60	**42.1**	**50.5**	**58.9**	**67.4**	**75.8**	**84.2**	101	126	168	*211*	*253*
24	35	50	70	70	**50.1**	**60.1**	**70.2**	**80.2**	**90.2**	**100**	**120**	150	200	251	*301*
30	45	60	85	90	**63.2**	**75.8**	**88.4**	**101**	**114**	**126**	**152**	**189**	253	316	379

Table 2.14.2.4. Bolt Resistances.
Non-preloaded Class 8.8 hexagon head bolts in S275

Table 2.14.2.5

Diameter of Bolt	Minimum				Bearing Resistance (kN)										
	Edge Distance	End Distance	Pitch	Gauge											
d	e_2	e_1	p_1	p_2	Thickness in mm of ply,t										
mm	mm	mm	mm	mm	5	6	7	8	9	10	12	15	20	25	30
12	25	40	50	45	42.2	50.6	*59.0*	*67.5*	*75.9*	*84.3*	*101*	*127*	*169*	*211*	*253*
16	30	50	65	55	**58.3**	70.0	81.6	93.3	105	117	*140*	*175*	*233*	*292*	*350*
20	35	60	80	70	**74.5**	**89.5**	104	119	134	149	179	*224*	*298*	*373*	*447*
24	40	75	95	80	**90.8**	**109**	**127**	145	163	182	218	*272*	*363*	*454*	*545*
30	50	90	115	100	**112**	**134**	**157**	**179**	**201**	224	268	335	*447*	*559*	*671*

Table 2.14.2.4. Bolt Resistances.
Non-preloaded Class 8.8 hexagon head bolts in S275

BS EN 1993-1-8: 2005
BS EN ISO 4014
BS EN ISO 4017

UK EUROCODES

BOLT RESISTANCES

NON-PRELOADED BOLTS

Class 10.9 Hexagon Head Bolts

S275

C-304

Table 2.14.2.6

Diameter of Bolt	Tensile Stress Area	Tension Resistance	Shear Resistance		Bolts in Tension
			Single Shear	Double Shear	Min Thickness for Punching Shear
d	A_s	$F_{t,Rd}$	$F_{v,Rd}$	$2 \times F_{v,Rd}$	t_{min}
mm	mm^2	kN	kN	kN	mm
12	84.3	60.7	28.7	57.3	5.3
16	157	113	62.8	126	7.9
20	245	176	98.0	196	9.8
24	353	254	141	282	11.7
30	561	404	224	449	14.5

Table 2.14.2.8. Bolt Resistances.
Non-preloaded Class 10.9 hexagon head bolts in S275

Table 2.14.2.7

Diameter of Bolt	Minimum				Bearing Resistance (kN)										
	Edge Distance	End Distance	Pitch	Gauge											
d	e_2	e_1	p_1	p_2	Thickness in mm of ply,t										
mm	mm	mm	mm	mm	5	6	7	8	9	10	12	15	20	25	30
12	20	25	35	40	**25.9**	31.0	36.2	41.4	46.6	51.7	*62.1*	*77.6*	*103*	*129*	*155*
16	25	35	50	50	**34.0**	**40.8**	**47.7**	**54.5**	**61.3**	68.1	81.7	102	*136*	*170*	*204*
20	30	40	60	60	**42.1**	**50.5**	**58.9**	**67.4**	**75.8**	**84.2**	101	126	168	*211*	*253*
24	35	50	70	70	**50.1**	**60.1**	**70.2**	**80.2**	**90.2**	**100**	**120**	150	200	251	*301*
30	45	60	85	90	**63.2**	**75.8**	**88.4**	**101**	**114**	**126**	**152**	**189**	253	316	379

Table 2.14.2.7. Bolt Resistances.
Non-preloaded Class 10.9 hexagon head bolts in S275

Table 2.14.2.8

Diameter of Bolt	Minimum				Bearing Resistance (kN)										
	Edge Distance	End Distance	Pitch	Gauge											
d	e_2	e_1	p_1	p_2	Thickness in mm of ply,t										
mm	mm	mm	mm	mm	5	6	7	8	9	10	12	15	20	25	30
12	25	40	50	45	42.2	50.6	*59.0*	*67.5*	*75.9*	*84.3*	*101*	*127*	*169*	*211*	*253*
16	30	50	65	55	**58.3**	70.0	81.6	93.3	105	117	*140*	*175*	*233*	*292*	*350*
20	35	60	80	70	**74.5**	**89.5**	104	119	134	149	179	*224*	*298*	*373*	*447*
24	40	75	95	80	**90.8**	**109**	**127**	145	163	182	218	272	*363*	*454*	*545*
30	50	90	115	100	**112**	**134**	**157**	**179**	**201**	**224**	268	335	447	*559*	*671*

Table 2.14.2.7. Bolt Resistances.
Non-preloaded Class 10.9 hexagon head bolts in S275

BS EN 1993-1-8: 2005
BS EN ISO 4016
BS EN ISO 4018

UK EUROCODES

BOLT RESISTANCES

NON-PRELOADED BOLTS

Class 4.6 Hexagon Head Bolts

S355

D-302

Table 2.14.1.1

Diameter of Bolt	Tensile Stress Area	Tension Resistance	Shear Resistance		Bolts in Tension
			Single Shear	Double Shear	Min Thickness for Punching Shear
d	A_s	$F_{t,Rd}$	$F_{v,Rd}$	$2 \times F_{v,Rd}$	t_{min}
mm	mm^2	kN	kN	kN	mm
12	84.3	24.3	13.8	27.5	1.9
16	157	45.2	30.1	60.3	2.8
20	245	70.6	47.0	94.1	3.4
24	353	102	67.8	136	4.1
30	561	162	108	215	5.1

Table 2.14.1.1. Bolt Resistances.
Non-preloaded Class 4.6 hexagon head bolts in S355

Table 2.14.1.2

Diameter of Bolt	Minimum				Bearing Resistance (kN)										
	Edge Distance	End Distance	Pitch	Gauge	Thickness in mm of ply,t										
d	e_2	e_1	p_1	p_2											
mm	mm	mm	mm	mm	5	6	7	8	9	10	12	15	20	25	30
12	20	25	35	40	*29.7*	*35.6*	*41.5*	*47.4*	*53.4*	*59.3*	*71.2*	*89.0*	*119*	*148*	*178*
16	25	35	50	50	39.0	46.8	54.6	*62.4*	*70.2*	*78.0*	*93.6*	*117*	*156*	*195*	*234*
20	30	40	60	60	48.3	57.9	67.6	77.2	86.9	*96.5*	*116*	*145*	*193*	*241*	*290*
24	35	50	70	70	**57.5**	68.9	80.4	91.9	103	115	*138*	*172*	*230*	*287*	*345*
30	45	60	85	90	**72.4**	**86.9**	**101**	116	130	145	174	*217*	*290*	*362*	*434*

Table 2.14.1.1. Bolt Resistances.
Non-preloaded Class 4.6 hexagon head bolts in S355

BS EN 1993-1-8: 2005
BS EN ISO 4014
BS EN ISO 4017

UK EUROCODES

BOLT RESISTANCES

NON-PRELOADED BOLTS

Class 8.8 Hexagon Head Bolts

S355

D-303

Table 2.14.1.3

Diameter of Bolt	Tensile Stress Area	Tension Resistance	Shear Resistance		Bolts in Tension
			Single Shear	Double Shear	Min Thickness for Punching Shear
d	A_s	$F_{t,Rd}$	$F_{v,Rd}$	$2 \times F_{v,Rd}$	t_{min}
mm	mm^2	kN	kN	kN	mm
12	84.3	48.6	27.5	55.0	3.7
16	157	90.4	60.3	121	5.5
20	245	141	94.1	188	6.8
24	353	203	136	271	8.2
30	561	323	215	431	10.1

Table 2.14.1.5. Bolt Resistances.
Non-preloaded Class 8.8 hexagon head bolts in S355

Table 2.14.1.4

Diameter of Bolt	Minimum				Bearing Resistance (kN)										
	Edge Distance	End Distance	Pitch	Gauge											
d	e_2	e_1	p_1	p_2	Thickness in mm of ply,t										
mm	mm	mm	mm	mm	5	6	7	8	9	10	12	15	20	25	30
12	20	25	35	40	29.7	35.6	41.5	47.4	53.4	*59.3*	*71.2*	*89.0*	*119*	*148*	*178*
16	25	35	50	50	**39.0**	**46.8**	**54.6**	62.4	70.2	78.0	93.6	117	*156*	*195*	*234*
20	30	40	60	60	**48.3**	**57.9**	**67.6**	**77.2**	**86.9**	96.5	116	145	*193*	*241*	*290*
24	35	50	70	70	**57.5**	**68.9**	**80.4**	**91.9**	**103**	**115**	138	172	230	*287*	*345*
30	45	60	85	90	**72.4**	**86.9**	**101**	**116**	**130**	**145**	**174**	217	290	362	*434*

Table 2.14.1.4. Bolt Resistances.
Non-preloaded Class 8.8 hexagon head bolts in S355

Table 2.14.1.5

Diameter of Bolt	Minimum				Bearing Resistance (kN)										
	Edge Distance	End Distance	Pitch	Gauge											
d	e_2	e_1	p_1	p_2	Thickness in mm of ply,t										
mm	mm	mm	mm	mm	5	6	7	8	9	10	12	15	20	25	30
12	25	40	50	45	48.3	*58.0*	*67.7*	*77.3*	*87.0*	*96.7*	*116*	*145*	*193*	*242*	*290*
16	30	50	65	55	66.8	80.2	93.6	107	120	*134*	*160*	*201*	*267*	*334*	*401*
20	35	60	80	70	**85.5**	103	120	137	154	171	*205*	*256*	*342*	*427*	*513*
24	40	75	95	80	**104**	**125**	146	167	187	208	250	*312*	*416*	*521*	*625*
30	50	90	115	100	**128**	**154**	**179**	**205**	231	256	308	385	*513*	*641*	*769*

Table 2.14.1.4. Bolt Resistances.
Non-preloaded Class 8.8 hexagon head bolts in S355

BS EN 1993-1-8: 2005
BS EN ISO 4014
BS EN ISO 4017

UK EUROCODES

BOLT RESISTANCES

NON-PRELOADED BOLTS

Class 10.9 Hexagon Head Bolts

S355

D-304

Table 2.14.1.6

Diameter of Bolt	Tensile Stress Area	Tension Resistance	Shear Resistance		Bolts in Tension
			Single Shear	Double Shear	Min Thickness for Punching Shear
d	A_s	$F_{t,Rd}$	$F_{v,Rd}$	$2 \times F_{v,Rd}$	t_{min}
mm	mm^2	kN	kN	kN	mm
12	84.3	60.7	28.7	57.3	4.6
16	157	113	62.8	126	6.9
20	245	176	98.0	196	8.5
24	353	254	141	282	10.2
30	561	404	224	449	12.7

Table 2.14.1.8. Bolt Resistances.
Non-preloaded Class 10.9 hexagon head bolts in S355

Table 2.14.1.7

Diameter of Bolt	Minimum				Bearing Resistance (kN)										
	Edge Distance	End Distance	Pitch	Gauge											
d	e_2	e_1	p_1	p_2	Thickness in mm of ply,t										
mm	mm	mm	mm	mm	5	6	7	8	9	10	12	15	20	25	30
12	20	25	35	40	29.7	35.6	41.5	47.4	53.4	*59.3*	*71.2*	*89.0*	*119*	*148*	*178*
16	25	35	50	50	**39.0**	**46.8**	**54.6**	**62.4**	70.2	78.0	93.6	117	*156*	*195*	*234*
20	30	40	60	60	**48.3**	**57.9**	**67.6**	**77.2**	**86.9**	**96.5**	116	145	193	*241*	*290*
24	35	50	70	70	**57.5**	**68.9**	**80.4**	**91.9**	**103**	**115**	**138**	172	230	*287*	*345*
30	45	60	85	90	**72.4**	**86.9**	**101**	**116**	**130**	**145**	**174**	**217**	290	362	434

Table 2.14.1.7. Bolt Resistances.
Non-preloaded Class 10.9 hexagon head bolts in S355

Table 2.14.1.8

Diameter of Bolt	Minimum				Bearing Resistance (kN)										
	Edge Distance	End Distance	Pitch	Gauge											
d	e_2	e_1	p_1	p_2	Thickness in mm of ply,t										
mm	mm	mm	mm	mm	5	6	7	8	9	10	12	15	20	25	30
12	25	40	50	45	48.3	*58.0*	*67.7*	*77.3*	*87.0*	*96.7*	*116*	*145*	*193*	*242*	*290*
16	30	50	65	55	66.8	80.2	93.6	107	120	*134*	*160*	*201*	*267*	*334*	*401*
20	35	60	80	70	**85.5**	103	120	137	154	171	*205*	*256*	*342*	*427*	*513*
24	40	75	95	80	**104**	**125**	146	167	187	208	250	*312*	*416*	*521*	*625*
30	50	90	115	100	**128**	**154**	**179**	**205**	231	256	308	385	*513*	*641*	*769*

Table 2.14.1.7. Bolt Resistances.
Non-preloaded Class 10.9 hexagon head bolts in S355

BS EN 1993-1-8: 2005
BS EN 14399: 2005
EN 1090: 2008

UK EUROCODES

BOLT RESISTANCES

PRELOADED BOLTS AT SERVICEABILITY LIMIT STATE

Class 8.8 countersunk bolts

S275

C-312

Table 2.14.12.1

Diameter of Bolt	Tensile Stress Area	Tension Resistance	Shear Resistance		Bolts in Tension	Slip Resistance μ = 0.5	
			Single Shear	Double Shear	Min Thickness for Punching Shear	Single Shear	Double Shear
	A_s	$F_{t,Rd}$	$F_{v,Rd}$	$2 \times F_{v,Rd}$	t_{min}		
mm	mm^2	kN	kN	kN	mm	kN	kN
12	84.3	34.0	27.5	55.0	2.60	21.5	42.9
16	157	63.3	60.3	121	3.91	40.0	79.9
20	245	98.8	94.1	188	5.15	62.4	125
24	353	142	136	271	5.76	89.9	180
30	561	226	215	431	7.47	143	286

Table 2.14.12.1. Bolt Resistances. Preloaded bolts at serviceability limit state.
Class 8.8 countersunk bolts in S275

Table 2.14.12.2

Diameter of Bolt	Minimum				Bearing Resistance (kN)										
	Edge Distance	End Distance	Pitch	Gauge											
d	e_2	e_1	p_1	p_2	Thickness in mm of ply,t										
mm	mm	mm	mm	mm	5	6	7	8	9	10	12	15	20	25	30
12	20	40	50	40	**15.5**	**23.3**	31.0	38.8	46.6	54.3	*69.8*	*93.1*	*132*	*171*	*210*
16	25	50	65	50	**10.2**	**20.4**	**30.6**	**40.8**	**51.1**	61.3	81.7	112	*163*	*214*	*265*
20	30	60	80	60	**0**	**12.6**	**25.3**	**37.9**	**50.5**	**63.2**	**88.4**	126	*189*	*253*	*316*
24	35	75	95	70	**0**	**0**	**15.0**	**30.1**	**45.1**	**60.1**	**90.2**	**135**	211	*286*	*361*
30	45	90	115	90	**0**	**0**	**0**	**9.47**	**28.4**	**47.4**	**85.3**	**142**	237	332	426

Table 2.14.12.1. Bolt Resistances. Preloaded bolts at serviceability limit state.
Class 8.8 countersunk bolts in S275

BS EN 1993-1-8: 2005
BS EN 14399: 2005
EN 1090: 2008

UK EUROCODES

BOLT RESISTANCES

PRELOADED BOLTS AT SERVICEABILITY LIMIT STATE

Class 10.9 countersunk bolts

S275

C-313

Table 2.14.12.3

Diameter of Bolt	Tensile Stress Area	Tension Resistance	Shear Resistance		Bolts in Tension	Slip Resistance μ = 0.5	
			Single Shear	Double Shear	Min Thickness for Punching Shear	Single Shear	Double Shear
	A_s	$F_{t,Rd}$	$F_{v,Rd}$	$2 \times F_{v,Rd}$	t_{min}		
mm	mm^2	kN	kN	kN	mm	kN	kN
16	157	79.1	62.8	126	4.89	50.0	99.9
20	245	123	98.0	196	6.44	78.0	156
24	353	178	141	282	7.19	112	225
30	561	283	224	449	9.33	179	357

Table 2.14.12.3. Bolt Resistances. Preloaded bolts at serviceability limit state. Class 10.9 countersunk bolts in S275

Table 2.14.12.4

Diameter of Bolt	Minimum				Bearing Resistance (kN)										
	Edge Distance	End Distance	Pitch	Gauge											
d	e_2	e_1	p_1	p_2	Thickness in mm of ply,t										
mm	mm	mm	mm	mm	5	6	7	8	9	10	12	15	20	25	30
16	25	50	65	50	**10.2**	**20.4**	**30.6**	**40.8**	**51.1**	**61.3**	81.7	112	*163*	*214*	*265*
20	30	60	80	60	**0**	**12.6**	**25.3**	**37.9**	**50.5**	**63.2**	**88.4**	126	189	*253*	*316*
24	35	75	95	70	**0**	**0**	**15.0**	**30.1**	**45.1**	**60.1**	**90.2**	**135**	211	*286*	*361*
30	45	90	115	90	**0**	**0**	**0**	**9.47**	**28.4**	**47.4**	**85.3**	**142**	237	332	426

Table 2.14.12.3. Bolt Resistances. Preloaded bolts at serviceability limit state. Class 10.9 countersunk bolts in S275

BS EN 1993-1-8: 2005
BS EN 14399: 2005
EN 1090: 2008

UK EUROCODES

BOLT RESISTANCES

PRELOADED BOLTS AT SERVICEABILITY LIMIT STATE

Class 8.8 countersunk bolts

S355

D-312

Table 2.14.11.1

Diameter of Bolt	Tensile Stress Area	Tension Resistance	Shear Resistance		Bolts in Tension	Slip Resistance μ = 0.5	
			Single Shear	Double Shear	Min Thickness for Punching Shear	Single Shear	Double Shear
	A_s	$F_{t,Rd}$	$F_{v,Rd}$	$2 \times F_{v,Rd}$	t_{min}		
mm	mm^2	kN	kN	kN	mm	kN	kN
12	84.3	34.0	27.5	55.0	2.27	21.5	42.9
16	157	63.3	60.3	121	3.41	40.0	79.9
20	245	98.8	94.1	188	4.50	62.4	125
24	353	142	136	271	5.02	89.9	180
30	561	226	215	431	6.51	143	286

Table 2.14.11.1. Bolt Resistances. Preloaded bolts at serviceability limit state. Class 8.8 countersunk bolts in S355

Table 2.14.11.2

Diameter of Bolt	Minimum				Bearing Resistance (kN)										
	Edge Distance	End Distance	Pitch	Gauge	Thickness in mm of ply,t										
d	e_2	e_1	p_1	p_2											
mm	mm	mm	mm	mm	5	6	7	8	9	10	12	15	20	25	30
12	20	40	50	40	**17.8**	**26.7**	35.6	44.5	53.4	*62.3*	*80.1*	*107*	*151*	*196*	*240*
16	25	50	65	50	**11.7**	**23.4**	**35.1**	**46.8**	**58.5**	70.2	93.6	*129*	*187*	*246*	*304*
20	30	60	80	60	**0**	**14.5**	**29.0**	**43.4**	**57.9**	**72.4**	101	145	*217*	*290*	*362*
24	35	75	95	70	**0**	**0**	**17.2**	**34.5**	**51.7**	**68.9**	**103**	155	241	*327*	*414*
30	45	90	115	90	**0**	**0**	**0**	**10.9**	**32.6**	**54.3**	**97.7**	**163**	272	380	*489*

Table 2.14.11.1. Bolt Resistances. Preloaded bolts at serviceability limit state. Class 8.8 countersunk bolts in S355

BS EN 1993-1-8: 2005
BS EN 14399: 2005
EN 1090: 2008

UK EUROCODES

BOLT RESISTANCES

PRELOADED BOLTS AT SERVICEABILITY LIMIT STATE

Class 10.9 countersunk bolts

S355

D-313

Table 2.14.11.3

Diameter of Bolt	Tensile Stress Area	Tension Resistance	Shear Resistance		Bolts in Tension	Slip Resistance μ = 0.5	
			Single Shear	Double Shear	Min Thickness for Punching Shear	Single Shear	Double Shear
	A_s	$F_{t,Rd}$	$F_{v,Rd}$	$2 \times F_{v,Rd}$	t_{min}		
mm	mm^2	kN	kN	kN	mm	kN	kN
16	157	79.1	62.8	126	4.27	50.0	99.9
20	245	123	98.0	196	5.62	78.0	156
24	353	178	141	282	6.28	112	225
30	561	283	224	449	8.14	179	357

Table 2.14.11.3. Bolt Resistances. Preloaded bolts at serviceability limit state. Class 10.9 countersunk bolts in S355

Table 2.14.11.4

Diameter of Bolt	Minimum				Bearing Resistance (kN)										
	Edge Distance	End Distance	Pitch	Gauge											
d	e_2	e_1	p_1	p_2	Thickness in mm of ply,t										
mm	mm	mm	mm	mm	5	6	7	8	9	10	12	15	20	25	30
16	25	50	65	50	**11.7**	**23.4**	**35.1**	**46.8**	**58.5**	70.2	93.6	*129*	*187*	*246*	*304*
20	30	60	80	60	**0**	**14.5**	**29.0**	**43.4**	**57.9**	**72.4**	101	145	*217*	*290*	*362*
24	35	75	95	70	**0**	**0**	**17.2**	**34.5**	**51.7**	**68.9**	**103**	155	241	*327*	*414*
30	45	90	115	90	**0**	**0**	**0**	**10.9**	**32.6**	**54.3**	**97.7**	**163**	272	380	*489*

Table 2.14.11.3. Bolt Resistances. Preloaded bolts at serviceability limit state. Class 10.9 countersunk bolts in S355

BS EN 1993-1-8: 2005
BS EN 14399: 2005
EN 1090: 2008

UK EUROCODES

BOLT RESISTANCES

PRELOADED BOLTS AT ULTIMATE LIMIT STATE

Class 8.8 countersunk bolts

S275

C-314

Table 2.14.14.1

Diameter of Bolt	Tensile Stress Area	Bolts in Tension		Slip Resistance							
		Tension Resistance	Min Thickness for Punching Shear	μ = 0.2		μ = 0.3		μ = 0.4		μ = 0.5	
				Single Shear	Double Shear	Single Shear	Double Shear	Single Shear	Double Shear	Single Shear	Double Shear
	A_s	$F_{t,Rd}$	t_{min}								
mm	mm^2	kN	mm	kN	kN	kN	kN	kN	kN	kN	kN
12	84.3	34.0	2.60	7.55	15.1	11.3	22.7	15.1	30.2	18.9	37.8
16	157	63.3	3.91	14.1	28.1	21.1	42.2	28.1	56.3	35.2	70.3
20	245	98.8	5.15	22.0	43.9	32.9	65.9	43.9	87.8	54.9	110
24	353	142	5.76	31.6	63.3	47.4	94.9	63.3	127	79.1	158
30	561	226	7.47	50.3	101	75.4	151	101	201	126	251

Table 2.14.14.1. Bolt Resistances. Preloaded bolts at ultimate limit state.
Class 8.8 countersunk bolts in S275

Table 2.14.14.2

Diameter of Bolt	Minimum				Bearing Resistance (kN)										
	Edge Distance	End Distance	Pitch	Gauge											
d	e_2	e_1	p_1	p_2	Thickness in mm of ply,t										
mm	mm	mm	mm	mm	5	6	7	8	9	10	12	15	20	25	30
12	20	40	50	40	**15.5**	**23.3**	31.0	38.8	46.6	54.3	*69.8*	*93.1*	*132*	*171*	*210*
16	25	50	65	50	**10.2**	**20.4**	**30.6**	**40.8**	**51.1**	61.3	81.7	112	*163*	*214*	*265*
20	30	60	80	60	**0**	**12.6**	**25.3**	**37.9**	**50.5**	**63.2**	**88.4**	126	*189*	*253*	*316*
24	35	75	95	70	**0**	**0**	**15.0**	**30.1**	**45.1**	**60.1**	**90.2**	**135**	211	*286*	*361*
30	45	90	115	90	**0**	**0**	**0**	**9.47**	**28.4**	**47.4**	**85.3**	**142**	237	332	426

Table 2.14.14.1. Bolt Resistances. Preloaded bolts at ultimate limit state.
Class 8.8 countersunk bolts in S275

BS EN 1993-1-8: 2005
BS EN 14399: 2005
EN 1090: 2008

UK EUROCODES

BOLT RESISTANCES

PRELOADED BOLTS AT ULTIMATE LIMIT STATE

Class 10.9 countersunk bolts

S275

C-315

Table 2.14.14.3

Diameter of Bolt	Tensile Stress Area	Bolts in Tension		Slip Resistance							
		Tension Resistance	Min Thickness for Punching Shear	μ = 0.2		μ = 0.3		μ = 0.4		μ = 0.5	
				Single Shear	Double Shear	Single Shear	Double Shear	Single Shear	Double Shear	Single Shear	Double Shear
	A_s	$F_{t,Rd}$	t_{min}								
mm	mm^2	kN	mm	kN	kN	kN	kN	kN	kN	kN	kN
16	157	79.1	4.89	17.6	35.2	26.4	52.8	35.2	70.3	44.0	87.9
20	245	123	6.44	27.4	54.9	41.2	82.3	54.9	110	68.6	137
24	353	178	7.19	39.5	79.1	59.3	119	79.1	158	98.8	198
30	561	283	9.33	62.8	126	94.2	188	126	251	157	314

Table 2.14.14.3. Bolt Resistances. Preloaded bolts at ultimate limit state.
Class 10.9 countersunk bolts in S275

Table 2.14.14.4

Diameter of Bolt	Minimum				Bearing Resistance (kN)										
	Edge Distance	End Distance	Pitch	Gauge											
d	e_2	e_1	p_1	p_2	Thickness in mm of ply,t										
mm	mm	mm	mm	mm	5	6	7	8	9	10	12	15	20	25	30
16	25	50	65	50	**10.2**	**20.4**	**30.6**	**40.8**	**51.1**	**61.3**	81.7	112	*163*	*214*	*265*
20	30	60	80	60	**0**	**12.6**	**25.3**	**37.9**	**50.5**	**63.2**	**88.4**	126	189	*253*	*316*
24	35	75	95	70	**0**	**0**	**15.0**	**30.1**	**45.1**	**60.1**	**90.2**	**135**	211	*286*	*361*
30	45	90	115	90	**0**	**0**	**0**	**9.47**	**28.4**	**47.4**	**85.3**	**142**	237	332	426

Table 2.14.14.3. Bolt Resistances. Preloaded bolts at ultimate limit state.
Class 10.9 countersunk bolts in S275

BS EN 1993-1-8: 2005
BS EN 14399: 2005
EN 1090: 2008

UK EUROCODES

BOLT RESISTANCES

PRELOADED BOLTS AT ULTIMATE LIMIT STATE

Class 8.8 countersunk bolts

S355

D-314

Table 2.14.13.1

Diameter of Bolt	Tensile Stress Area	Bolts in Tension		Slip Resistance							
		Tension Resistance	Min Thickness for Punching Shear	μ = 0.2		μ = 0.3		μ = 0.4		μ = 0.5	
				Single Shear	Double Shear	Single Shear	Double Shear	Single Shear	Double Shear	Single Shear	Double Shear
d	A_s	$F_{t,Rd}$	t_{min}								
mm	mm^2	kN	mm	kN	kN	kN	kN	kN	kN	kN	kN
12	84.3	34.0	2.27	7.55	15.1	11.3	22.7	15.1	30.2	18.9	37.8
16	157	63.3	3.41	14.1	28.1	21.1	42.2	28.1	56.3	35.2	70.3
20	245	98.8	4.50	22.0	43.9	32.9	65.9	43.9	87.8	54.9	110
24	353	142	5.02	31.6	63.3	47.4	94.9	63.3	127	79.1	158
30	561	226	6.51	50.3	101	75.4	151	101	201	126	251

Table 2.14.13.1. Bolt Resistances. Preloaded bolts at ultimate limit state.
Class 8.8 countersunk bolts in S355

Table 2.14.13.2

Diameter of Bolt	Minimum				Bearing Resistance (kN)										
	Edge Distance	End Distance	Pitch	Gauge											
d	e_2	e_1	p_1	p_2	Thickness in mm of ply,t										
mm	mm	mm	mm	mm	5	6	7	8	9	10	12	15	20	25	30
12	20	40	50	40	**17.8**	**26.7**	35.6	44.5	53.4	*62.3*	*80.1*	*107*	*151*	*196*	*240*
16	25	50	65	50	**11.7**	**23.4**	**35.1**	**46.8**	**58.5**	70.2	93.6	*129*	*187*	*246*	*304*
20	30	60	80	60	**0**	**14.5**	**29.0**	**43.4**	**57.9**	**72.4**	101	145	*217*	*290*	*362*
24	35	75	95	70	**0**	**0**	**17.2**	**34.5**	**51.7**	**68.9**	**103**	155	241	*327*	*414*
30	45	90	115	90	**0**	**0**	**0**	**10.9**	**32.6**	**54.3**	**97.7**	**163**	272	380	*489*

Table 2.14.13.1. Bolt Resistances. Preloaded bolts at ultimate limit state.
Class 8.8 countersunk bolts in S355

BS EN 1993-1-8: 2005
BS EN 14399: 2005
EN 1090: 2008

UK EUROCODES

BOLT RESISTANCES

PRELOADED BOLTS AT ULTIMATE LIMIT STATE

Class 10.9 countersunk bolts

S355

D-315

Table 2.14.13.3

Diameter of Bolt	Tensile Stress Area	Bolts in Tension		Slip Resistance							
		Tension Resistance	Min Thickness for Punching Shear	μ = 0.2		μ = 0.3		μ = 0.4		μ = 0.5	
				Single Shear	Double Shear	Single Shear	Double Shear	Single Shear	Double Shear	Single Shear	Double Shear
d	A_s	$F_{t,Rd}$	t_{min}								
mm	mm^2	kN	mm	kN	kN	kN	kN	kN	kN	kN	kN
16	157	79.1	4.27	17.6	35.2	26.4	52.8	35.2	70.3	44.0	87.9
20	245	123	5.62	27.4	54.9	41.2	82.3	54.9	110	68.6	137
24	353	178	6.28	39.5	79.1	59.3	119	79.1	158	98.8	198
30	561	283	8.14	62.8	126	94.2	188	126	251	157	314

Table 2.14.13.3. Bolt Resistances. Preloaded bolts at ultimate limit state.
Class 10.9 countersunk bolts in S355

Table 2.14.13.4

Diameter of Bolt	Minimum				Bearing Resistance (kN)										
	Edge Distance	End Distance	Pitch	Gauge											
d	e_2	e_1	p_1	p_2	Thickness in mm of ply,t										
mm	mm	mm	mm	mm	5	6	7	8	9	10	12	15	20	25	30
16	25	50	65	50	**11.7**	**23.4**	**35.1**	**46.8**	**58.5**	70.2	93.6	*129*	*187*	*246*	*304*
20	30	60	80	60	**0**	**14.5**	**29.0**	**43.4**	**57.9**	**72.4**	101	145	*217*	*290*	*362*
24	35	75	95	70	**0**	**0**	**17.2**	**34.5**	**51.7**	**68.9**	**103**	155	241	*327*	*414*
30	45	90	115	90	**0**	**0**	**0**	**10.9**	**32.6**	**54.3**	**97.7**	**163**	272	380	*489*

Table 2.14.13.3. Bolt Resistances. Preloaded bolts at ultimate limit state.
Class 10.9 countersunk bolts in S355

BS EN 1993-1-8: 2005
BS EN 14399: 2005
EN 1090: 2008

UK EUROCODES

BOLT RESISTANCES

PRELOADED BOLTS AT SERVICEABILITY LIMIT STATE

Class 8.8 hexagon head bolts

S275

C-308

Table 2.14.8.1

Diameter of Bolt	Tensile Stress Area	Tension Resistance	Shear Resistance		Bolts in Tension	Slip Resistance μ = 0.5	
			Single Shear	Double Shear	Min Thickness for Punching Shear	Single Shear	Double Shear
d	A_s	$F_{t,Rd}$	$F_{v,Rd}$	$2 \times F_{v,Rd}$	t_{min}		
mm	mm^2	kN	kN	kN	mm	kN	kN
12	84.3	48.6	27.5	55.0	3.71	21.5	42.9
16	157	90.4	60.3	121	5.59	40.0	79.9
20	245	141	94.1	188	7.36	62.4	125
24	353	203	136	271	8.22	89.9	180
30	561	323	215	431	10.7	143	286

Table 2.14.8.1. Bolt Resistances. Preloaded bolts at serviceability limit state. Class 8.8 hexagon head bolts in S275

Table 2.14.8.2

Diameter of Bolt	Minimum				Bearing Resistance (kN)										
	Edge Distance	End Distance	Pitch	Gauge											
d	e_2	e_1	p_1	p_2	Thickness in mm of ply,t										
mm	mm	mm	mm	mm	5	6	7	8	9	10	12	15	20	25	30
12	20	40	50	40	38.8	46.6	54.3	*62.1*	*69.8*	*77.6*	*93.1*	*116*	*155*	*194*	*233*
16	25	50	65	50	**51.1**	61.3	71.5	81.7	91.9	102	*123*	*153*	*204*	*255*	*306*
20	30	60	80	60	**63.2**	**75.8**	**88.4**	101	114	126	152	*189*	*253*	*316*	*379*
24	35	75	95	70	**75.2**	**90.2**	**105**	**120**	**135**	150	180	226	*301*	*376*	*451*
30	45	90	115	90	**94.7**	**114**	**133**	**152**	**171**	**189**	227	284	379	*474*	*568*

Table 2.14.8.1. Bolt Resistances. Preloaded bolts at serviceability limit state. Class 8.8 hexagon head bolts in S275

BS EN 1993-1-8: 2005
BS EN 14399: 2005
EN 1090: 2008

UK EUROCODES

BOLT RESISTANCES

PRELOADED BOLTS AT SERVICEABILITY LIMIT STATE

Class 10.9 hexagon head bolts

S275

C-309

Table 2.14.8.3

Diameter of Bolt	Tensile Stress Area	Tension Resistance	Shear Resistance		Bolts in Tension	Slip Resistance μ = 0.5	
			Single Shear	Double Shear	Min Thickness for Punching Shear	Single Shear	Double Shear
d	A_s	$F_{t,Rd}$	$F_{v,Rd}$	$2 \times F_{v,Rd}$	t_{min}		
mm	mm^2	kN	kN	kN	mm	kN	kN
16	157	113	62.8	126	6.99	50.0	99.9
20	245	176	98.0	196	9.20	78.0	156
24	353	254	141	282	10.3	112	225
30	561	404	224	449	13.3	179	357

Table 2.14.8.3. Bolt Resistances. Preloaded bolts at serviceability limit state. Class 10.9 hexagon head bolts in S275

Table 2.14.8.4

Diameter of Bolt	Minimum				Bearing Resistance (kN)										
	Edge Distance	End Distance	Pitch	Gauge											
d	e_2	e_1	p_1	p_2	Thickness in mm of ply,t										
mm	mm	mm	mm	mm	5	6	7	8	9	10	12	15	20	25	30
16	25	50	65	50	**51.1**	**61.3**	71.5	81.7	91.9	102	123	*153*	*204*	*255*	*306*
20	30	60	80	60	**63.2**	**75.8**	**88.4**	101	114	126	152	189	*253*	*316*	*379*
24	35	75	95	70	**75.2**	**90.2**	**105**	**120**	**135**	150	180	226	*301*	*376*	*451*
30	45	90	115	90	**94.7**	**114**	**133**	**152**	**171**	**189**	227	284	379	*474*	*568*

Table 2.14.8.3. Bolt Resistances. Preloaded bolts at serviceability limit state. Class 10.9 hexagon head bolts in S275

BS EN 1993-1-8: 2005
BS EN 14399: 2005
EN 1090: 2008

UK EUROCODES

BOLT RESISTANCES

PRELOADED BOLTS AT SERVICEABILITY LIMIT STATE

Class 8.8 hexagon head bolts

S355

D-308

Table 2.14.7.1

Diameter of Bolt	Tensile Stress Area	Tension Resistance	Shear Resistance		Bolts in Tension	Slip Resistance μ = 0.5	
			Single Shear	Double Shear	Min Thickness for Punching Shear	Single Shear	Double Shear
d	A_s	$F_{t,Rd}$	$F_{v,Rd}$	$2 \times F_{v,Rd}$	t_{min}		
mm	mm^2	kN	kN	kN	mm	kN	kN
12	84.3	48.6	27.5	55.0	3.24	21.5	42.9
16	157	90.4	60.3	121	4.88	40.0	79.9
20	245	141	94.1	188	6.42	62.4	125
24	353	203	136	271	7.17	89.9	180
30	561	323	215	431	9.30	143	286

Table 2.14.7.1. Bolt Resistances. Preloaded bolts at serviceability limit state.
Class 8.8 hexagon head bolts in S355

Table 2.14.7.2

Diameter of Bolt	Minimum				Bearing Resistance (kN)										
	Edge Distance	End Distance	Pitch	Gauge											
d	e_2	e_1	p_1	p_2	Thickness in mm of ply,t										
mm	mm	mm	mm	mm	5	6	7	8	9	10	12	15	20	25	30
12	20	40	50	40	44.5	53.4	*62.3*	*71.2*	*80.1*	*89.0*	*107*	*133*	*178*	*222*	*267*
16	25	50	65	50	**58.5**	70.2	81.9	93.6	105	117	*140*	*176*	*234*	*293*	*351*
20	30	60	80	60	**72.4**	**86.9**	101	116	130	145	174	*217*	*290*	*362*	*434*
24	35	75	95	70	**86.2**	**103**	**121**	138	155	172	207	259	*345*	*431*	*517*
30	45	90	115	90	**109**	**130**	**152**	**174**	**195**	217	261	326	*434*	*543*	*652*

Table 2.14.7.1. Bolt Resistances. Preloaded bolts at serviceability limit state.
Class 8.8 hexagon head bolts in S355

BS EN 1993-1-8: 2005
BS EN 14399: 2005
EN 1090: 2008

UK EUROCODES

BOLT RESISTANCES

PRELOADED BOLTS AT SERVICEABILITY LIMIT STATE

Class 10.9 hexagon head bolts

S355

D-309

Table 2.14.7.3

Diameter of Bolt	Tensile Stress Area	Tension Resistance	Shear Resistance		Bolts in Tension	Slip Resistance μ = 0.5	
			Single Shear	Double Shear	Min Thickness for Punching Shear	Single Shear	Double Shear
d	A_s	$F_{t,Rd}$	$F_{v,Rd}$	$2 \times F_{v,Rd}$	t_{min}		
mm	mm^2	kN	kN	kN	mm	kN	kN
16	157	113	62.8	126	6.10	50.0	99.9
20	245	176	98.0	196	8.03	78.0	156
24	353	254	141	282	8.97	112	225
30	561	404	224	449	11.6	179	357

Table 2.14.7.3. Bolt Resistances. Preloaded bolts at serviceability limit state. Class 10.9 hexagon head bolts in S355

Table 2.14.7.4

Diameter of Bolt	Minimum				Bearing Resistance (kN)										
	Edge Distance	End Distance	Pitch	Gauge											
d	e_2	e_1	p_1	p_2	Thickness in mm of ply,t										
mm	mm	mm	mm	mm	5	6	7	8	9	10	12	15	20	25	30
16	25	50	65	50	**58.5**	70.2	81.9	93.6	105	117	*140*	*176*	*234*	*293*	*351*
20	30	60	80	60	**72.4**	**86.9**	101	116	130	145	174	*217*	*290*	*362*	*434*
24	35	75	95	70	**86.2**	**103**	**121**	**138**	155	172	207	259	*345*	*431*	*517*
30	45	90	115	90	**109**	**130**	**152**	**174**	**195**	**217**	261	326	434	*543*	*652*

Table 2.14.7.3. Bolt Resistances. Preloaded bolts at serviceability limit state. Class 10.9 hexagon head bolts in S355

BS EN 1993-1-8: 2005
BS EN 14399: 2005
EN 1090: 2008

UK EUROCODES

BOLT RESISTANCES

PRELOADED BOLTS AT ULTIMATE LIMIT STATE

Class 8.8 hexagon head bolts

S275

C-310

Table 2.14.10.1

Diameter of Bolt	Tensile Stress Area	Bolts in Tension		Slip Resistance							
		Tension Resistance	Min Thickness for Punching Shear	μ = 0.2		μ = 0.3		μ = 0.4		μ = 0.5	
				Single Shear	Double Shear	Single Shear	Double Shear	Single Shear	Double Shear	Single Shear	Double Shear
	A_s	$F_{t,Rd}$	t_{min}								
mm	mm^2	kN	mm	kN	kN	kN	kN	kN	kN	kN	kN
12	84.3	48.6	3.71	7.55	15.1	11.3	22.7	15.1	30.2	18.9	37.8
16	157	90.4	5.59	14.1	28.1	21.1	42.2	28.1	56.3	35.2	70.3
20	245	141	7.36	22.0	43.9	32.9	65.9	43.9	87.8	54.9	110
24	353	203	8.22	31.6	63.3	47.4	94.9	63.3	127	79.1	158
30	561	323	10.7	50.3	101	75.4	151	101	201	126	251

Table 2.14.10.1. Bolt Resistances. Preloaded bolts at ultimate limit state.
Class 8.8 hexagon head bolts in S275

Table 2.14.10.2

Diameter of Bolt	Minimum				Bearing Resistance (kN)										
	Edge Distance	End Distance	Pitch	Gauge											
d	e_2	e_1	p_1	p_2	Thickness in mm of ply,t										
mm	mm	mm	mm	mm	5	6	7	8	9	10	12	15	20	25	30
12	20	40	50	40	38.8	46.6	54.3	*62.1*	*69.8*	*77.6*	*93.1*	*116*	*155*	*194*	*233*
16	25	50	65	50	**51.1**	61.3	71.5	81.7	91.9	102	*123*	*153*	*204*	*255*	*306*
20	30	60	80	60	**63.2**	**75.8**	**88.4**	101	114	126	152	*189*	*253*	*316*	*379*
24	35	75	95	70	**75.2**	**90.2**	**105**	**120**	**135**	150	180	226	*301*	*376*	*451*
30	45	90	115	90	**94.7**	**114**	**133**	**152**	**171**	**189**	227	284	379	*474*	*568*

Table 2.14.10.1. Bolt Resistances. Preloaded bolts at ultimate limit state.
Class 8.8 hexagon head bolts in S275

BS EN 1993-1-8: 2005
BS EN 14399: 2005
EN 1090: 2008

UK EUROCODES

BOLT RESISTANCES

PRELOADED BOLTS AT ULTIMATE LIMIT STATE

Class 10.9 hexagon head bolts

S275

C-311

Table 2.14.10.3

Diameter of Bolt	Tensile Stress Area	Bolts in Tension		Slip Resistance							
		Tension Resistance	Min Thickness for Punching Shear	μ = 0.2		μ = 0.3		μ = 0.4		μ = 0.5	
				Single Shear	Double Shear	Single Shear	Double Shear	Single Shear	Double Shear	Single Shear	Double Shear
	A_s	$F_{t,Rd}$	t_{min}								
mm	mm^2	kN	mm	kN	kN	kN	kN	kN	kN	kN	kN
16	157	113	6.99	17.6	35.2	26.4	52.8	35.2	70.3	44.0	87.9
20	245	176	9.20	27.4	54.9	41.2	82.3	54.9	110	68.6	137
24	353	254	10.3	39.5	79.1	59.3	119	79.1	158	98.8	198
30	561	404	13.3	62.8	126	94.2	188	126	251	157	314

Table 2.14.10.3. Bolt Resistances. Preloaded bolts at ultimate limit state.
Class 10.9 hexagon head bolts in S275

Table 2.14.10.4

Diameter of Bolt	Minimum				Bearing Resistance (kN)										
	Edge Distance	End Distance	Pitch	Gauge											
d	e_2	e_1	p_1	p_2	Thickness in mm of ply,t										
mm	mm	mm	mm	mm	5	6	7	8	9	10	12	15	20	25	30
16	25	50	65	50	**51.1**	**61.3**	71.5	81.7	91.9	102	123	*153*	*204*	*255*	*306*
20	30	60	80	60	**63.2**	**75.8**	**88.4**	101	114	126	152	189	*253*	*316*	*379*
24	35	75	95	70	**75.2**	**90.2**	**105**	**120**	**135**	150	180	226	*301*	*376*	*451*
30	45	90	115	90	**94.7**	**114**	**133**	**152**	**171**	**189**	227	284	379	*474*	*568*

Table 2.14.10.3. Bolt Resistances. Preloaded bolts at ultimate limit state.
Class 10.9 hexagon head bolts in S275

BS EN 1993-1-8: 2005
BS EN 14399: 2005
EN 1090: 2008

UK EUROCODES

BOLT RESISTANCES

PRELOADED BOLTS AT ULTIMATE LIMIT STATE

Class 8.8 hexagon head bolts

S355

D-310

Table 2.14.9.1

Diameter of Bolt	Tensile Stress Area	Bolts in Tension		Slip Resistance							
		Tension Resistance	Min Thickness for Punching Shear	μ = 0.2		μ = 0.3		μ = 0.4		μ = 0.5	
				Single Shear	Double Shear	Single Shear	Double Shear	Single Shear	Double Shear	Single Shear	Double Shear
	A_s	$F_{t,Rd}$	t_{min}								
mm	mm^2	kN	mm	kN	kN	kN	kN	kN	kN	kN	kN
12	84.3	48.6	3.24	7.55	15.1	11.3	22.7	15.1	30.2	18.9	37.8
16	157	90.4	4.88	14.1	28.1	21.1	42.2	28.1	56.3	35.2	70.3
20	245	141	6.42	22.0	43.9	32.9	65.9	43.9	87.8	54.9	110
24	353	203	7.17	31.6	63.3	47.4	94.9	63.3	127	79.1	158
30	561	323	9.30	50.3	101	75.4	151	101	201	126	251

Table 2.14.9.1. Bolt Resistances. Preloaded bolts at ultimate limit state.
Class 8.8 hexagon head bolts in S355

Table 2.14.9.2

Diameter of Bolt	Minimum				Bearing Resistance (kN)										
	Edge Distance	End Distance	Pitch	Gauge											
d	e_2	e_1	p_1	p_2	Thickness in mm of ply,t										
mm	mm	mm	mm	mm	5	6	7	8	9	10	12	15	20	25	30
12	20	40	50	40	44.5	53.4	*62.3*	*71.2*	*80.1*	*89.0*	*107*	*133*	*178*	*222*	*267*
16	25	50	65	50	**58.5**	70.2	81.9	93.6	105	117	*140*	*176*	*234*	*293*	*351*
20	30	60	80	60	**72.4**	**86.9**	101	116	130	145	174	*217*	*290*	*362*	*434*
24	35	75	95	70	**86.2**	**103**	**121**	138	155	172	207	259	*345*	*431*	*517*
30	45	90	115	90	**109**	**130**	**152**	**174**	**195**	217	261	326	*434*	*543*	*652*

Table 2.14.9.1. Bolt Resistances. Preloaded bolts at ultimate limit state.
Class 8.8 hexagon head bolts in S355

BS EN 1993-1-8: 2005
BS EN 14399: 2005
EN 1090: 2008

UK EUROCODES

BOLT RESISTANCES

PRELOADED BOLTS AT ULTIMATE LIMIT STATE

Class 10.9 hexagon head bolts

S355

D-311

Table 2.14.9.3

Diameter of Bolt	Tensile Stress Area	Bolts in Tension		Slip Resistance							
		Tension Resistance	Min Thickness for Punching Shear	μ = 0.2		μ = 0.3		μ = 0.4		μ = 0.5	
				Single Shear	Double Shear	Single Shear	Double Shear	Single Shear	Double Shear	Single Shear	Double Shear
	A_s	$F_{t,Rd}$	t_{min}								
mm	mm^2	kN	mm	kN	kN	kN	kN	kN	kN	kN	kN
16	157	113	6.10	17.6	35.2	26.4	52.8	35.2	70.3	44.0	87.9
20	245	176	8.03	27.4	54.9	41.2	82.3	54.9	110	68.6	137
24	353	254	8.97	39.5	79.1	59.3	119	79.1	158	98.8	198
30	561	404	11.6	62.8	126	94.2	188	126	251	157	314

Table 2.14.9.3. Bolt Resistances. Preloaded bolts at ultimate limit state.
Class 10.9 hexagon head bolts in S355

Table 2.14.9.4

Diameter of Bolt	Minimum				Bearing Resistance (kN)										
	Edge Distance	End Distance	Pitch	Gauge											
d	e_2	e_1	p_1	p_2	Thickness in mm of ply,t										
mm	mm	mm	mm	mm	5	6	7	8	9	10	12	15	20	25	30
16	25	50	65	50	**58.5**	70.2	81.9	93.6	105	117	*140*	*176*	*234*	*293*	*351*
20	30	60	80	60	**72.4**	**86.9**	101	116	130	145	174	*217*	*290*	*362*	*434*
24	35	75	95	70	**86.2**	**103**	**121**	**138**	155	172	207	259	*345*	*431*	*517*
30	45	90	115	90	**109**	**130**	**152**	**174**	**195**	**217**	261	326	434	*543*	*652*

Table 2.14.9.3. Bolt Resistances. Preloaded bolts at ultimate limit state.
Class 10.9 hexagon head bolts in S355

BS EN 1993-1-8

UK EUROCODES

FILLET WELDS

DESIGN WELD RESISTANCES

S275

C-316

Table 2.14.16.1

Leg Length s mm	Throat Thickness a mm	Longitudinal Resistance $F_{w,L,Rd}$ kN/mm	Transverse Resistance $F_{w,T,Rd}$ kN/mm
3.0	2.1	0.47	0.57
4.0	2.8	0.62	0.76
5.0	3.5	0.78	0.96
6.0	4.2	0.94	1.15
8.0	5.6	1.25	1.53
10.0	7.0	1.56	1.91
12.0	8.4	1.87	2.29
15.0	10.5	2.34	2.87
18.0	12.6	2.81	3.44
20.0	14.0	3.12	3.82
22.0	15.4	3.43	4.20
25.0	17.5	3.90	4.78

Table 2.14.16.1. Fillet Welds. Design weld resistances. S275

BS EN 1993-1-8

UK EUROCODES

FILLET WELDS

DESIGN WELD RESISTANCES

S355

D-316

Table 2.14.15.1

Leg Length s mm	Throat Thickness a mm	Longitudinal Resistance $F_{w,L,Rd}$ kN/mm	Transverse Resistance $F_{w,T,Rd}$ kN/mm
3.0	2.1	0.51	0.62
4.0	2.8	0.68	0.83
5.0	3.5	0.84	1.03
6.0	4.2	1.01	1.24
8.0	5.6	1.35	1.65
10.0	7.0	1.69	2.07
12.0	8.4	2.03	2.48
15.0	10.5	2.53	3.10
18.0	12.6	3.04	3.72
20.0	14.0	3.38	4.14
22.0	15.4	3.71	4.55
25.0	17.5	4.22	5.17

Table 2.14.15.1. Fillet Welds. Design weld resistances. S355

Poutrelles I européennes

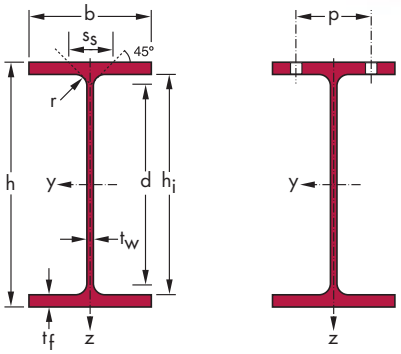
Dimensions: IPE 80 - 600 conformes à l'Euronorme 19-57; IPE A 80 - 600; IPE O 180 - 600; IPE 750
Tolérances: EN 10034: 1993
Etat de surface conforme à EN 10163-3: 1991, classe C, sous-classe 1

European I beams

Dimensions: IPE 80 - 600 in accordance with Euronorm 19-57; IPE A 80 - 600; IPE O 180 - 600; IPE 750
Tolerances: EN 10034: 1993
Surface condition according to EN 10163-3:1991, class C, subclass 1

Europäische I-Profile

Abmessungen: IPE 80 - 600 gemäß Euronorm 19-57; IPE A 80 - 600; IPE O 180 - 600; IPE 750
Toleranzen: EN 10034: 1993
Oberflächenbeschaffenheit gemäß EN 10163-3: 1991, Klasse C, Untergruppe 1



Désignation Designation Bezeichnung		Dimensions Abmessungen						Dimensions de construction Dimensions for detailing Konstruktionsmaße					Surface Oberfläche	
	G kg/m	h mm	b mm	t_w mm	t_f mm	r mm	A mm^2	h_i mm	d mm	Ø	p_{min} mm	p_{max} mm	A_L m^2/m	A_G m^2/t
							x 10^2							
IPE 80 A•/*	5,0	78	46	3,3	4,2	5	6,38	69,6	59,6	-	-	-	0,325	64,90
IPE 80*	6,0	80	46	3,8	5,2	5	7,64	69,6	59,6	-	-	-	0,328	54,64
IPE A 100•/*	6,9	98	55	3,6	4,7	7	8,78	88,6	74,6	-	-	-	0,397	57,57
IPE 100*	8,1	100	55	4,1	5,7	7	10,3	88,6	74,6	-	-	-	0,400	49,33
IPE A 120•	8,7	117,6	64	3,8	5,1	7	11,0	107,4	93,4	-	-	-	0,472	54,47
IPE 120	10,4	120	64	4,4	6,3	7	13,2	107,4	93,4	-	-	-	0,475	45,82
IPE A 140•	10,5	137,4	73	3,8	5,6	7	13,4	126,2	112,2	-	-	-	0,547	52,05
IPE 140	12,9	140	73	4,7	6,9	7	16,4	126,2	112,2	-	-	-	0,551	42,70
IPE A 160•	12,7	157	82	4	5,9	9	16,2	145,2	127,2	-	-	-	0,619	48,70
IPE 160	15,8	160	82	5	7,4	9	20,1	145,2	127,2	-	-	-	0,623	39,47
IPE A 180•	15,4	177	91	4,3	6,5	9	19,6	164	146	M 10	48	48	0,694	45,15
IPE 180	18,8	180	91	5,3	8	9	23,9	164	146	M 10	48	48	0,698	37,13
IPE O 180+	21,3	182	92	6	9	9	27,1	164	146	M 10	50	50	0,705	33,12
IPE A 200•	18,4	197	100	4,5	7	12	23,5	183	159	M 10	54	58	0,764	41,49
IPE 200	22,4	200	100	5,6	8,5	12	28,5	183	159	M 10	54	58	0,768	34,36
IPE O 200+	25,1	202	102	6,2	9,5	12	32,0	183	159	M 10	56	60	0,779	31,05
IPE A 220•	22,2	217	110	5	7,7	12	28,3	201,6	177,6	M 12	60	62	0,843	38,02
IPE 220	26,2	220	110	5,9	9,2	12	33,4	201,6	177,6	M 12	60	62	0,848	32,36
IPE O 220+	29,4	222	112	6,6	10,2	12	37,4	201,6	177,6	M 10	58	66	0,858	29,24

• Commande minimale: pour S 235 JR, cf. conditions de livraison page 216; pour toute autre qualité 40 t ou suivant accord.
+ Commande minimale: 40 t par profilé et qualité ou suivant accord.
* Tonnage minimum et conditions de livraison nécessitent un accord préalable.

• Minimum order: for the S 235 JR grade cf. delivery conditions page 216; for any other grade 40 t or upon agreement.
+ Minimum order: 40 t per section and grade or upon agreement.
* Minimum tonnage and delivery conditions upon agreement.

• Mindestbestellmenge: für S 235 JR gemäß Lieferbedingungen Seite 216; für jede andere Güte 40 t oder nach Vereinbarung.
+ Mindestbestellmenge: 40 t pro Profil und Güte oder nach Vereinbarung.
* Die Mindestmengen pro Bestellung sowie die Lieferbedingungen sind im Voraus zu vereinbaren.

IPE

Notations pages 211-215 / Bezeichnungen Seiten 211-215

Désignation Designation Bezeichnung	G kg/m	Valeurs statiques / Section properties / Statische Kennwerte axe fort y-y strong axis y-y starke Achse y-y I_y mm⁴	$W_{el.y}$ mm³	$W_{pl.y}$♦ mm³	i_y mm	A_{vz} mm²	axe faible z-z weak axis z-z schwache Achse z-z I_z mm⁴	$W_{el.z}$ mm³	$W_{pl.z}$♦ mm³	i_z mm	s_s mm	I_t mm⁴	I_w mm⁶	Classification ENV 1993-1-1 pure bending y-y S 235	S 355	S 460	pure compression S 235	S 355	S 460	EN 10025:1993	EN 10113-3:1993	EN 10225:2001
		x 10^4	x 10^3	x 10^3	x 10	x 10^2	x 10^4	x 10^3	x 10^3	x 10		x 10^4	x 10^9									
IPE 80 A	5,0	64,38	16,51	18,98	3,18	3,07	6,85	2,98	4,69	1,04	17,60	0,42	0,09	1	1	-	1	1	-	✔		
IPE 80	6,0	80,14	20,03	23,22	3,24	3,58	8,49	3,69	5,82	1,05	20,10	0,70	0,12	1	1	-	1	1	-	✔		
IPE A 100	6,9	141,2	28,81	32,98	4,01	4,44	13,12	4,77	7,54	1,22	21,20	0,77	0,28	1	1	-	1	1	-	✔		
IPE 100	8,1	171,0	34,20	39,41	4,07	5,08	15,92	5,79	9,15	1,24	23,70	1,20	0,35	1	1	-	1	1	-	✔		
IPE A 120	8,7	257,4	43,77	49,87	4,83	5,41	22,39	7,00	10,98	1,42	22,20	1,04	0,71	1	1	-	1	1	-	✔		
IPE 120	10,4	317,8	52,96	60,73	4,90	6,31	27,67	8,65	13,58	1,45	25,20	1,74	0,89	1	1	-	1	1	-	✔	✔	✔
IPE A 140	10,5	434,9	63,30	71,60	5,70	6,21	36,42	9,98	15,52	1,65	23,20	1,36	1,58	1	1	-	1	2	-	✔	✔	✔
IPE 140	12,9	541,2	77,32	88,34	5,74	7,64	44,92	12,31	19,25	1,65	26,70	2,45	1,98	1	1	-	1	1	-	✔	✔	✔
IPE A 160	12,7	689,3	87,81	99,09	6,53	7,80	54,43	13,27	20,70	1,83	26,34	1,96	3,09	1	1	-	1	3	-	✔	✔	✔
IPE 160	15,8	869,3	108,7	123,9	6,58	9,66	68,31	16,66	26,10	1,84	30,34	3,60	3,96	1	1	-	1	1	-	✔	✔	✔
IPE A 180	15,4	1063	120,1	135,3	7,37	9,20	81,89	18,00	27,96	2,05	27,84	2,70	5,93	1	1	-	2	3	-	✔	✔	✔
IPE 180	18,8	1317	146,3	166,4	7,42	11,25	100,9	22,16	34,60	2,05	31,84	4,79	7,43	1	1	-	1	2	-	✔	✔	✔
IPE O 180	21,3	1505	165,4	189,1	7,45	12,70	117,3	25,50	39,91	2,08	34,54	6,76	8,74	1	1	-	1	1	-	✔	✔	✔
IPE A 200	18,4	1591	161,6	181,7	8,23	11,47	117,2	23,43	36,54	2,23	32,56	4,11	10,53	1	1	-	2	4	-	✔	✔	✔
IPE 200	22,4	1943	194,3	220,6	8,26	14,00	142,4	28,47	44,61	2,24	36,66	6,98	12,99	1	1	-	1	2	-	✔	✔	✔
IPE O 200	25,1	2211	218,9	249,4	8,32	15,45	168,9	33,11	51,89	2,30	39,26	9,45	15,57	1	1	-	1	1	-	✔	✔	✔
IPE A 220	22,2	2317	213,5	240,2	9,05	13,55	171,4	31,17	48,49	2,46	34,46	5,69	18,71	1	1	-	2	4	-	✔	✔	✔
IPE 220	26,2	2772	252,0	285,4	9,11	15,88	204,9	37,25	58,11	2,48	38,36	9,07	22,67	1	1	-	1	2	-	✔	✔	✔
IPE O 220	29,4	3134	282,3	321,1	9,16	17,66	239,8	42,83	66,91	2,53	41,06	12,27	26,79	1	1	-	1	2	-	✔	✔	✔

♦ W_{pl}: Pour un dimensionnement plastique, la section doit appartenir à la classe 1 ou 2 suivant la capacité de rotation requise. Voir page 215.

♦ W_{pl}: For plastic design, the shape must belong to class 1 or 2 according to the required rotation capacity. See page 215.

♦ W_{pl}: Bei einer plastischen Bemessung muss das Profil der Klasse 1 oder 2, entsprechend der erforderlichen Rotationskapazität, angehören. Siehe Seite 215.

Poutrelles I européennes (suite)

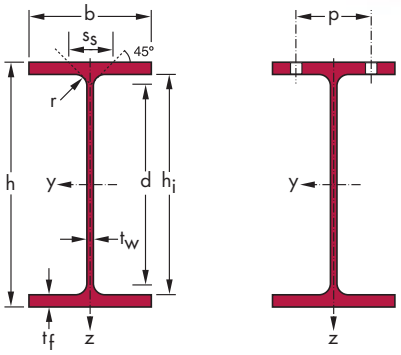
Dimensions: IPE 80 - 600 conformes à l'Euronorme 19-57; IPE A 80 - 600; IPE O 180 - 600; IPE 750
Tolérances: EN 10034: 1993
Etat de surface conforme à EN 10163-3: 1991, classe C, sous-classe 1

European I beams (continued)

Dimensions: IPE 80 - 600 in accordance with Euronorm 19-57; IPE A 80 - 600; IPE O 180 - 600; IPE 750
Tolerances: EN 10034: 1993
Surface condition according to EN 10163-3:1991, class C, subclass 1

Europäische I-Profile (Fortsetzung)

Abmessungen: IPE 80 - 600 gemäß Euronorm 19-57; IPE A 80 - 600; IPE O 180 - 600; IPE 750
Toleranzen: EN 10034: 1993
Oberflächenbeschaffenheit gemäß EN 10163-3: 1991, Klasse C, Untergruppe 1



Désignation Designation Bezeichnung		Dimensions Abmessungen						Dimensions de construction Dimensions for detailing Konstruktionsmaße					Surface Oberfläche	
	G kg/m	h mm	b mm	t_w mm	t_f mm	r mm	A mm^2	h_i mm	d mm	Ø	p_{min} mm	p_{max} mm	A_L m^2/m	A_G m^2/t
							x 10^2							
IPE A 240•	26,2	237	120	5,2	8,3	15	33,3	220,4	190,4	M 12	64	68	0,918	35,10
IPE 240	30,7	240	120	6,2	9,8	15	39,1	220,4	190,4	M 12	66	68	0,922	30,02
IPE O 240+	34,3	242	122	7	10,8	15	43,7	220,4	190,4	M 12	66	70	0,932	27,17
IPE A 270•	30,7	267	135	5,5	8,7	15	39,2	249,6	219,6	M 16	70	72	1,037	33,75
IPE 270	36,1	270	135	6,6	10,2	15	45,9	249,6	219,6	M 16	72	72	1,041	28,86
IPE O 270+	42,3	274	136	7,5	12,2	15	53,8	249,6	219,6	M 16	72	72	1,051	24,88
IPE A 300•	36,5	297	150	6,1	9,2	15	46,5	278,6	248,6	M 16	72	86	1,156	31,65
IPE 300	42,2	300	150	7,1	10,7	15	53,8	278,6	248,6	M 16	72	86	1,160	27,46
IPE O 300+	49,3	304	152	8	12,7	15	62,8	278,6	248,6	M 16	74	88	1,174	23,81
IPE A 330•	43,0	327	160	6,5	10	18	54,7	307	271	M 16	78	96	1,250	29,09
IPE 330	49,1	330	160	7,5	11,5	18	62,6	307	271	M 16	78	96	1,254	25,52
IPE O 330+	57,0	334	162	8,5	13,5	18	72,6	307	271	M 16	80	98	1,268	22,24
IPE A 360•	50,2	357,6	170	6,6	11,5	18	64,0	334,6	298,6	M 22	86	88	1,351	26,91
IPE 360	57,1	360	170	8	12,7	18	72,7	334,6	298,6	M 22	88	88	1,353	23,70
IPE O 360+	66,0	364	172	9,2	14,7	18	84,1	334,6	298,6	M 22	90	90	1,367	20,69
IPE A 400•	57,4	397	180	7	12	21	73,1	373	331	M 22	94	98	1,464	25,51
IPE 400	66,3	400	180	8,6	13,5	21	84,5	373	331	M 22	96	98	1,467	22,12
IPE O 400+	75,7	404	182	9,7	15,5	21	96,4	373	331	M 22	96	100	1,481	19,57
IPE A 450•	67,2	447	190	7,6	13,1	21	85,6	420,8	378,8	M 24	100	102	1,603	23,87
IPE 450	77,6	450	190	9,4	14,6	21	98,8	420,8	378,8	M 24	100	102	1,605	20,69
IPE O 450+	92,4	456	192	11	17,6	21	118	420,8	378,8	M 24	102	104	1,622	17,56

- Commande minimale: pour S 235 JR, cf. conditions de livraison page 216; pour toute autre qualité 40 t ou suivant accord.
+ Commande minimale: 40 t par profilé et qualité ou suivant accord.

- Minimum order: for the S 235 JR grade cf. delivery conditions page 216; for any other grade 40 t or upon agreement.
+ Minimum order: 40 t per section and grade or upon agreement.

- Mindestbestellmenge: für S 235 JR gemäß Lieferbedingungen Seite 216; für jede andere Güte 40 t oder nach Vereinbarung.
+ Mindestbestellmenge: 40 t pro Profil und Güte oder nach Vereinbarung.

IPE

Notations pages 211-215 / Bezeichnungen Seiten 211-215

Désignation Designation Bezeichnung	Valeurs statiques / Section properties / Statische Kennwerte												Classification ENV 1993-1-1						EN 10025:1993	EN 10113-3:1993	EN 10225:2001
	axe fort y-y strong axis y-y starke Achse y-y					axe faible z-z weak axis z-z schwache Achse z-z							pure bending y-y			pure compression					
G kg/m	I_y mm^4	$W_{el.y}$ mm^3	$W_{pl.y}$♦ mm^3	i_y mm	A_{vz} mm^2	I_z mm^4	$W_{el.z}$ mm^3	$W_{pl.z}$♦ mm^3	i_z mm	s_s mm	I_t mm^4	I_w mm^6	S 235	S 355	S 460	S 235	S 355	S 460			
	x 10^4	x 10^3	x 10^3	x 10	x 10^2	x 10^4	x 10^3	x 10^3	x 10		x 10^4	x 10^9									
IPE A 240 26,2	3290	277,7	311,6	9,94	16,31	240,1	40,02	62,40	2,68	39,37	8,35	31,26	1	1	-	2	4	-	✔	✔	✔
IPE 240 30,7	3892	324,3	366,6	9,97	19,14	283,6	47,27	73,92	2,69	43,37	12,88	37,39	1	1	-	1	2	-	✔	✔	✔
IPE O 240 34,3	4369	361,1	410,3	10,00	21,36	328,5	53,86	84,40	2,74	46,17	17,18	43,68	1	1	-	1	2	-	✔	✔	✔
IPE A 270 30,7	4917	368,3	412,5	11,21	18,75	358,0	53,03	82,34	3,02	40,47	10,30	59,51	1	1	-	3	4	-	✔	✔	✔
IPE 270 36,1	5790	428,9	484,0	11,23	22,14	419,9	62,20	96,95	3,02	44,57	15,94	70,58	1	1	-	2	3	-	✔	✔	✔
IPE O 270 42,3	6947	507,1	574,6	11,36	25,23	513,5	75,51	117,7	3,09	49,47	24,90	87,64	1	1	-	1	2	-	✔	✔	✔
IPE A 300 36,5	7173	483,1	541,8	12,42	22,25	519,0	69,20	107,3	3,34	42,07	13,43	107,2	1	2	-	3	4	-	✔	✔	✔
IPE 300 42,2	8356	557,1	628,4	12,46	25,68	603,8	80,50	125,2	3,35	46,07	20,12	125,9	1	1	-	2	4	-	✔	✔	✔
IPE O 300 49,3	9994	657,5	743,8	12,61	29,05	745,7	98,12	152,6	3,45	50,97	31,06	157,7	1	1	-	1	3	-	✔	✔	✔
IPE A 330 43,0	10230	625,7	701,9	13,67	26,99	685,2	85,64	133,3	3,54	47,59	19,57	171,5	1	1	-	3	4	-	✔	✔	✔
IPE 330 49,1	11770	713,1	804,3	13,71	30,81	788,1	98,52	153,7	3,55	51,59	28,15	199,1	1	1	-	2	4	-	✔	✔	✔
IPE O 330 57,0	13910	833,0	942,8	13,84	34,88	960,4	118,6	185,0	3,64	56,59	42,15	245,7	1	1	-	1	3	-	✔	✔	✔
IPE A 360 50,2	14520	811,8	906,8	15,06	29,76	944,3	111,1	171,9	3,84	50,69	26,51	282,0	1	1	-	4	4	-	✔	✔	✔
IPE 360 57,1	16270	903,6	1019	14,95	35,14	1043	122,8	191,1	3,79	54,49	37,32	313,6	1	1	-	2	4	-	✔	✔	✔
IPE O 360 66,0	19050	1047	1186	15,05	40,21	1251	145,5	226,9	3,86	59,69	55,76	380,3	1	1	-	1	3	-	✔	✔	✔
IPE A 400 57,4	20290	1022	1144	16,66	35,78	1171	130,1	202,1	4,00	55,60	34,79	432,2	1	1	-	4	4	-	✔	✔	✔
IPE 400 66,3	23130	1156	1307	16,55	42,69	1318	146,4	229,0	3,95	60,20	51,08	490,0	1	1	-	3	4	-	✔	✔	✔
IPE O 400 75,7	26750	1324	1502	16,66	47,98	1564	171,9	269,1	4,03	65,30	73,10	587,6	1	1	-	2	3	-	✔	✔	✔
IPE A 450 67,2	29760	1331	1494	18,65	42,26	1502	158,1	245,7	4,19	58,40	45,67	704,9	1	1	-	4	4	-	✔	✔	✔
IPE 450 77,6	33740	1500	1702	18,48	50,85	1676	176,4	276,4	4,12	63,20	66,87	791,0	1	1	-	3	4	-	✔	✔	✔
IPE O 450 92,4	40920	1795	2046	18,65	59,40	2085	217,2	341,0	4,21	70,80	109	997,6	1	1	-	2	4	-	✔	✔	✔

♦ W_{pl}: Pour un dimensionnement plastique, la section doit appartenir à la classe 1 ou 2 suivant la capacité de rotation requise. Voir page 215.

♦ W_{pl}: For plastic design, the shape must belong to class 1 or 2 according to the required rotation capacity. See page 215.

♦ W_{pl}: Bei einer plastischen Bemessung muss das Profil der Klasse 1 oder 2, entsprechend der erforderlichen Rotationskapazität, angehören. Siehe Seite 215.

Poutrelles I européennes (suite)

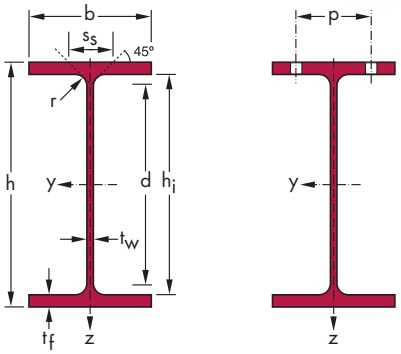
Dimensions: IPE 80 - 600 conformes à l'Euronorme 19-57; IPE A 80 - 600; IPE O 180 - 600; IPE 750
Tolérances: EN 10034: 1993
Etat de surface conforme à EN 10163-3: 1991, classe C, sous-classe 1

European I beams (continued)

Dimensions: IPE 80 - 600 in accordance with Euronorm 19-57; IPE A 80 - 600; IPE O 180 - 600; IPE 750
Tolerances: EN 10034: 1993
Surface condition according to EN 10163-3:1991, class C, subclass 1

Europäische I-Profile (Fortsetzung)

Abmessungen: IPE 80 - 600 gemäß Euronorm 19-57; IPE A 80 - 600; IPE O 180 - 600; IPE 750
Toleranzen: EN 10034: 1993
Oberflächenbeschaffenheit gemäß EN 10163-3: 1991, Klasse C, Untergruppe 1



Désignation Designation Bezeichnung		Dimensions Abmessungen						Dimensions de construction Dimensions for detailing Konstruktionsmaße					Surface Oberfläche	
	G kg/m	h mm	b mm	t_w mm	t_f mm	r mm	A mm²	h_i mm	d mm	Ø	p_{min} mm	p_{max} mm	A_L m²/m	A_G m²/t
							x 10²							
IPE A 500•	79,4	497	200	8,4	14,5	21	101	468	426	M 24	100	112	1,741	21,94
IPE 500	90,7	500	200	10,2	16	21	116	468	426	M 24	102	112	1,744	19,23
IPE O 500+	107	506	202	12	19	21	137	468	426	M 24	104	114	1,760	16,40
IPE A 550•	92,1	547	210	9	15,7	24	117	515,6	467,6	M 24	106	122	1,875	20,36
IPE 550	106	550	210	11,1	17,2	24	134	515,6	467,6	M 24	110	122	1,877	17,78
IPE O 550+	123	556	212	12,7	20,2	24	156	515,6	467,6	M 24	110	122	1,893	15,45
IPE A 600•	108	597	220	9,8	17,5	24	137	562	514	M 27	114	118	2,013	18,72
IPE 600	122	600	220	12	19	24	156	562	514	M 27	116	118	2,015	16,45
IPE O 600+	154	610	224	15	24	24	197	562	514	M 27	118	122	2,045	13,24
IPE 750 x 137*	137	753	263	11,5	17	17	175	719	685	M 27	102	162	2,506	18,28
IPE 750 x 147	147	753	265	13,2	17	17	188	719	685	M 27	104	164	2,510	17,06
IPE 750 x 173+	173	762	267	14,4	21,6	17	221	718,8	684,8	M 27	104	166	2,534	14,58
IPE 750 x 196+	196	770	268	15,6	25,4	17	251	719,2	685,2	M 27	106	166	2,552	12,96

- Commande minimale: pour S 235 JR, cf. conditions de livraison page 216; pour toute autre qualité 40 t ou suivant accord.
+ Commande minimale: 40 t par profilé et qualité ou suivant accord.
* Tonnage minimum et conditions de livraison nécessitent un accord préalable.

- Minimum order: for the S 235 JR grade cf. delivery conditions page 216; for any other grade 40 t or upon agreement.
+ Minimum order: 40 t per section and grade or upon agreement.
* Minimum tonnage and delivery conditions upon agreement.

- Mindestbestellmenge: für S 235 JR gemäß Lieferbedingungen Seite 216; für jede andere Güte 40 t oder nach Vereinbarung.
+ Mindestbestellmenge: 40 t pro Profil und Güte oder nach Vereinbarung.
* Die Mindestmengen pro Bestellung sowie die Lieferbedingungen sind im Voraus zu vereinbaren.

IPE

Notations pages 211-215 / Bezeichnungen Seiten 211-215

Désignation Designation Bezeichnung	G kg/m	Valeurs statiques / Section properties / Statische Kennwerte axe fort y-y strong axis y-y starke Achse y-y I_y mm⁴	$W_{el.y}$ mm³	$W_{pl.y}$♦ mm³	i_y mm	A_{vz} mm²	axe faible z-z weak axis z-z schwache Achse z-z I_z mm⁴	$W_{el.z}$ mm³	$W_{pl.z}$♦ mm³	i_z mm	s_s mm	I_t mm⁴	I_w mm⁶	Classification ENV 1993-1-1 pure bending y-y S 235	S 355	S 460	pure compression S 235	S 355	S 460	EN 10025:1993	EN 10113-3:1993	EN 10225:2001
		x 10^4	x 10^3	x 10^3	x 10	x 10^2	x 10^4	x 10^3	x 10^3	x 10		x 10^4	x 10^9									
IPE A 500	79,4	42930	1728	1946	20,61	50,41	1939	193,9	301,6	4,38	62,00	62,78	1125	1	1	-	4	4	-	✔	✔	✔
IPE 500	90,7	48200	1928	2194	20,43	59,87	2142	214,2	335,9	4,31	66,80	89,29	1249	1	1	1	3	4	4	✔	HI	HI
IPE O 500	107	57780	2284	2613	20,56	70,21	2622	259,6	408,5	4,38	74,60	143,5	1548	1	1	1	2	4	4	✔	HI	HI
IPE A 550	92,1	59980	2193	2475	22,61	60,30	2432	231,6	361,5	4,55	68,52	86,53	1710	1	1	-	4	4	-	✔	✔	✔
IPE 550	106	67120	2441	2787	22,35	72,34	2668	254,1	400,5	4,45	73,62	123,2	1884	1	1	1	4	4	4	✔	HI	HI
IPE O 550	123	79160	2847	3263	22,52	82,69	3224	304,2	480,5	4,55	81,22	187,5	2302	1	1	1	2	4	4	✔	HI	HI
IPE A 600	108	82920	2778	3141	24,60	70,14	3116	283,3	442,1	4,77	72,92	118,8	2607	1	1	-	4	4	-	✔	✔	✔
IPE 600	122	92080	3069	3512	24,30	83,78	3387	307,9	485,6	4,66	78,12	165,4	2846	1	1	1	4	4	4	✔	HI	HI
IPE O 600	154	118300	3879	4471	24,52	104,4	4521	403,6	640,1	4,79	91,12	318,1	3860	1	1	1	2	4	4	✔	HI	HI
IPE 750 x 137	137	159900	4246	4865	30,26	92,90	5166	392,8	614,1	5,44	65,42	137,1	6980	1	2	-	4	4	-	✔	✔	✔
IPE 750 x 147	147	166100	4411	5110	29,76	105,4	5289	399,2	630,8	5,31	67,12	161,5	7141	1	1	-	4	4	-	✔	✔	✔
IPE 750 x 173	173	205800	5402	6218	30,49	116,4	6873	514,9	809,9	5,57	77,52	273,6	9391	1	1	1	4	4	4	✔	HI	HI
IPE 750 x 196	196	240300	6241	7174	30,95	127,3	8175	610,1	958,8	5,71	86,32	408,9	11290	1	1	1	4	4	4	✔	HI	HI

HI = HISTAR®

♦ W_{pl}: Pour un dimensionnement plastique, la section doit appartenir à la classe 1 ou 2 suivant la capacité de rotation requise. Voir page 215.

♦ W_{pl}: For plastic design, the shape must belong to class 1 or 2 according to the required rotation capacity. See page 215.

♦ W_{pl}: Bei einer plastischen Bemessung muss das Profil der Klasse 1 oder 2, entsprechend der erforderlichen Rotationskapazität, angehören. Siehe Seite 215.

Poutrelles normales européennes

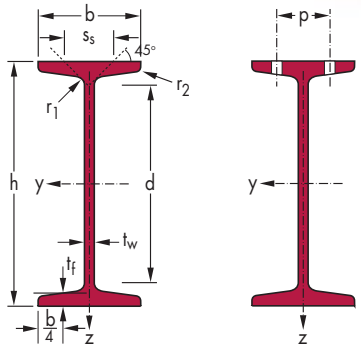
Inclinaison des ailes: 14%
Dimensions: DIN 1025-1: 1963, NF A 45-209 (1983)
Tolérances: EN 10024: 1995
Etat de surface conforme à EN 10163-3: 1991, classe C, sous-classe 1

European standard beams

Flange slope: 14%
Dimensions: DIN 1025-1: 1963, NF A 45-209 (1983)
Tolerances: EN 10024: 1995
Surface condition according to EN 10163-3:1991, class C, subclass 1

Europäische Normalträger

Flanschneigung: 14%
Abmessungen: DIN 1025-1: 1963, NF A 45-209 (1983)
Toleranzen: EN 10024: 1995
Oberflächenbeschaffenheit gemäß EN 10163-3: 1991, Klasse C, Untergruppe 1



Désignation Designation Bezeichnung	Dimensions Abmessungen							Dimensions de construction Dimensions for detailing Konstruktionsmaße				Surface Oberfläche	
G kg/m	h mm	b mm	t_w mm	t_f mm	r_1 mm	r_2 mm	A mm^2	d mm	Ø	p_{min} mm	p_{max} mm	A_L m^2/m	A_G m^2/t
							x 10^2						
IPN 80* 5,9	80	42	3,9	5,9	3,9	2,3	7,58	59	-	-	-	0,304	51,09
IPN 100* 8,3	100	50	4,5	6,8	4,5	2,7	10,6	75,7	-	-	-	0,370	44,47
IPN 120* 11,1	120	58	5,1	7,7	5,1	3,1	14,2	92,4	-	-	-	0,439	39,38
IPN 140* 14,3	140	66	5,7	8,6	5,7	3,4	18,3	109,1	-	-	-	0,502	34,94
IPN 160* 17,9	160	74	6,3	9,5	6,3	3,8	22,8	125,8	-	-	-	0,575	32,13
IPN 180* 21,9	180	82	6,9	10,4	6,9	4,1	27,9	142,4	-	-	-	0,640	29,22
IPN 200* 26,2	200	90	7,5	11,3	7,5	4,5	33,4	159,1	-	-	-	0,709	27,04
IPN 220* 31,1	220	98	8,1	12,2	8,1	4,9	39,5	175,8	M 10	50	56	0,775	24,99
IPN 240* 36,2	240	106	8,7	13,1	8,7	5,2	46,1	192,5	M 10	54	60	0,844	23,32
IPN 260* 41,9	260	113	9,4	14,1	9,4	5,6	53,3	208,9	M 12	62	62	0,906	21,65
IPN 280* 47,9	280	119	10,1	15,2	10,1	6,1	61,0	225,1	M 12	68	68	0,966	20,17
IPN 300* 54,2	300	125	10,8	16,2	10,8	6,5	69,0	241,6	M 12	70	74	1,03	19,02
IPN 320* 61,0	320	131	11,5	17,3	11,5	6,9	77,7	257,9	M 12	70	80	1,09	17,87
IPN 340* 68,0	340	137	12,2	18,3	12,2	7,3	86,7	274,3	M 12	78	86	1,15	16,90
IPN 360* 76,1	360	143	13	19,5	13	7,8	97,0	290,2	M 12	78	92	1,21	15,89
IPN 380* 84,0	380	149	13,7	20,5	13,7	8,2	107	306,7	M 16	84	86	1,27	15,12
IPN 400* 92,4	400	155	14,4	21,6	14,4	8,6	118	322,9	M 16	86	92	1,33	14,36
IPN 450* 115	450	170	16,2	24,3	16,2	9,7	147	363,6	M 16	92	106	1,48	12,83
IPN 500* 141	500	185	18	27	18	10,8	179	404,3	M 20	102	110	1,63	11,60
IPN 550* 166	550	200	19	30	19	11,9	212	445,6	M 22	112	118	1,80	10,80
IPN 600* 199	600	215	21,6	32,4	21,6	13	254	485,8	M 24	126	128	1,97	9,89

* Tonnage minimum et conditions de livraison nécessitent un accord préalable.

* Minimum tonnage and delivery conditions upon agreement.

* Die Mindestmengen pro Bestellung sowie die Lieferbedingungen sind im Voraus zu vereinbaren.

IPN

Notations pages 211-215 / Bezeichnungen Seiten 211-215

Désignation Designation Bezeichnung	G kg/m	Valeurs statiques / Section properties / Statische Kennwerte axe fort y-y strong axis y-y starke Achse y-y I_y mm^4	$W_{el.y}$ mm^3	$W_{pl.y}$♦ mm^3	i_y mm	A_{vz} mm^2	axe faible z-z weak axis z-z schwache Achse z-z I_z mm^4	$W_{el.z}$ mm^3	$W_{pl.z}$♦ mm^3	i_z mm	s_s mm	I_t mm^4	I_w mm^6	Classification ENV 1993-1-1 pure bending y-y S 235	S 355	pure compression S 235	S 355	EN 10025:1993	EN 10113-3:1993	EN 10225:2001
		x 10^4	x 10^3	x 10^3	x 10	x 10^2	x 10^4	x 10^3	x 10^3	x 10		x 10^4	x 10^9							
IPN 80	5,9	77,8	19,5	22,8	3,20	3,41	6,29	3,00	5,00	0,91	21,6	0,87	0,09	4	4	4	4	✔		
IPN 100	8,3	171	34,2	39,8	4,01	4,85	12,2	4,88	8,10	1,07	25,0	1,60	0,27	1	1	1	1	✔		
IPN 120	11,1	328	54,7	63,6	4,81	6,63	21,5	7,41	12,4	1,23	28,4	2,71	0,69	1	1	1	1	✔		
IPN 140	14,3	573	81,9	95,4	5,61	8,65	35,2	10,7	17,9	1,40	31,8	4,32	1,54	1	1	1	1	✔		
IPN 160	17,9	935	117	136	6,40	10,83	54,7	14,8	24,9	1,55	35,2	6,57	3,14	1	1	1	1	✔		
IPN 180	21,9	1450	161	187	7,20	13,35	81,3	19,8	33,2	1,71	38,6	9,58	5,92	1	1	1	1	✔		
IPN 200	26,2	2140	214	250	8,00	16,03	117	26,0	43,5	1,87	42,0	13,5	10,5	1	1	1	1	✔		
IPN 220	31,1	3060	278	324	8,80	19,06	162	33,1	55,7	2,02	45,4	18,6	17,8	1	1	1	1	✔		
IPN 240	36,2	4250	354	412	9,59	22,33	221	41,7	70,0	2,20	48,9	25,0	28,7	1	1	1	1	✔		
IPN 260	41,9	5740	442	514	10,40	26,08	288	51,0	85,9	2,32	52,6	33,5	44,1	1	1	1	1	✔		
IPN 280	47,9	7590	542	632	11,10	30,18	364	61,2	103	2,45	56,4	44,2	64,6	1	1	1	1	✔		
IPN 300	54,2	9800	653	762	11,90	34,58	451	72,2	121	2,56	60,1	56,8	91,8	1	1	1	1	✔		
IPN 320	61,0	12510	782	914	12,70	39,26	555	84,7	143	2,67	63,9	72,5	129	1	1	1	1	✔		
IPN 340	68,0	15700	923	1080	13,50	44,27	674	98,4	166	2,80	67,6	90,4	176	1	1	1	1	✔		
IPN 360	76,1	19610	1090	1276	14,20	49,95	818	114	194	2,90	71,8	115	240	1	1	1	1	✔		
IPN 380	84,0	24010	1260	1482	15,00	55,55	975	131	221	3,02	75,4	141	319	1	1	1	1	✔		
IPN 400	92,4	29210	1460	1714	15,70	61,69	1160	149	253	3,13	79,3	170	420	1	1	1	1	✔		
IPN 450	115	45850	2040	2400	17,70	77,79	1730	203	345	3,43	88,9	267	791	1	1	1	1	✔		
IPN 500	141	68740	2750	3240	19,60	95,60	2480	268	456	3,72	98,5	402	1400	1	1	1	1	✔		
IPN 550	166	99180	3610	4240	21,60	111,3	3490	349	592	4,02	107,3	544	2390	1	1	1	1	✔		
IPN 600	199	138800	4627	5452	23,39	138,0	4674	435	752	4,29	117,6	787	3814	1	1	1	1	✔		

♦ W_{pl}: Pour un dimensionnement plastique, la section doit appartenir à la classe 1 ou 2 suivant la capacité de rotation requise. Voir page 215.

♦ W_{pl}: For plastic design, the shape must belong to class 1 or 2 according to the required rotation capacity. See page 215.

♦ W_{pl}: Bei einer plastischen Bemessung muss das Profil der Klasse 1 oder 2, entsprechend der erforderlichen Rotationskapazität, angehören. Siehe Seite 215.

Poutrelles européennes à larges ailes

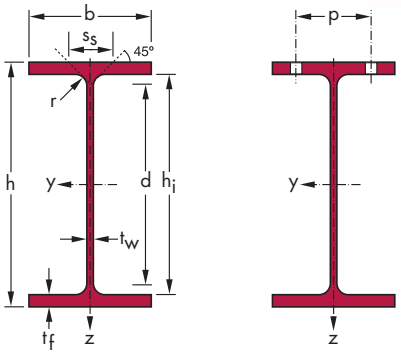
Dim.: HE A, HE B et HE M 100-1000 conformes à l'Euronorme 53-62 ; HE AA 100-1000 ; HL 920-1100
Tolérances: EN 10034: 1993 HE 100 - 900 ; HE 1000 AA-M ; HL AA-R
A6 - 02 HE avec $G_{HE}>G_{HE\,M}$; HL 920 ; HL 1000 avec $G_{HL}>G_{HL\,M}$
Etat de surface conforme à EN 10163-3: 1991, classe C, sous-classe 1

European wide flange beams

Dim.: HE A, HE B and HE M 100 - 1000 in accordance with Euronorm 53-63 ; HE AA 100 - 1000 ; HL 920 - 1100
Tolerances: EN 10034: 1993 HE 100 - 900 ; HE 1000 AA-M ; HL AA-R
A6 - 02 HE with $G_{HE}>G_{HE\,M}$; HL 920 ; HL 1000 with $G_{HL}>G_{HL\,M}$
Surface condition according to EN 10163-3:1991, class C, subclass 1

Europäische Breitflanschträger

Abmessungen: HE A, HE B und HE M 100 - 1000 gemäß Euronorm 53-62 ; HE AA 100 - 1000 ; HL 920 - 1100
Toleranzen: EN 10034: 1993 HE 100 - 900 ; HE 1000 AA-M ; HL AA-R
A6 - 02 HE mit $G_{HE}>G_{HE\,M}$; HL 920 ; HL 1000 mit $G_{HL}>G_{HL\,M}$
Oberflächenbeschaffenheit gemäß EN 10163-3: 1991, Klasse C, Untergruppe 1



Désignation Designation Bezeichnung		Dimensions Abmessungen						Dimensions de construction Dimensions for detailing Konstruktionsmaße					Surface Oberfläche	
	G kg/m	h mm	b mm	t_w mm	t_f mm	r mm	A mm^2	h_i mm	d mm	Ø	p_{min} mm	p_{max} mm	A_L m^2/m	A_G m^2/t
							x 10^2							
HE 100 AA*	12,2	91	100	4,2	5,5	12	15,6	80	56	M 10	54	58	0,553	45,17
HE 100 A	16,7	96	100	5	8	12	21,2	80	56	M 10	54	58	0,561	33,68
HE 100 B	20,4	100	100	6	10	12	26,0	80	56	M 10	56	58	0,567	27,76
HE 100 M	41,8	120	106	12	20	12	53,2	80	56	M 10	62	64	0,619	14,82
HE 120 AA*	14,6	109	120	4,2	5,5	12	18,6	98	74	M 12	58	68	0,669	45,94
HE 120 A	19,9	114	120	5	8	12	25,3	98	74	M 12	58	68	0,677	34,06
HE 120 B	26,7	120	120	6,5	11	12	34,0	98	74	M 12	60	68	0,686	25,71
HE 120 M	52,1	140	126	12,5	21	12	66,4	98	74	M 12	66	74	0,738	14,16
HE 140 AA*	18,1	128	140	4,3	6	12	23,0	116	92	M 16	64	76	0,787	43,53
HE 140 A	24,7	133	140	5,5	8,5	12	31,4	116	92	M 16	64	76	0,794	32,21
HE 140 B	33,7	140	140	7	12	12	43,0	116	92	M 16	66	76	0,805	23,88
HE 140 M	63,2	160	146	13	22	12	80,6	116	92	M 16	72	82	0,857	13,56
HE 160 AA*	23,8	148	160	4,5	7	15	30,4	134	104	M 20	76	84	0,901	37,81
HE 160 A	30,4	152	160	6	9	15	38,8	134	104	M 20	78	84	0,906	29,78
HE 160 B	42,6	160	160	8	13	15	54,3	134	104	M 20	80	84	0,918	21,56
HE 160 M	76,2	180	166	14	23	15	97,1	134	104	M 20	86	90	0,970	12,74
HE 180 AA*	28,7	167	180	5	7,5	15	36,5	152	122	M 24	84	92	1,018	35,51
HE 180 A	35,5	171	180	6	9,5	15	45,3	152	122	M 24	86	92	1,024	28,83
HE 180 B	51,2	180	180	8,5	14	15	65,3	152	122	M 24	88	92	1,037	20,25
HE 180 M	88,9	200	186	14,5	24	15	113,3	152	122	M 24	94	98	1,089	12,25
HE 200 AA*	34,6	186	200	5,5	8	18	44,1	170	134	M 27	96	100	1,130	32,62
HE 200 A	42,3	190	200	6,5	10	18	53,8	170	134	M 27	98	100	1,136	26,89
HE 200 B	61,3	200	200	9	15	18	78,1	170	134	M 27	100	100	1,151	18,78
HE 200 M	103	220	206	15	25	18	131,3	170	134	M 27	106	106	1,203	11,67
HE 220 AA*	40,4	205	220	6	8,5	18	51,5	188	152	M 27	98	118	1,247	30,87
HE 220 A	50,5	210	220	7	11	18	64,3	188	152	M 27	98	118	1,255	24,85
HE 220 B	71,5	220	220	9,5	16	18	91,0	188	152	M 27	100	118	1,270	17,77
HE 220 M	117	240	226	15,5	26	18	149,4	188	152	M 27	108	124	1,322	11,27

- Commande minimale: pour S 235 JR, cf. conditions de livraison page 216 ; pour toute autre qualité 40 t ou suivant accord.
- Minimum order: for the S 235 JR grade cf. delivery conditions page 216 ; for any other grade 40 t or upon agreement.
- Mindestbestellmenge: für S 235 JR gemäß Lieferbedingungen Seite 216 ; für jede andere Güte 40 t oder nach Vereinbarung.

Notations pages 211-215 / Bezeichnungen Seiten 211-215

Désignation Designation Bezeichnung	G	Valeurs statiques / Section properties / Statische Kennwerte												Classification ENV 1993-1-1						EN 10025:1993	EN 10113-3:1993	EN 10225:2001
		axe fort y-y strong axis y-y starke Achse y-y					axe faible z-z weak axis z-z schwache Achse z-z							pure bending y-y			pure compression					
		I_y	$W_{el.y}$	$W_{pl.y}$♦	i_y	A_{vz}	I_z	$W_{el.z}$	$W_{pl.z}$♦	i_z	s_s	I_t	I_w	S 235	S 355	S 460	S 235	S 355	S 460			
	kg/m	mm^4	mm^3	mm^3	mm	mm^2	mm^4	mm^3	mm^3	mm	mm	mm^4	mm^6									
		x 10^4	x 10^3	x 10^3	x 10	x 10^2	x 10^4	x 10^3	x 10^3	x 10		x 10^4	x 10^9									
HE 100 AA	12,2	236,5	51,98	58,36	3,89	6,15	92,06	18,41	28,44	2,43	29,26	2,51	1,68	1	3	-	1	3	-	✔	✔	✔
HE 100 A	16,7	349,2	72,76	83,01	4,06	7,56	133,8	26,76	41,14	2,51	35,06	5,24	2,58	1	1	-	1	1	-	✔	✔	✔
HE 100 B	20,4	449,5	89,91	104,2	4,16	9,04	167,3	33,45	51,42	2,53	40,06	9,25	3,38	1	1	-	1	1	-	✔	✔	✔
HE 100 M	41,8	1143	190,4	235,8	4,63	18,04	399,2	75,31	116,3	2,74	66,06	68,21	9,93	1	1	-	1	1	-	✔	✔	✔
HE 120 AA	14,6	413,4	75,85	84,12	4,72	6,90	158,8	26,47	40,62	2,93	29,26	2,78	4,24	2	3	-	2	3	-	✔	✔	✔
HE 120 A	19,9	606,2	106,3	119,5	4,89	8,46	230,9	38,48	58,85	3,02	35,06	5,99	6,47	1	1	-	1	1	-	✔	✔	✔
HE 120 B	26,7	864,4	144,1	165,2	5,04	10,96	317,5	52,92	80,97	3,06	42,56	13,84	9,41	1	1	-	1	1	-	✔	✔	✔
HE 120 M	52,1	2018	288,2	350,6	5,51	21,15	702,8	111,6	171,6	3,25	68,56	91,66	24,79	1	1	-	1	1	-	✔	✔	✔
HE 140 AA	18,1	719,5	112,4	123,8	5,59	7,92	274,8	39,26	59,93	3,45	30,36	3,54	10,21	3	3	-	3	3	-	✔	✔	✔
HE 140 A	24,7	1033	155,4	173,5	5,73	10,12	389,3	55,62	84,85	3,52	36,56	8,13	15,06	1	2	-	1	2	-	✔	✔	✔
HE 140 B	33,7	1509	215,6	245,4	5,93	13,08	549,7	78,52	119,8	3,58	45,06	20,06	22,48	1	1	-	1	1	-	✔	✔	✔
HE 140 M	63,2	3291	411,4	493,8	6,39	24,46	1144	156,8	240,5	3,77	71,06	120,0	54,33	1	1	-	1	1	-	✔	✔	✔
HE 160 AA	23,8	1283	173,4	190,4	6,50	10,38	478,7	59,84	91,36	3,97	36,07	6,33	23,75	3	3	-	3	3	-	✔	✔	✔
HE 160 A	30,4	1673	220,1	245,1	6,57	13,21	615,6	76,95	117,6	3,98	41,57	12,19	31,41	1	2	-	1	2	-	✔	✔	✔
HE 160 B	42,6	2492	311,5	354,0	6,78	17,59	889,2	111,2	170,0	4,05	51,57	31,24	47,94	1	1	-	1	1	-	✔	✔	✔
HE 160 M	76,2	5098	566,5	674,6	7,25	30,81	1759	211,9	325,5	4,26	77,57	162,4	108,1	1	1	-	1	1	-	✔	✔	✔
HE 180 AA	28,7	1967	235,6	258,2	7,34	12,16	730,0	81,11	123,6	4,47	37,57	8,33	46,36	3	3	-	3	3	-	✔	✔	✔
HE 180 A	35,5	2510	293,6	324,9	7,45	14,47	924,6	102,7	156,5	4,52	42,57	14,80	60,21	1	3	-	1	3	-	✔	✔	✔
HE 180 B	51,2	3831	425,7	481,4	7,66	20,24	1363	151,4	231,0	4,57	54,07	42,16	93,75	1	1	-	1	1	-	✔	✔	✔
HE 180 M	88,9	7483	748,3	883,4	8,13	34,65	2580	277,4	425,2	4,77	80,07	203,3	199,3	1	1	-	1	1	-	✔	✔	✔
HE 200 AA	34,6	2944	316,6	347,1	8,17	15,45	1068	106,8	163,2	4,92	42,59	12,69	84,49	3	4	-	3	4	-	✔	✔	✔
HE 200 A	42,3	3692	388,6	429,5	8,28	18,08	1336	133,6	203,8	4,98	47,59	20,98	108,0	1	3	-	1	3	-	✔	✔	✔
HE 200 B	61,3	5696	569,6	642,5	8,54	24,83	2003	200,3	305,8	5,07	60,09	59,28	171,1	1	1	-	1	1	-	✔	✔	✔
HE 200 M	103	10640	967,4	1135	9,00	41,03	3651	354,5	543,2	5,27	86,09	259,4	346,3	1	1	-	1	1	-	✔	✔	✔
HE 220 AA	40,4	4170	406,9	445,5	9,00	17,63	1510	137,3	209,3	5,42	44,09	15,93	145,6	3	4	-	3	4	-	✔	✔	✔
HE 220 A	50,5	5410	515,2	568,5	9,17	20,67	1955	177,7	270,6	5,51	50,09	28,46	193,3	1	3	-	1	3	-	✔	✔	✔
HE 220 B	71,5	8091	735,5	827,0	9,43	27,92	2843	258,5	393,9	5,59	62,59	76,57	295,4	1	1	-	1	1	-	✔	✔	✔
HE 220 M	117	14600	1217	1419	9,89	45,31	5012	443,5	678,6	5,79	88,59	315,3	572,7	1	1	-	1	1	-	✔	✔	✔

♦ W_{pl}: Pour un dimensionnement plastique, la section doit appartenir à la classe 1 ou 2 suivant la capacité de rotation requise. Voir page 215.

♦ W_{pl}: For plastic design, the shape must belong to class 1 or 2 according to the required rotation capacity. See page 215.

♦ W_{pl}: Bei einer plastischen Bemessung muss das Profil der Klasse 1 oder 2, entsprechend der erforderlichen Rotationskapazität, angehören. Siehe Seite 215.

Poutrelles européennes à larges ailes (suite)

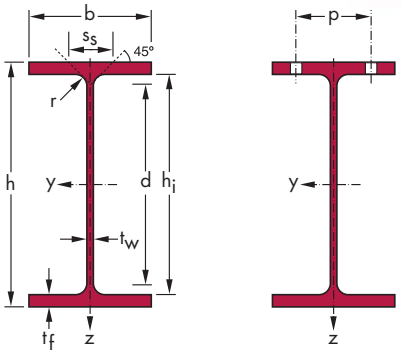
Dim.: HE A, HE B et HE M 100-1000 conformes à l'Euronorme 53-62; HE AA 100-1000; HL 920-1100
Tolérances: EN 10034: 1993 HE 100 - 900; HE 1000 AA-M; HL AA-R
A6 - 02 HE avec $G_{HE}>G_{HE\,M}$; HL 920; HL 1000 avec $G_{HL}>G_{HL\,M}$
Etat de surface conforme à EN 10163-3: 1991, classe C, sous-classe 1

European wide flange beams (continued)

Dim.: HE A, HE B and HE M 100 - 1000 in accordance with Euronorm 53-63; HE AA 100 - 1000; HL 920 - 1100
Tolerances: EN 10034: 1993 HE 100 - 900; HE 1000 AA-M; HL AA-R
A6 - 02 HE with $G_{HE}>G_{HE\,M}$; HL 920; HL 1000 with $G_{HL}>G_{HL\,M}$
Surface condition according to EN 10163-3:1991, class C, subclass 1

Europäische Breitflanschträger (Fortsetzung)

Abmessungen: HE A, HE B und HE M 100 - 1000 gemäß Euronorm 53-62; HE AA 100 - 1000; HL 920 - 1100
Toleranzen: EN 10034: 1993 HE 100 - 900; HE 1000 AA-M; HL AA-R
A6 - 02 HE mit $G_{HE}>G_{HE\,M}$; HL 920; HL 1000 mit $G_{HL}>G_{HL\,M}$
Oberflächenbeschaffenheit gemäß EN 10163-3: 1991, Klasse C, Untergruppe 1



Désignation Designation Bezeichnung		Dimensions Abmessungen						Dimensions de construction Dimensions for detailing Konstruktionsmaße					Surface Oberfläche	
	G kg/m	h mm	b mm	t_w mm	t_f mm	r mm	A mm²	h_i mm	d mm	Ø	p_{min} mm	p_{max} mm	A_L m²/m	A_G m²/t
							x 10²							
HE 240 AA*	47,4	224	240	6,5	9	21	60,4	206	164	M 27	104	138	1,359	28,67
HE 240 A	60,3	230	240	7,5	12	21	76,8	206	164	M 27	104	138	1,369	22,70
HE 240 B	83,2	240	240	10	17	21	106,0	206	164	M 27	108	138	1,384	16,63
HE 240 M	157	270	248	18	32	21	199,6	206	164	M 27	116	146	1,460	9,318
HE 260 AA*	54,1	244	260	6,5	9,5	24	69,0	225	177	M 27	110	158	1,474	27,22
HE 260 A	68,2	250	260	7,5	12,5	24	86,8	225	177	M 27	110	158	1,484	21,77
HE 260 B	93	260	260	10	17,5	24	118,4	225	177	M 27	114	158	1,499	16,12
HE 260 M	172	290	268	18	32,5	24	219,6	225	177	M 27	122	166	1,575	9,133
HE 280 AA*	61,2	264	280	7	10	24	78,0	244	196	M 27	110	178	1,593	26,01
HE 280 A	76,4	270	280	8	13	24	97,3	244	196	M 27	112	178	1,603	20,99
HE 280 B	103	280	280	10,5	18	24	131,4	244	196	M 27	114	178	1,618	15,69
HE 280 M	189	310	288	18,5	33	24	240,2	244	196	M 27	122	186	1,694	8,984
HE 300 AA*	69,8	283	300	7,5	10,5	27	88,9	262	208	M 27	116	198	1,705	24,42
HE 300 A	88,3	290	300	8,5	14	27	112,5	262	208	M 27	118	198	1,717	19,43
HE 300 B	117	300	300	11	19	27	149,1	262	208	M 27	120	198	1,732	14,80
HE 300 M	238	340	310	21	39	27	303,1	262	208	M 27	132	208	1,832	7,699
HE 320 AA*	74,2	301	300	8	11	27	94,6	279	225	M 27	118	198	1,740	23,43
HE 320 A	97,6	310	300	9	15,5	27	124,4	279	225	M 27	118	198	1,756	17,98
HE 320 B	127	320	300	11,5	20,5	27	161,3	279	225	M 27	122	198	1,771	13,98
HE 320 M	245	359	309	21	40	27	312,0	279	225	M 27	132	204	1,866	7,616
HE 340 AA*	78,9	320	300	8,5	11,5	27	100,5	297	243	M 27	118	198	1,777	22,52
HE 340 A	105	330	300	9,5	16,5	27	133,5	297	243	M 27	118	198	1,795	17,13
HE 340 B	134	340	300	12	21,5	27	170,9	297	243	M 27	122	198	1,810	13,49
HE 340 M	248	377	309	21	40	27	315,8	297	243	M 27	132	204	1,902	7,670
HE 360 AA*	83,7	339	300	9	12	27	106,6	315	261	M 27	118	198	1,814	21,67
HE 360 A	112	350	300	10	17,5	27	142,8	315	261	M 27	120	198	1,834	16,36
HE 360 B	142	360	300	12,5	22,5	27	180,6	315	261	M 27	122	198	1,849	13,04
HE 360 M	250	395	308	21	40	27	318,8	315	261	M 27	132	204	1,934	7,730

- Commande minimale: pour S 235 JR, cf. conditions de livraison page 216; pour toute autre qualité 40 t ou suivant accord.
- Minimum order: for the S 235 JR grade cf. delivery conditions page 216; for any other grade 40 t or upon agreement.
- Mindestbestellmenge: für S 235 JR gemäß Lieferbedingungen Seite 216; für jede andere Güte 40 t oder nach Vereinbarung.

Notations pages 211-215 / Bezeichnungen Seiten 211-215

Désignation Designation Bezeichnung	G kg/m	Valeurs statiques / Section properties / Statische Kennwerte axe fort y-y strong axis y-y starke Achse y-y I_y mm^4	$W_{el.y}$ mm^3	$W_{pl.y}$♦ mm^3	i_y mm	A_{vz} mm^2	axe faible z-z weak axis z-z schwache Achse z-z I_z mm^4	$W_{el.z}$ mm^3	$W_{pl.z}$♦ mm^3	i_z mm	s_s mm	I_t mm^4	I_w mm^6	Classification ENV 1993-1-1 pure bending y-y S 235	S 355	S 460	pure compression S 235	S 355	S 460	EN 10025:1993	EN 10113-3:1993	EN 10225:2001
		x 10^4	x 10^3	x 10^3	x 10	x 10^2	x 10^4	x 10^3	x 10^3	x 10		x 10^4	x 10^9									
HE 240 AA	47,4	5835	521,0	570,6	9,83	21,54	2077	173,1	264,4	5,87	49,10	22,98	239,6	3	4	-	3	4	-	✔	✔	✔
HE 240 A	60,3	7763	675,1	744,6	10,05	25,18	2769	230,7	351,7	6,00	56,10	41,55	328,5	1	3	-	1	3	-	✔	✔	✔
HE 240 B	83,2	11260	938,3	1053	10,31	33,23	3923	326,9	498,4	6,08	68,60	102,7	486,9	1	1	-	1	1	-	✔	✔	✔
HE 240 M	157	24290	1799	2117	11,03	60,07	8153	657,5	1006	6,39	106,6	627,9	1152	1	1	-	1	1	-	✔	✔	✔
HE 260 AA	54,1	7981	654,1	714,5	10,76	24,75	2788	214,5	327,7	6,36	53,62	30,31	382,6	3	4	-	3	4	-	✔	✔	✔
HE 260 A	68,2	10450	836,4	919,8	10,97	28,76	3668	282,1	430,2	6,50	60,62	52,37	516,4	2	3	3	2	3	3	✔	HI	HI
HE 260 B	93	14920	1148	1283	11,22	37,59	5135	395,0	602,2	6,58	73,12	123,8	753,7	1	1	2	1	1	2	✔	HI	HI
HE 260 M	172	31310	2159	2524	11,94	66,89	10450	779,7	1192	6,90	111,1	719,0	1728	1	1	1	1	1	1	✔	HI	HI
HE 280 AA	61,2	10560	799,8	873,1	11,63	27,52	3664	261,7	399,4	6,85	55,12	36,22	590,1	3	4	-	3	4	-	✔	✔	✔
HE 280 A	76,4	13670	1013	1112	11,86	31,74	4763	340,2	518,1	7,00	62,12	62,10	785,4	2	3	4	2	3	4	✔	HI	HI
HE 280 B	103	19270	1376	1534	12,11	41,09	6595	471,0	717,6	7,09	74,62	143,7	1130	1	1	2	1	1	2	✔	HI	HI
HE 280 M	189	39550	2551	2966	12,83	72,03	13160	914,1	1397	7,40	112,6	807,3	2520	1	1	1	1	1	1	✔	HI	HI
HE 300 AA	69,8	13800	975,6	1065	12,46	32,37	4734	315,6	482,3	7,30	60,13	49,35	877,2	3	4	-	3	4	-	✔	✔	✔
HE 300 A	88,3	18260	1260	1383	12,74	37,28	6310	420,6	641,2	7,49	68,13	85,17	1200	2	3	3	2	3	3	✔	HI	HI
HE 300 B	117	25170	1678	1869	12,99	47,43	8563	570,9	870,1	7,58	80,63	185,0	1688	1	1	3	1	1	3	✔	HI	HI
HE 300 M	238	59200	3482	4078	13,98	90,53	19400	1252	1913	8,00	130,6	1408	4386	1	1	1	1	1	1	✔	HI	HI
HE 320 AA	74,2	16450	1093	1196	13,19	35,40	4959	330,6	505,7	7,24	61,63	55,87	1041	3	4	-	3	4	-	✔	✔	✔
HE 320 A	97,6	22930	1479	1628	13,58	41,13	6985	465,7	709,7	7,49	71,63	108,0	1512	1	3	3	1	3	3	✔	HI	HI
HE 320 B	127	30820	1926	2149	13,82	51,77	9239	615,9	939,1	7,57	84,13	225,1	2069	1	1	2	1	1	2	✔	HI	HI
HE 320 M	245	68130	3796	4435	14,78	94,85	19710	1276	1951	7,95	132,6	1501	5004	1	1	1	1	1	1	✔	HI	HI
HE 340 AA	78,9	19550	1222	1341	13,95	38,69	5185	345,6	529,3	7,18	63,13	63,07	1231	3	4	-	3	4	-	✔	✔	✔
HE 340 A	105	27690	1678	1850	14,40	44,95	7436	495,7	755,9	7,46	74,13	127,2	1824	1	3	3	1	3	3	✔	HI	HI
HE 340 B	134	36660	2156	2408	14,65	56,09	9690	646,0	985,7	7,53	86,63	257,2	2454	1	1	1	1	1	1	✔	HI	HI
HE 340 M	248	76370	4052	4718	15,55	98,63	19710	1276	1953	7,90	132,6	1506	5584	1	1	1	1	1	1	✔	HI	HI
HE 360 AA	83,7	23040	1359	1495	14,70	42,17	5410	360,7	553,0	7,12	64,63	70,99	1444	3	4	-	3	4	-	✔	✔	✔
HE 360 A	112	33090	1891	2088	15,22	48,96	7887	525,8	802,3	7,43	76,63	148,8	2177	1	2	3	1	2	3	✔	HI	HI
HE 360 B	142	43190	2400	2683	15,46	60,60	10140	676,1	1032	7,49	89,13	292,5	2883	1	1	1	1	1	1	✔	HI	HI
HE 360 M	250	84870	4297	4989	16,32	102,4	19520	1268	1942	7,83	132,6	1507	6137	1	1	1	1	1	1	✔	HI	HI

HI = HISTAR®

♦ W_{pl}: Pour un dimensionnement plastique, la section doit appartenir à la classe 1 ou 2 suivant la capacité de rotation requise. Voir page 215.

♦ W_{pl}: For plastic design, the shape must belong to class 1 or 2 according to the required rotation capacity. See page 215.

♦ W_{pl}: Bei einer plastischen Bemessung muss das Profil der Klasse 1 oder 2, entsprechend der erforderlichen Rotationskapazität, angehören. Siehe Seite 215.

Poutrelles européennes à larges ailes (suite)

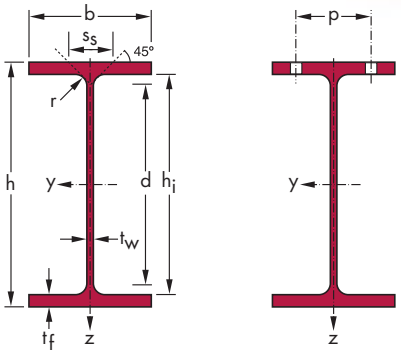
Dim.: HE A, HE B et HE M 100-1000 conformes à l'Euronorme 53-62 ; HE AA 100-1000 ; HL 920-1100
Tolérances: EN 10034: 1993 HE 100 - 900 ; HE 1000 AA-M ; HL AA-R
A6 - 02 HE avec $G_{HE}>G_{HE\,M}$; HL 920 ; HL 1000 avec $G_{HL}>G_{HL\,M}$
Etat de surface conforme à EN 10163-3: 1991, classe C, sous-classe 1

European wide flange beams (continued)

Dim.: HE A, HE B and HE M 100 - 1000 in accordance with Euronorm 53-63 ; HE AA 100 - 1000 ; HL 920 - 1100
Tolerances: EN 10034: 1993 HE 100 - 900 ; HE 1000 AA-M ; HL AA-R
A6 - 02 HE with $G_{HE}>G_{HE\,M}$; HL 920 ; HL 1000 with $G_{HL}>G_{HL\,M}$
Surface condition according to EN 10163-3:1991, class C, subclass 1

Europäische Breitflanschträger (Fortsetzung)

Abmessungen: HE A, HE B und HE M 100 - 1000 gemäß Euronorm 53-62 ; HE AA 100 - 1000 ; HL 920 - 1100
Toleranzen: EN 10034: 1993 HE 100 - 900 ; HE 1000 AA-M ; HL AA-R
A6 - 02 HE mit $G_{HE}>G_{HE\,M}$; HL 920 ; HL 1000 mit $G_{HL}>G_{HL\,M}$
Oberflächenbeschaffenheit gemäß EN 10163-3: 1991, Klasse C, Untergruppe 1



Désignation Designation Bezeichnung		Dimensions Abmessungen						Dimensions de construction Dimensions for detailing Konstruktionsmaße					Surface Oberfläche	
	G	h	b	t_w	t_f	r	A	h_i	d	Ø	p_{min}	p_{max}	A_L	A_G
	kg/m	mm	mm	mm	mm	mm	mm²	mm	mm		mm	mm	m²/m	m²/t
							x 10²							
HE 400 AA*	92,4	378	300	9,5	13	27	117,7	352	298	M 27	118	198	1,891	20,46
HE 400 A	125	390	300	11	19	27	159,0	352	298	M 27	120	198	1,912	15,32
HE 400 B	155	400	300	13,5	24	27	197,8	352	298	M 27	124	198	1,927	12,41
HE 400 M	256	432	307	21	40	27	325,8	352	298	M 27	132	202	2,004	7,835
HE 450 AA*	99,7	425	300	10	13,5	27	127,1	398	344	M 27	120	198	1,984	19,89
HE 450 A	140	440	300	11,5	21	27	178,0	398	344	M 27	122	198	2,011	14,39
HE 450 B	171	450	300	14	26	27	218,0	398	344	M 27	124	198	2,026	11,84
HE 450 M	263	478	307	21	40	27	335,4	398	344	M 27	132	202	2,096	7,959
HE 500 AA*	107	472	300	10,5	14	27	136,9	444	390	M 27	120	198	2,077	19,33
HE 500 A	155	490	300	12	23	27	197,5	444	390	M 27	122	198	2,110	13,60
HE 500 B	187	500	300	14,5	28	27	238,6	444	390	M 27	124	198	2,125	11,34
HE 500 M	270	524	306	21	40	27	344,3	444	390	M 27	132	202	2,184	8,079
HE 550 AA*	120	522	300	11,5	15	27	152,8	492	438	M 27	122	198	2,175	18,13
HE 550 A	166	540	300	12,5	24	27	211,8	492	438	M 27	122	198	2,209	13,29
HE 550 B	199	550	300	15	29	27	254,1	492	438	M 27	124	198	2,224	11,15
HE 550 M	278	572	306	21	40	27	354,4	492	438	M 27	132	202	2,280	8,195
HE 600 AA*	129	571	300	12	15,5	27	164,1	540	486	M 27	122	198	2,272	17,64
HE 600 A	178	590	300	13	25	27	226,5	540	486	M 27	122	198	2,308	12,98
HE 600 B	212	600	300	15,5	30	27	270,0	540	486	M 27	126	198	2,323	10,96
HE 600 M	285	620	305	21	40	27	363,7	540	486	M 27	132	200	2,372	8,308
HE 600 x 337*	337	632	310	25,5	46	27	429,2	540	486	M 27	138	202	2,407	7,144
HE 600 x 399*	399	648	315	30	54	27	508,5	540	486	M 27	142	208	2,450	6,137
HE 650 AA*	138	620	300	12,5	16	27	175,8	588	534	M 27	122	198	2,369	17,17
HE 650 A	190	640	300	13,5	26	27	241,6	588	534	M 27	124	198	2,407	12,69
HE 650 B	225	650	300	16	31	27	286,3	588	534	M 27	126	198	2,422	10,77
HE 650 M	293	668	305	21	40	27	373,7	588	534	M 27	132	200	2,468	8,411
HE 650 x 343*	343	680	309	25	46	27	437,5	588	534	M 27	138	202	2,500	7,278
HE 650 x 407*	407	696	314	29,5	54	27	518,8	588	534	M 27	142	206	2,543	6,243

- Commande minimale: pour S 235 JR, cf. conditions de livraison page 216 ; pour toute autre qualité 40 t ou suivant accord.
- Minimum order: for the S 235 JR grade cf. delivery conditions page 216 ; for any other grade 40 t or upon agreement.
- Mindestbestellmenge: für S 235 JR gemäß Lieferbedingungen Seite 216 ; für jede andere Güte 40 t oder nach Vereinbarung.

HE

Notations pages 211-215 / Bezeichnungen Seiten 211-215

Désignation Designation Bezeichnung	G kg/m	Valeurs statiques / Section properties / Statische Kennwerte axe fort y-y strong axis y-y starke Achse y-y I_y mm^4	$W_{el.y}$ mm^3	$W_{pl.y}$♦ mm^3	i_y mm	A_{vz} mm^2	axe faible z-z weak axis z-z schwache Achse z-z I_z mm^4	$W_{el.z}$ mm^3	$W_{pl.z}$♦ mm^3	i_z mm	s_s mm	I_t mm^4	I_w mm^6	Classification ENV 1993-1-1 pure bending y-y S 235	S 355	S 460	pure compression S 235	S 355	S 460	EN 10025:1993	EN 10113-3:1993	EN 10225:2001
		x 10^4	x 10^3	x 10^3	x 10	x 10^2	x 10^4	x 10^3	x 10^3	x 10		x 10^4	x 10^9									
HE 400 AA	92,4	31250	1654	1824	16,30	47,95	5861	390,8	599,7	7,06	67,13	84,69	1948	3	3	-	3	3	-	✔	✔	✔
HE 400 A	125	45070	2311	2562	16,84	57,33	8564	570,9	872,9	7,34	80,63	189,0	2942	1	1	3	1	2	3	✔	HI	HI
HE 400 B	155	57680	2884	3232	17,08	69,98	10820	721,3	1104	7,40	93,13	355,7	3817	1	1	1	1	1	1	✔	HI	HI
HE 400 M	256	104100	4820	5571	17,88	110,2	19340	1260	1934	7,70	132,6	1515	7410	1	1	1	1	1	1	✔	HI	HI
HE 450 AA	99,7	41890	1971	2183	18,16	54,70	6088	405,8	624,4	6,92	68,63	95,61	2572	3	3	-	3	4	-	✔	✔	✔
HE 450 A	140	63720	2896	3216	18,92	65,78	9465	631,0	965,5	7,29	85,13	243,8	4148	1	1	1	1	2	3	✔	HI	HI
HE 450 B	171	79890	3551	3982	19,14	79,66	11720	781,4	1198	7,33	97,63	440,5	5258	1	1	1	1	1	2	✔	HI	HI
HE 450 M	263	131500	5501	6331	19,80	119,8	19340	1260	1939	7,59	132,6	1529	9251	1	1	1	1	1	1	✔	HI	HI
HE 500 AA	107	54640	2315	2576	19,98	61,91	6314	420,9	649,3	6,79	70,13	107,7	3304	2	3	-	2	4	-	✔	✔	✔
HE 500 A	155	86970	3550	3949	20,98	74,72	10370	691,1	1059	7,24	89,63	309,3	5643	1	1	1	1	3	4	✔	HI	HI
HE 500 B	187	107200	4287	4815	21,19	89,82	12620	841,6	1292	7,27	102,1	538,4	7018	1	1	1	1	2	2	✔	HI	HI
HE 500 M	270	161900	6180	7094	21,69	129,5	19150	1252	1932	7,46	132,6	1539	11190	1	1	1	1	1	1	✔	HI	HI
HE 550 AA	120	72870	2792	3128	21,84	72,66	6767	451,1	698,6	6,65	73,13	133,7	4338	1	3	-	3	4	-	✔	✔	✔
HE 550 A	166	111900	4146	4622	22,99	83,72	10820	721,3	1107	7,15	92,13	351,5	7189	1	1	1	2	4	4	✔	HI	HI
HE 550 B	199	136700	4971	5591	23,20	100,1	13080	871,8	1341	7,17	104,6	600,3	8856	1	1	1	1	2	3	✔	HI	HI
HE 550 M	278	198000	6923	7933	23,64	139,6	19160	1252	1937	7,35	132,6	1554	13520	1	1	1	1	1	1	✔	HI	HI
HE 600 AA	129	91900	3218	3623	23,66	81,29	6993	466,2	724,5	6,53	74,63	149,8	5381	1	3	-	3	4	-	✔	✔	✔
HE 600 A	178	141200	4787	5350	24,97	93,21	11270	751,4	1156	7,05	94,63	397,8	8978	1	1	1	2	4	4	✔	HI	HI
HE 600 B	212	171000	5701	6425	25,17	110,8	13530	902,0	1391	7,08	107,1	667,2	10970	1	1	1	1	3	4	✔	HI	HI
HE 600 M	285	237400	7660	8772	25,55	149,7	18980	1244	1930	7,22	132,6	1564	15910	1	1	1	1	1	1	✔	HI	HI
HE 600 x 337	337	283200	8961	10380	25,69	180,5	22940	1480	2310	7,31	149,1	2451	19610	1	1	1	1	1	1	✔	HI	
HE 600 x 399	399	344600	10640	12460	26,03	213,6	28280	1796	2814	7,46	169,6	3966	24810	1	1	1	1	1	1	✔	HI	
HE 650 AA	138	113900	3676	4160	25,46	90,40	7221	481,4	750,7	6,41	76,13	167,5	6567	1	3	-	4	4	-	✔	✔	✔
HE 650 A	190	175200	5474	6136	26,93	103,2	11720	781,6	1205	6,97	97,13	448,3	11030	1	1	1	3	4	4	✔	HI	HI
HE 650 B	225	210600	6480	7320	27,12	122,0	13980	932,3	1441	6,99	109,6	739,2	13360	1	1	1	2	3	4	✔	HI	HI
HE 650 M	293	281700	8433	9657	27,45	159,7	18980	1245	1936	7,13	132,6	1579	18650	1	1	1	1	1	2	✔	HI	HI
HE 650 x 343	343	333700	9815	11350	27,62	189,6	22720	1470	2300	7,21	148,6	2442	22730	1	1	1	1	1	1	✔	HI	
HE 650 x 407	407	405400	11650	13620	27,95	224,8	28020	1785	2803	7,35	169,1	3958	28710	1	1	1	1	1	1	✔	HI	

HI = HISTAR®

♦ W_{pl}: Pour un dimensionnement plastique, la section doit appartenir à la classe 1 ou 2 suivant la capacité de rotation requise. Voir page 215.

♦ W_{pl}: For plastic design, the shape must belong to class 1 or 2 according to the required rotation capacity. See page 215.

♦ W_{pl}: Bei einer plastischen Bemessung muss das Profil der Klasse 1 oder 2, entsprechend der erforderlichen Rotationskapazität, angehören. Siehe Seite 215.

Poutrelles européennes à larges ailes (suite)

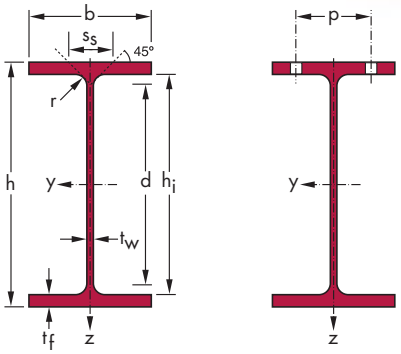
Dim.: HE A, HE B et HE M 100-1000 conformes à l'Euronorme 53-62 ; HE AA 100-1000 ; HL 920-1100
Tolérances: EN 10034: 1993 HE 100 - 900 ; HE 1000 AA-M ; HL AA-R
A6 - 02 HE avec $G_{HE}>G_{HE\,M}$; HL 920 ; HL 1000 avec $G_{HL}>G_{HL\,M}$
Etat de surface conforme à EN 10163-3: 1991, classe C, sous-classe 1

European wide flange beams (continued)

Dim.: HE A, HE B and HE M 100 - 1000 in accordance with Euronorm 53-63 ; HE AA 100 - 1000 ; HL 920 - 1100
Tolerances: EN 10034: 1993 HE 100 - 900 ; HE 1000 AA-M ; HL AA-R
A6 - 02 HE with $G_{HE}>G_{HE\,M}$; HL 920 ; HL 1000 with $G_{HL}>G_{HL\,M}$
Surface condition according to EN 10163-3:1991, class C, subclass 1

Europäische Breitflanschträger (Fortsetzung)

Abmessungen: HE A, HE B und HE M 100 - 1000 gemäß Euronorm 53-62 ; HE AA 100 - 1000 ; HL 920 - 1100
Toleranzen: EN 10034: 1993 HE 100 - 900 ; HE 1000 AA-M ; HL AA-R
A6 - 02 HE mit $G_{HE}>G_{HE\,M}$; HL 920 ; HL 1000 mit $G_{HL}>G_{HL\,M}$
Oberflächenbeschaffenheit gemäß EN 10163-3: 1991, Klasse C, Untergruppe 1



Désignation Designation Bezeichnung		Dimensions Abmessungen						Dimensions de construction Dimensions for detailing Konstruktionsmaße					Surface Oberfläche	
	G	h	b	t_w	t_f	r	A	h_i	d	Ø	p_{min}	p_{max}	A_L	A_G
	kg/m	mm	mm	mm	mm	mm	mm^2	mm	mm		mm	mm	m^2/m	m^2/t
							x 10^2							
HE 700 AA•	150	670	300	13	17	27	190,9	636	582	M 27	122	198	2,468	16,46
HE 700 A	204	690	300	14,5	27	27	260,5	636	582	M 27	124	198	2,505	12,25
HE 700 B	241	700	300	17	32	27	306,4	636	582	M 27	126	198	2,520	10,48
HE 700 M	301	716	304	21	40	27	383,0	636	582	M 27	132	200	2,560	8,513
HE 700 x 352•	352	728	308	25	46	27	448,6	636	582	M 27	138	200	2,592	7,359
HE 700 x 418•	418	744	313	29,5	54	27	531,9	636	582	M 27	142	206	2,635	6,310
HE 800 AA•	172	770	300	14	18	30	218,5	734	674	M 27	130	198	2,660	15,51
HE 800 A	224	790	300	15	28	30	285,8	734	674	M 27	130	198	2,698	12,03
HE 800 B	262	800	300	17,5	33	30	334,2	734	674	M 27	134	198	2,713	10,34
HE 800 M	317	814	303	21	40	30	404,3	734	674	M 27	138	198	2,746	8,655
HE 800 x 373•	373	826	308	25	46	30	474,6	734	674	M 27	144	200	2,782	7,469
HE 800 x 444•	444	842	313	30	54	30	566,0	734	674	M 27	148	206	2,824	6,357
HE 900 AA•	198	870	300	15	20	30	252,2	830	770	M 27	130	198	2,858	14,44
HE 900 A	252	890	300	16	30	30	320,5	830	770	M 27	132	198	2,896	11,51
HE 900 B	291	900	300	18,5	35	30	371,3	830	770	M 27	134	198	2,911	9,99
HE 900 M	333	910	302	21	40	30	423,6	830	770	M 27	138	198	2,934	8,824
HE 900 x 391•	391	922	307	25	46	30	497,7	830	770	M 27	144	200	2,970	7,604
HE 900 x 466•	466	938	312	30	54	30	593,7	830	770	M 27	148	204	3,012	6,464
HE 1000 AA•	222	970	300	16	21	30	282,2	928	868	M 27	132	198	3,056	13,80
HE 1000 x 249•	249	980	300	16,5	26	30	316,8	928	868	M 27	134	194	3,08	12,37
HE 1000 A	272	990	300	16,5	31	30	346,8	928	868	M 27	132	198	3,095	11,37
HE 1000 B	314	1000	300	19	36	30	400,0	928	868	M 27	134	198	3,110	9,905
HE 1000 M	349	1008	302	21	40	30	444,2	928	868	M 27	138	198	3,130	8,978
HE 1000 x 393•	393	1016	303	24,4	43,9	30	500,2	928	868	M 27	142	198	3,14	8,01
HE 1000 x 415•	415	1020	304	26	46	30	528,7	928	868	M 27	144	198	3,15	7,60
HE 1000 x 438•	437	1026	305	26,9	49	30	557,2	928	868	M 27	146	198	3,17	7,24
HE 1000 x 494•	494	1036	309	31	54	30	629,1	928	868	M 27	148	204	3,19	6,47
HE 1000 x 584•	584	1056	314	36	64	30	743,7	928	868	M 27	154	208	3,24	5,56

- Commande minimale: pour S 235 JR, cf. conditions de livraison page 216 ; pour toute autre qualité 40 t ou suivant accord.
- Minimum order: for the S 235 JR grade cf. delivery conditions page 216 ; for any other grade 40 t or upon agreement.
- Mindestbestellmenge: für S 235 JR gemäß Lieferbedingungen Seite 216 ; für jede andere Güte 40 t oder nach Vereinbarung.

HE

Notations pages 211-215 / Bezeichnungen Seiten 211-215

Désignation Designation Bezeichnung	Valeurs statiques / Section properties / Statische Kennwerte												Classification ENV 1993-1-1						EN 10025:1993	EN 10113-3:1993	EN 10225:2001
	axe fort y-y strong axis y-y starke Achse y-y					axe faible z-z weak axis z-z schwache Achse z-z							pure bending y-y			pure compression					
G kg/m	I_y mm^4	$W_{el.y}$ mm^3	$W_{pl.y}$♦ mm^3	i_y mm	A_{vz} mm^2	I_z mm^4	$W_{el.z}$ mm^3	$W_{pl.z}$♦ mm^3	i_z mm	s_s mm	I_t mm^4	I_w mm^6	S 235	S 355	S 460	S 235	S 355	S 460			
	x 10^4	x 10^3	x 10^3	x 10	x 10^2	x 10^4	x 10^3	x 10^3	x 10		x 10^4	x 10^9									
HE 700 AA 150	142700	4260	4840	27,34	100,3	7673	511,5	799,7	6,34	78,63	195,2	8155	1	2	-	4	4	-	✔	✔	✔
HE 700 A 204	215300	6241	7032	28,75	117,0	12180	811,9	1257	6,84	100,1	513,9	13350	1	1	1	3	4	4	✔	HI	HI
HE 700 B 241	256900	7340	8327	28,96	137,1	14440	962,7	1495	6,87	112,6	830,9	16060	1	1	1	2	4	4	✔	HI	HI
HE 700 M 301	329300	9198	10540	29,32	169,8	18800	1237	1929	7,01	132,6	1589	21400	1	1	1	1	2	3	✔	HI	HI
HE 700 x 352 352	389700	10710	12390	29,47	201,6	22510	1461	2293	7,08	148,6	2461	26050	1	1	1	1	1	1	✔	HI	
HE 700 x 418 418	472500	12700	14840	29,80	239,0	27760	1774	2797	7,22	169,1	3989	32850	1	1	1	1	1	1	✔	HI	
HE 800 AA 172	208900	5426	6225	30,92	123,8	8134	542,2	856,6	6,10	85,15	256,8	11450	1	2	-	4	4	-	✔	✔	✔
HE 800 A 224	303400	7682	8699	32,58	138,8	12640	842,6	1312	6,65	106,1	596,9	18290	1	1	1	4	4	4	✔	HI	HI
HE 800 B 262	359100	8977	10230	32,78	161,8	14900	993,6	1553	6,68	118,6	946,0	21840	1	1	1	3	4	4	✔	HI	HI
HE 800 M 317	442600	10870	12490	33,09	194,3	18630	1230	1930	6,79	136,1	1646	27780	1	1	1	1	3	4	✔	HI	HI
HE 800 x 373 373	523900	12690	14700	33,23	230,3	22530	1463	2311	6,89	152,1	2554	34070	1	1	1	1	2	2	✔	HI	
HE 800 x 444 444	634500	15070	17640	33,48	276,5	27800	1776	2827	7,01	173,1	4180	42840	1	1	1	1	1	1	✔	HI	
HE 900 AA 198	301100	6923	7999	34,55	147,2	9041	602,8	957,7	5,99	90,15	334,9	16260	1	1	-	4	4	-	✔	✔	✔
HE 900 A 252	422100	9485	10810	36,29	163,3	13550	903,2	1414	6,50	111,1	736,8	24960	1	1	1	4	4	4	✔	HI	HI
HE 900 B 291	494100	10980	12580	36,48	188,8	15820	1054	1658	6,53	123,6	1137	29460	1	1	1	3	4	4	✔	HI	HI
HE 900 M 333	570400	12540	14440	36,70	214,4	18450	1222	1929	6,60	136,1	1671	34750	1	1	1	2	4	4	✔	HI	HI
HE 900 x 391 391	674300	14630	16990	36,81	254,3	22320	1454	2312	6,70	152,1	2597	42560	1	1	1	1	3	4	✔	HI	
HE 900 x 466 466	814900	17380	20380	37,05	305,3	27560	1767	2832	6,81	173,1	4256	53400	1	1	1	1	1	2	✔	HI	
HE 1000 AA 222	406500	8380	9777	37,95	172,2	9501	633,4	1016	5,80	93,15	403,4	21280	1	1	-	4	4	-	✔		
HE 1000 x 249 249	481100	9818	11350	38,97	180,7	11750	784,0	1245	6,09	103,6	584,4	26620	1	1	2	4	4	4	✔	HI	HI
HE 1000 A 272	553800	11190	12820	39,96	184,6	14000	933,6	1470	6,35	113,6	822,4	32070	1	1	2	4	4	4	✔	HI	HI
HE 1000 B 314	644700	12890	14860	40,15	212,5	16280	1085	1716	6,38	126,1	1254	37640	1	1	1	4	4	4	✔	HI	HI
HE 1000 M 349	722300	14330	16570	40,32	235,0	18460	1222	1940	6,45	136,1	1701	43020	1	1	1	3	4	4	✔	HI	HI
HE 1000 x 393 393	807700	15900	18540	40,18	271,3	20500	1353	2168	6,40	147,3	2332	48080	1	1	1	2	4	4	✔	HI	
HE 1000 x 415 415	853100	16728	19571	40,17	288,6	21710	1428	2298	6,41	153,1	2713	51080	1	1	1	2	3	4	✔	HI	
HE 1000 x 438 437	909800	17740	20770	40,41	300,9	23360	1532	2464	6,47	160,1	3200	55290	1	1	1	1	3	4	✔	HI	
HE 1000 x 494 494	1028000	19845	23413	40,42	344,5	26820	1736	2818	6,53	174,1	4433	64010	1	1	1	1	2	3	✔	HI	
HE 1000 x 584 584	1246100	23600	28039	40,93	403,2	33430	2130	3475	6,70	199,1	7230	81240	1	1	1	1	1	2	✔	HI	

HI = HISTAR®

♦ W_{pl}: Pour un dimensionnement plastique, la section doit appartenir à la classe 1 ou 2 suivant la capacité de rotation requise. Voir page 215.

♦ W_{pl}: For plastic design, the shape must belong to class 1 or 2 according to the required rotation capacity. See page 215.

♦ W_{pl}: Bei einer plastischen Bemessung muss das Profil der Klasse 1 oder 2, entsprechend der erforderlichen Rotationskapazität, angehören. Siehe Seite 215.

Poutrelles européennes à larges ailes (suite)

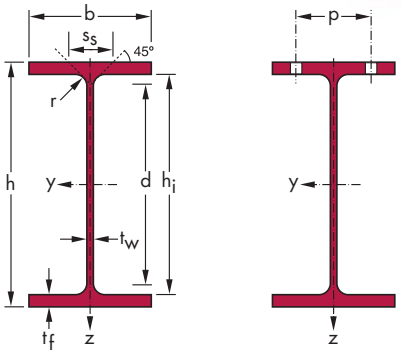
Dim.: HE A, HE B et HE M 100-1000 conformes à l'Euronorme 53-62 ; HE AA 100-1000 ; HL 920-1100
Tolérances: EN 10034: 1993 HE 100 - 900 ; HE 1000 AA-M ; HL AA-R
A6 - 02 HE avec $G_{HE}>G_{HE\,M}$; HL 920 ; HL 1000 avec $G_{HL}>G_{HL\,M}$
Etat de surface conforme à EN 10163-3: 1991, classe C, sous-classe 1

European wide flange beams (continued)

Dim.: HE A, HE B and HE M 100 - 1000 in accordance with Euronorm 53-63 ; HE AA 100 - 1000 ; HL 920 - 1100
Tolerances: EN 10034: 1993 HE 100 - 900 ; HE 1000 AA-M ; HL AA-R
A6 - 02 HE with $G_{HE}>G_{HE\,M}$; HL 920 ; HL 1000 with $G_{HL}>G_{HL\,M}$
Surface condition according to EN 10163-3:1991, class C, subclass 1

Europäische Breitflanschträger (Fortsetzung)

Abmessungen: HE A, HE B und HE M 100 - 1000 gemäß Euronorm 53-62 ; HE AA 100 - 1000 ; HL 920 - 1100
Toleranzen: EN 10034: 1993 HE 100 - 900 ; HE 1000 AA-M ; HL AA-R
A6 - 02 HE mit $G_{HE}>G_{HE\,M}$; HL 920 ; HL 1000 mit $G_{HL}>G_{HL\,M}$
Oberflächenbeschaffenheit gemäß EN 10163-3: 1991, Klasse C, Untergruppe 1



Désignation Designation Bezeichnung		Dimensions Abmessungen						Dimensions de construction Dimensions for detailing Konstruktionsmaße					Surface Oberfläche	
	G	h	b	t_w	t_f	r	A	h_i	d	Ø	p_{min}	p_{max}	A_L	A_G
	kg/m	mm	mm	mm	mm	mm	mm^2	mm	mm		mm	mm	m^2/m	m^2/t
							x 10^2							
HL 920 x 342*	342	912	418	19,3	32	24	436,1	848	800	M 27	126	312	3,42	9,98
HL 920 x 365*	365	916	419	20,3	34,3	24	464,4	847,4	799,4	M 27	128	314	3,43	9,40
HL 920 x 387*	387	921	420	21,3	36,6	24	493,0	847,8	799,8	M 27	128	314	3,44	8,88
HL 920 x 417*	417	928	422	22,5	39,9	24	532,5	848,2	800,2	M 27	130	316	3,46	8,27
HL 920 x 446*	446	933	423	24	42,7	24	569,6	847,6	799,6	M 27	130	318	3,47	7,76
HL 920 x 488*	488	942	422	25,9	47	24	621,3	848	800	M 27	132	316	3,48	7,13
HL 920 x 534*	534	950	425	28,4	51,1	24	680,1	847,8	799,8	M 27	136	320	3,50	6,56
HL 920 x 585*	585	960	427	31	55,9	24	745,3	848,2	800,2	M 27	138	322	3,52	6,02
HL 920 x 653*	653	972	431	34,5	62	24	831,9	848	800	M 27	144	320	3,56	5,45
HL 920 x 784*	784	996	437	40,9	73,9	24	997,7	848,2	800,2	M 27	152	326	3,62	4,62
HL 920 x 967*	967	1028	446	50	89,9	24	1231,0	848,2	800,2	M 27	160	334	3,70	3,83
HL 1000 AA*	296	982	400	16,5	27	30	376,8	928	868	M 27	134	294	3,479	11,76
HL 1000 A*	321	990	400	16,5	31	30	408,8	928	868	M 27	134	294	3,495	10,89
HL 1000 B*	371	1000	400	19	36	30	472,0	928	868	M 27	136	294	3,510	9,474
HL 1000 M*	412	1008	402	21	40	30	524,2	928	868	M 27	142	290	3,530	8,580
HL 1000 x 443*	443	1012	402	23,6	41,9	30	563,7	928	868	M27	142	296	3,53	7,99
HL 1000 x 483*	483	1020	404	25,4	46	30	615,1	928	868	M 27	144	298	3,55	7,36
HL 1000 x 539*	539	1030	407	28,4	51,1	30	687,2	928	868	M 27	146	302	3,58	6,64
HL 1000 x 554*	554	1032	408	29,5	52	30	705,8	928	868	M 27	150	296	3,59	6,47
HL 1000 x 591*	591	1040	409	31	55,9	30	752,7	928	868	M 27	148	304	3,60	6,10
HL 1000 x 642*	642	1048	412	34	60	30	817,6	928	868	M 27	154	300	3,62	5,65
HL 1000 x 748*	748	1068	417	39	70	30	953,4	928	868	M 27	160	304	3,67	4,91
HL 1000 x 883*	883	1092	424	45,5	82	30	1125,3	928	868	M 27	166	312	3,74	4,23
HL 1100 A*	343	1090	400	18	31	20	436,5	1028	988	M 27	116	294	3,710	10,83
HL 1100 B*	390	1100	400	20	36	20	497,0	1028	988	M 27	118	294	3,726	9,549
HL 1100 M*	433	1108	402	22	40	20	551,2	1028	988	M 27	122	290	3,746	8,657
HL 1100 R*	499	1118	405	26	45	20	635,2	1028	988	M 27	126	294	3,770	7,560

- Commande minimale: pour S 235 JR, cf. conditions de livraison page 216 ; pour toute autre qualité 40 t ou suivant accord.
- Minimum order: for the S 235 JR grade cf. delivery conditions page 216 ; for any other grade 40 t or upon agreement.
- Mindestbestellmenge: für S 235 JR gemäß Lieferbedingungen Seite 216 ; für jede andere Güte 40 t oder nach Vereinbarung.

HL

Notations pages 211-215 / Bezeichnungen Seiten 211-215

Désignation Designation Bezeichnung	Valeurs statiques / Section properties / Statische Kennwerte												Classification ENV 1993-1-1						EN 10025:1993	EN 10113-3:1993	EN 10225:2001
	axe fort y-y strong axis y-y starke Achse y-y					axe faible z-z weak axis z-z schwache Achse z-z							pure bending y-y			pure compression					
G kg/m	I_y mm^4	$W_{el.y}$ mm^3	$W_{pl.y}$♦ mm^3	i_y mm	A_{vz} mm^2	I_z mm^4	$W_{el.z}$ mm^3	$W_{pl.z}$♦ mm^3	i_z mm	s_s mm	I_t mm^4	I_w mm^6	S 235	S 355	S 460	S 235	S 355	S 460			
	x 10^4	x 10^3	x 10^3	x 10	x 10^2	x 10^4	x 10^3	x 10^3	x 10		x 10^4	x 10^9									
HL 920 x 342 342	624900	13700	15450	37,85	190,1	39010	1867	2882	9,46	111,4	1193	75410	1	1	1	3	4	4	✔	HI	HI
HL 920 x 365 365	670500	14640	16520	38,00	200,4	42120	2011	3106	9,52	117,0	1446	81730	1	1	1	3	4	4	✔	HI	HI
HL 920 x 387 387	718300	15600	17630	38,17	210,9	45280	2156	3332	9,58	122,6	1734	88370	1	1	1	2	4	4	✔	HI	HI
HL 920 x 417 417	787600	16970	19210	38,46	223,9	50070	2373	3668	9,70	130,4	2200	98540	1	1	1	2	4	4	✔	HI	HI
HL 920 x 446 446	846800	18150	20600	38,56	239,1	53980	2552	3951	9,73	137,5	2685	106740	1	1	1	2	3	4	✔	HI	
HL 920 x 488 488	935390	19860	22615	38,80	259,3	59010	2797	4336	9,75	148,0	3514	117890	1	1	1	1	2	4	✔	HI	
HL 920 x 534 534	1031000	21710	24830	38,94	284,8	65560	3085	4796	9,82	158,7	4542	132070	1	1	1	1	2	3	✔	HI	
HL 920 x 585 585	1143090	23814	27363	39,16	312,0	72770	3408	5310	9,88	170,9	5932	148220	1	1	1	1	1	2	✔	HI	
HL 920 x 653 653	1292000	26590	30730	39,41	348,7	83050	3854	6022	9,99	186,6	8124	171280	1	1	1	1	1	1	✔	HI	
HL 920 x 784 784	1593000	31980	37340	39,95	417,6	103300	4728	7424	10,18	216,8	13730	218490	1	1	-	1	1	-	○		
HL 920 x 967 967	2033000	39540	46810	40,64	517,1	133900	6003	9486	10,43	257,9	24930	292450	1	1	-	1	1	-	○		
HL 1000 AA 296	618700	12600	14220	40,52	181,5	28850	1443	2235	8,75	105,6	756,9	65670	1	1	2	4	4	4	✔	HI	HI
HL 1000 A 321	696400	14070	15800	41,27	184,6	33120	1656	2555	9,00	113,6	1021	76030	1	1	2	4	4	4	✔	HI	HI
HL 1000 B 371	812100	16240	18330	41,48	212,5	38480	1924	2976	9,03	126,1	1565	89210	1	1	1	4	4	4	✔	HI	HI
HL 1000 M 412	909800	18050	20440	41,66	235,0	43410	2160	3348	9,10	136,1	2128	101460	1	1	1	3	4	4	✔	HI	HI
HL 1000 x 443 443	966510	19101	21777	41,41	261,8	45500	2264	3529	8,98	142,5	2545	106740	1	1	1	2	4	4	✔	HI	
HL 1000 x 483 483	1067480	20931	23923	41,66	282,7	50710	2510	3919	9,08	152,5	3311	119900	1	1	1	2	4	4	✔	HI	
HL 1000 x 539 539	1202540	23350	26824	41,83	316,4	57630	2832	4436	9,16	165,7	4546	137550	1	1	1	1	2	4	✔	HI	
HL 1000 x 554 554	1232000	23880	27500	41,79	328,0	59100	2897	4547	9,15	168,6	4860	141330	1	1	1	1	2	3	✔	HI	
HL 1000 x 591 591	1331040	25597	29530	42,05	346,3	64010	3130	4916	9,22	177,9	5927	154330	1	1	1	1	2	3	✔	HI	
HL 1000 x 642 642	1451000	27680	32100	42,12	379,6	70280	3412	5379	9,27	189,1	7440	170670	1	1	1	1	1	2	✔	HI	
HL 1000 x 748 748	1732000	32430	37880	42,62	438,9	85111	4082	6459	9,45	214,1	11670	210650	1	1	1	1	1	1	✔	HI	
HL 1000 x 883 883	2096000	38390	45260	43,16	516,5	105000	4952	7874	9,66	244,6	18750	265670	1	1	-	1	1	-	○		
HL 1100 A 343	867400	15920	18060	44,58	206,5	33120	1656	2568	8,71	103,4	1037	92710	1	1	2	4	4	4	✔	HI	HI
HL 1100 B 390	1005000	18280	20780	44,98	230,6	38480	1924	2988	8,80	115,4	1564	108680	1	1	1	4	4	4	✔	HI	HI
HL 1100 M 433	1126000	20320	23160	45,19	254,4	43410	2160	3362	8,87	125,4	2130	123500	1	1	1	4	4	4	✔	HI	HI
HL 1100 R 499	1294000	23150	26600	45,14	300,4	49980	2468	3870	8,87	139,4	3135	143410	1	1	1	2	4	4	✔	HI	

HI = HISTAR®

○ Disponible seulement en JR, JO.
♦ W_{pl}: Pour un dimensionnement plastique, la section doit appartenir à la classe 1 ou 2 suivant la capacité de rotation requise. Voir page 215.

○ Only available in JR, JO.
♦ W_{pl}: For plastic design, the shape must belong to class 1 or 2 according to the required rotation capacity. See page 215.

○ Nur in JR, JO verfügbar.
♦ W_{pl}: Bei einer plastischen Bemessung muss das Profil der Klasse 1 oder 2, entsprechend der erforderlichen Rotationskapazität, angehören. Siehe Seite 215.

Fers U à ailes parallèles

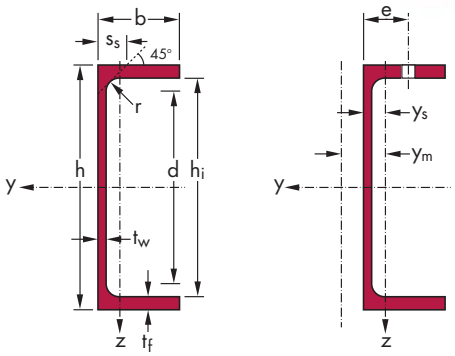
Dimensions: DIN 1026-2: 2002-10
Tolérances: EN 10279: 2000
Etat de surface conforme à EN 10163-3: 1991, classe C, sous-classe 1

Channel with parallel flanges

Dimensions: DIN 1026-2: 2002-10
Tolerances: EN 10279: 2000
Surface condition according to EN 10163-3: 1991, class C, subclass 1

U-Profile mit parallelen Flanschen

Abmessungen: DIN 1026-2: 2002-10
Toleranzen: EN 10279: 2000
Oberflächenbeschaffenheit gemäß EN 10163-3: 1991, Klasse C, Untergruppe 1



Désignation Designation Bezeichnung		Dimensions Abmessungen						Dimensions de construction Dimensions for detailing Konstruktionsmaße					Surface Oberfläche	
	G kg/m	h mm	b mm	t_w mm	t_f mm	r mm	A mm²	h_i mm	d mm	Ø	e_{min} mm	e_{max} mm	A_L m²/m	A_G m²/t
							x 10²							
UPE 80*	7,90	80	50	4	7	10	10,1	66	46	-	-	-	0,34	43,45
UPE 100*	9,82	100	55	4,5	7,5	10	12,5	85	65	M 12	35	36	0,40	41,00
UPE 120*	12,1	120	60	5	8	12	15,4	104	80	M 12	35	41	0,46	37,98
UPE 140*	14,5	140	65	5	9	12	18,4	122	98	M 16	35	38	0,52	35,95
UPE 160*	17,0	160	70	5,5	9,5	12	21,7	141	117	M 16	36	43	0,58	34,01
UPE 180*	19,7	180	75	5,5	10,5	12	25,1	159	135	M 16	36	48	0,64	32,40
UPE 200*	22,8	200	80	6	11	13	29,0	178	152	M 20	46	47	0,70	30,60
UPE 220*	26,6	220	85	6,5	12	13	33,9	196	170	M 22	47	49	0,76	28,43
UPE 240*	30,2	240	90	7	12,5	15	38,5	215	185	M 24	47	51	0,81	26,89
UPE 270*	35,2	270	95	7,5	13,5	15	44,8	243	213	M 27	48	50	0,89	25,34
UPE 300*	44,4	300	100	9,5	15	15	56,6	270	240	M 27	50	55	0,97	21,78
UPE 330*	53,2	330	105	11	16	18	67,8	298	262	M 27	54	60	1,04	19,60
UPE 360*	61,2	360	110	12	17	18	77,9	326	290	M 27	55	65	1,12	18,32
UPE 400*	72,2	400	115	13,5	18	18	91,9	364	328	M 27	57	70	1,22	16,87

* Tonnage minimum et conditions de livraison nécessitent un accord préalable.

* Minimum tonnage and delivery conditions upon agreement.

* Die Mindestmengen pro Bestellung sowie die Lieferbedingungen sind im Voraus zu vereinbaren.

UPE

Notations pages 211-215 / Bezeichnungen Seiten 211-215

Désignation Designation Bezeichnung	Valeurs statiques / Section properties / Statische Kennwerte														Classification ENV 1993-1-1				EN 10025:1993	EN 10113-3:1993	EN 10225:2001
	axe fort y-y strong axis y-y starke Achse y-y					axe faible z-z weak axis z-z schwache Achse z-z									pure bending y-y		pure compression				
G kg/m	I_y mm⁴	$W_{el.y}$ mm³	$W_{pl.y}$ ■ mm³	i_y mm	A_{vz} mm²	I_z mm⁴	$W_{el.z}$ mm³	$W_{pl.z'}$ mm³	i_z mm	s_s mm	I_t mm⁴	I_w mm⁶	y_s mm	y_m mm	S 235	S 355	S 235	S 355			
	x 10^4	x 10^3	x 10^3	x 10	x 10^2	x 10^4	x 10^3	x 10^3	x 10		x 10^4	x 10^9	x 10	x 10							
UPE 80 7,90	107,2	26,80	31,23	3,26	4,05	25,41	7,98	14,28	1,59	16,9	1,47	0,22	1,82	3,71	1	1	1	1	✔		
UPE 100 9,82	206,9	41,37	48,01	4,07	5,34	38,21	10,63	19,34	1,75	17,9	2,01	0,53	1,91	3,93	1	1	1	1	✔		
UPE 120 12,1	363,5	60,58	70,33	4,86	7,18	55,40	13,79	25,28	1,90	20,0	2,90	1,12	1,98	4,12	1	1	1	1	✔	✔	✔
UPE 140 14,5	599,5	85,64	98,84	5,71	8,25	78,70	18,19	33,22	2,07	21,0	4,05	2,20	2,17	4,54	1	1	1	1	✔	✔	✔
UPE 160 17,0	911,1	113,9	131,6	6,48	10,04	106,8	22,58	41,49	2,22	22,0	5,20	3,96	2,27	4,76	1	1	1	1	✔	✔	✔
UPE 180 19,7	1353	150,4	173,0	7,34	11,20	143,7	28,56	52,30	2,39	23,0	6,99	6,81	2,47	5,19	1	1	1	1	✔	✔	✔
UPE 200 22,8	1909	190,9	220,1	8,11	13,50	187,3	34,43	63,28	2,54	24,6	8,89	11,00	2,56	5,41	1	1	1	1	✔	✔	✔
UPE 220 26,6	2682	243,9	281,5	8,90	15,81	246,4	42,51	78,25	2,70	26,1	12,05	17,61	2,70	5,70	1	1	1	1	✔	✔	✔
UPE 240 30,2	3599	299,9	346,9	9,67	18,77	310,9	50,08	92,18	2,84	28,3	15,14	26,42	2,79	5,91	1	1	1	1	✔	✔	✔
UPE 270 35,2	5255	389,2	451,1	10,83	22,23	401,0	60,69	111,6	2,99	29,8	19,91	43,55	2,89	6,14	1	1	1	2	✔	✔	✔
UPE 300 44,4	7823	521,5	613,4	11,76	30,29	537,7	75,58	136,6	3,08	33,3	31,52	72,66	2,89	6,03	1	1	1	1	✔	✔	✔
UPE 330 53,2	11010	667,1	791,9	12,74	38,81	681,5	89,66	156,2	3,17	37,5	45,18	111,8	2,90	6,00	1	1	1	1	✔	✔	✔
UPE 360 61,2	14830	823,6	982,3	13,79	45,61	843,7	105,1	177,8	3,29	39,5	58,49	166,4	2,97	6,12	1	1	1	1	✔	✔	✔
UPE 400 72,2	20980	1049	1263	15,11	56,20	1045	122,6	191,4	3,37	42,0	79,14	259,0	2,98	6,06	1	1	1	1	✔	✔	✔

■ $W_{pl.y}$ est calculé selon l'hypothèse d'un diagramme de contraintes bi-rectangulaire et n'est applicable que si deux ou plusieurs fers U sont associés de façon à constituer une section doublement symétrique pour laquelle un moment de flexion agissant dans le plan du centre de gravité n'engendre pas de torsion.

■ $W_{pl.y}$ is determined assuming a bi-rectangular stress block distribution. Thus, the given value applies only if two or more channels are combined in such a way to form a doubly symmetric cross-section so that the bending moment acting in the plane of the centre of gravity will not lead to torsion.

■ Für die Berechnung von $W_{pl.y}$ wurde eine doppelrechteckige Spannungsverteilung angenommen. Der angegebene Wert ist daher nur anwendbar, wenn zwei oder mehr U-Profile so miteinander kombiniert sind, dass sie einen doppelsymmetrischen Querschnitt bilden, womit ein Biegemoment, das in der Schwerpunktebene angreift, keine Torsion hervorruft.

Fers U à ailes parallèles

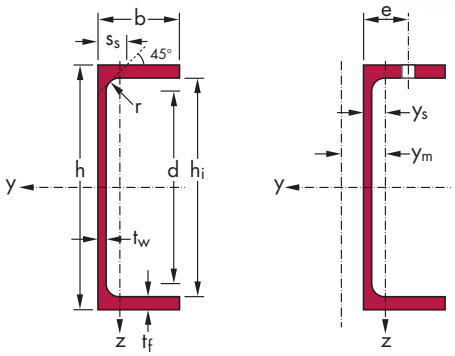
Dimensions: NF A 45-255 (1983)
Tolérances: EN 10279: 2000
Etat de surface conforme à EN 10163-3: 1991, classe C, sous-classe 1

Channels with parallel flanges

Dimensions: NF A 45-255 (1983)
Tolerances: EN 10279: 2000
Surface condition according to EN 10163-3: 1991, class C, subclass 1

U-Profiles mit parallelen Flanschen

Abmessungen: NF A 45-255 (1983)
Toleranzen: EN 10279: 2000
Oberflächenbeschaffenheit gemäß EN 10163-3: 1991, Klasse C, Untergruppe 1



Désignation Designation Bezeichnung		Dimensions Abmessungen						Dimensions de construction Dimensions for detailing Konstruktionsmaße					Surface Oberfläche	
	G kg/m	h mm	b mm	t_w mm	t_f mm	r mm	A mm²	h_i mm	d mm	Ø	e_{min} mm	e_{max} mm	A_L m²/m	A_G m²/t
							x 10²							
UAP 80*	8,38	80	45	5	8	8	10,7	64	48	-	-	-	0,32	38,56
UAP 100*	10,5	100	50	5,5	8,5	8,5	13,4	83	66	M 10	25	30	0,38	36,35
UAP 130*	13,7	130	55	6	9,5	9,5	17,5	111	92	M 10	27	35	0,46	33,48
UAP 150*	17,9	150	65	7	10,25	10,25	22,9	129,5	109	M 16	33	36	0,54	29,96
UAP 175*	21,2	175	70	7,5	10,75	10,75	27,0	153,5	132	M 16	34	41	0,61	28,52
UAP 200*	25,1	200	75	8	11,5	11,5	32,0	177	154	M 16	35	46	0,67	26,86
UAP 220*	28,5	220	80	8	12,5	12,5	36,3	195	170	M 16	36	51	0,73	25,75
UAP 250	34,4	250	85	9	13,5	13,5	43,8	223	196	M 22	43	47	0,81	23,57
UAP 300	46,0	300	100	9,5	16	16	58,6	268	236	M 27	51	53	0,97	21,04

* Tonnage minimum et conditions de livraison nécessitent un accord préalable.

* Minimum tonnage and delivery conditions upon agreement.

* Die Mindestmengen pro Bestellung sowie die Lieferbedingungen sind im Voraus zu vereinbaren.

UAP

Notations pages 211-215 / Bezeichnungen Seiten 211-215

Désignation Designation Bezeichnung	Valeurs statiques / Section properties / Statische Kennwerte														Classification ENV 1993-1-1				EN 10025:1993	EN 10113-3:1993	EN 10225:2001
	axe fort y-y strong axis y-y starke Achse y-y					axe faible z-z weak axis z-z schwache Achse z-z									pure bending y-y		pure compression				
G kg/m	I_y mm⁴	$W_{el.y}$ mm³	$W_{pl.y}$ ■ mm³	i_y mm	A_{vz} mm²	I_z mm⁴	$W_{el.z}$ mm³	$W_{pl.z'}$ mm³	i_z mm	s_s mm	I_t mm⁴	I_w mm⁶	y_s mm	y_m mm	S 235	S 355	S 235	S 355			
	x 10^4	x 10^3	x 10^3	x 10	x 10^2	x 10^4	x 10^3	x 10^3	x 10		x 10^4	x 10^9	x 10	x 10							
UAP 80 8,38	107,1	26,78	31,87	3,17	4,51	21,33	7,38	13,64	1,41	17,7	1,90	0,18	1,61	3,17	1	1	1	1	✔		
UAP 100 10,5	209,5	41,90	49,59	3,96	6,07	32,83	9,95	18,47	1,57	19,0	2,65	0,45	1,70	3,38	1	1	1	1	✔		
UAP 130 13,7	459,6	70,70	83,51	5,12	8,52	51,34	13,78	25,55	1,71	21,1	4,15	1,22	1,77	3,56	1	1	1	1	✔		
UAP 150 17,9	796,1	106,1	125,3	5,90	11,28	93,25	20,97	38,78	2,02	23,3	6,51	2,99	2,05	4,15	1	1	1	1	✔		
UAP 175 21,2	1270	145,1	171,5	6,85	13,97	126,4	25,92	47,47	2,16	24,5	8,43	5,62	2,12	4,32	1	1	1	1	✔		
UAP 200 25,1	1946	194,6	230,1	7,80	16,97	169,7	32,13	58,29	2,30	26,2	11,24	9,98	2,22	4,53	1	1	1	1	✔		
UAP 220 28,5	2710	246,4	289,9	8,64	18,83	222,3	39,68	72,56	2,48	27,8	14,40	15,82	2,40	4,94	1	1	1	1	✔		
UAP 250 34,4	4136	330,9	391,8	9,72	23,89	295,4	48,87	87,65	2,60	30,4	20,38	27,43	2,45	5,04	1	1	1	1	✔		
UAP 300 46,0	8170	544,7	639,3	11,81	30,64	562,1	79,88	145,8	3,10	34,9	36,30	75,04	2,96	6,17	1	1	1	1	✔		

- $W_{pl.y}$ est calculé selon l'hypothèse d'un diagramme de contraintes bi-rectangulaire et n'est applicable que si deux ou plusieurs fers U sont associés de façon à constituer une section doublement symétrique pour laquelle un moment de flexion agissant dans le plan du centre de gravité n'engendre pas de torsion.
- $W_{pl.y}$ is determined assuming a bi-rectangular stress block distribution. Thus, the given value applies only if two or more channels are combined in such a way to form a doubly symmetric cross-section so that the bending moment acting in the plane of the centre of gravity will not lead to torsion.
- Für die Berechnung von $W_{pl.y}$ wurde eine doppelrechteckige Spannungsverteilung angenommen. Der angegebene Wert ist daher nur anwendbar, wenn zwei oder mehr U-Profile so miteinander kombiniert sind, dass sie einen doppelsymmetrischen Querschnitt bilden, womit ein Biegemoment, das in der Schwerpunktebene angreift, keine Torsion hervorruft.

Fers U normaux européens

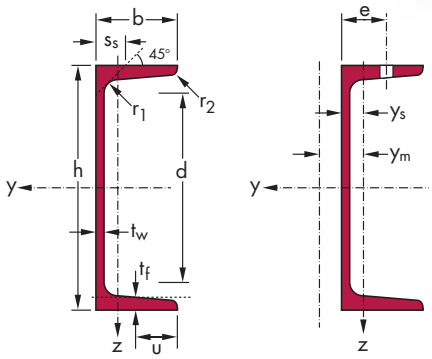
Dimensions: DIN 1026-1: 2000, NF A 45-202 (1983)
Tolérances: EN 10279: 2000
Etat de surface conforme à EN 10163-3: 1991, classe C, sous-classe 1

European standard channels

Dimensions: DIN 1026-1: 2000, NF A 45-202 (1983)
Tolerances: EN 10279: 2000
Surface condition according to EN 10163-3: 1991, class C, subclass 1

Europäische U-Stahl-Normalprofile

Abmessungen: DIN 1026-1: 2000, NF A 45-202 (1983)
Toleranzen: EN 10279: 2000
Oberflächenbeschaffenheit gemäß EN 10163-3: 1991, Klasse C, Untergruppe 1



Désignation Designation Bezeichnung		Dimensions Abmessungen							Dimensions de construction Dimensions for detailing Konstruktionsmaße				Surface Oberfläche	
	G kg/m	h mm	b mm	t_w mm	t_f mm	r_1 mm	r_2 mm	A mm²	d mm	Ø	e_{min} mm	e_{max} mm	A_L m²/m	A_G m²/t
								x 10²						
UPN 80*	8,65	80	45	6	8	8	4	11,02	47	-	-	-	0,321	37,10
UPN 100*	10,6	100	50	6	8,5	8,5	4,5	13,50	64	-	-	-	0,372	35,10
UPN 120	13,4	120	55	7	9	9	4,5	17,00	82	-	-	-	0,434	32,52
UPN 140	16,0	140	60	7	10	10	5	20,40	98	M 12	33	37	0,489	30,54
UPN 160	18,8	160	65	7,5	10,5	10,5	5,5	24,00	115	M 12	34	42	0,546	28,98
UPN 180	22,0	180	70	8	11	11	5,5	28,00	133	M 16	38	41	0,611	27,80
UPN 200	25,3	200	75	8,5	11,5	11,5	6	32,20	151	M 16	39	46	0,661	26,15
UPN 220	29,4	220	80	9	12,5	12,5	6,5	37,40	167	M 16	40	51	0,718	24,46
UPN 240	33,2	240	85	9,5	13	13	6,5	42,30	184	M 20	46	50	0,775	23,34
UPN 260	37,9	260	90	10	14	14	7	48,30	200	M 22	50	52	0,834	22,00
UPN 280	41,8	280	95	10	15	15	7,5	53,30	216	M 22	52	57	0,890	21,27
UPN 300	46,2	300	100	10	16	16	8	58,80	232	M 24	55	59	0,950	20,58
UPN 320*	59,5	320	100	14	17,5	17,5	8,75	75,80	246	M 22	58	62	0,982	16,50
UPN 350	60,6	350	100	14	16	16	8	77,30	282	M 22	56	62	1,047	17,25
UPN 380*	63,1	380	102	13,5	16	16	8	80,40	313	M 24	59	60	1,110	17,59
UPN 400*	71,8	400	110	14	18	18	9	91,50	324	M 27	61	62	1,182	16,46

	h≤300	h>300
u	$\frac{b}{2}$	$\frac{b - t_w}{2}$
Inclinaison des ailes Flange slope Flanschneigung	8%	5%

* Tonnage minimum et conditions de livraison nécessitent un accord préalable.

* Minimum tonnage and delivery conditions upon agreement.

* Die Mindestmengen pro Bestellung sowie die Lieferbedingungen sind im Voraus zu vereinbaren.

UPN

Notations pages 211-215 / Bezeichnungen Seiten 211-215

Désignation Designation Bezeichnung	G	Valeurs statiques / Section properties / Statische Kennwerte														Classification ENV 1993-1-1				EN 10025:1993	EN 10113-3:1993	EN 10225:2001
		axe fort y-y strong axis y-y starke Achse y-y					axe faible z-z weak axis z-z schwache Achse z-z									pure bending y-y		pure compression				
	kg/m	I_y mm^4	$W_{el.y}$ mm^3	$W_{pl.y}$ ■ mm^3	i_y mm	A_{vz} mm^2	I_z mm^4	$W_{el.z}$ mm^3	$W_{pl.z'}$ mm^3	i_z mm	s_s mm	I_t mm^4	I_w mm^6	y_s mm	y_m mm	S 235	S 355	S 235	S 355			
		x 10^4	x 10^3	x 10^3	x 10	x 10^2	x 10^4	x 10^3	x 10^3	x 10		x 10^4	x 10^9	x 10	x 10							
UPN 80	8,65	106	26,6	32,3	3,10	4,90	19,4	6,38	11,9	1,33	19,4	2,20	0,18	1,42	2,65	1	1	1	1	✔		
UPN 100	10,6	206	41,2	49,0	3,91	6,46	29,3	8,49	16,2	1,47	20,3	2,81	0,41	1,55	2,93	1	1	1	1	✔	✔	✔
UPN 120	13,4	364	60,7	72,6	4,62	8,80	43,2	11,1	21,2	1,59	22,2	4,15	0,90	1,60	3,03	1	1	1	1	✔	✔	✔
UPN 140	16,0	605	86,4	103	5,45	10,41	62,7	14,8	28,3	1,75	23,9	5,68	1,80	1,75	3,37	1	1	1	1	✔	✔	✔
UPN 160	18,8	925	116	138	6,21	12,60	85,3	18,3	35,2	1,89	25,3	7,39	3,26	1,84	3,56	1	1	1	1	✔	✔	✔
UPN 180	22,0	1350	150	179	6,95	15,09	114	22,4	42,9	2,02	26,7	9,55	5,57	1,92	3,75	1	1	1	1	✔	✔	✔
UPN 200	25,3	1910	191	228	7,70	17,71	148	27,0	51,8	2,14	28,1	11,9	9,07	2,01	3,94	1	1	1	1	✔	✔	✔
UPN 220	29,4	2690	245	292	8,48	20,62	197	33,6	64,1	2,30	30,3	16,0	14,6	2,14	4,20	1	1	1	1	✔	✔	✔
UPN 240	33,2	3600	300	358	9,22	23,71	248	39,6	75,7	2,42	31,7	19,7	22,1	2,23	4,39	1	1	1	1	✔	✔	✔
UPN 260	37,9	4820	371	442	9,99	27,12	317	47,7	91,6	2,56	33,9	25,5	33,3	2,36	4,66	1	1	1	1	✔	✔	✔
UPN 280	41,8	6280	448	532	10,9	29,28	399	57,2	109	2,74	35,6	31,0	48,5	2,53	5,02	1	1	1	1	✔	✔	✔
UPN 300	46,2	8030	535	632	11,7	31,77	495	67,8	130	2,90	37,3	37,4	69,1	2,70	5,41	1	1	1	1	✔	✔	✔
UPN 320	59,5	10870	679	826	12,1	47,11	597	80,6	152	2,81	43,0	66,7	96,1	2,60	4,82	1	1	1	1	✔		
UPN 350	60,6	12840	734	918	12,9	50,84	570	75,0	143	2,72	40,7	61,2	114	2,40	4,45	1	1	1	1	✔	✔	✔
UPN 380	63,1	15760	829	1014	14,0	53,23	615	78,7	148	2,77	40,3	59,1	146	2,38	4,58	1	1	1	1	✔		
UPN 400	71,8	20350	1020	1240	14,9	58,55	846	102	190	3,04	44,0	81,6	221	2,65	5,11	1	1	1	1	✔		

■ $W_{pl.y}$ est calculé selon l'hypothèse d'un diagramme de contraintes bi-rectangulaire et n'est applicable que si deux ou plusieurs fers U sont associés de façon à constituer une section doublement symétrique pour laquelle un moment de flexion agissant dans le plan du centre de gravité n'engendre pas de torsion.

■ $W_{pl.y}$ is determined assuming a bi-rectangular stress block distribution. Thus, the given value applies only if two or more channels are combined in such a way to form a doubly symmetric cross-section so that the bending moment acting in the plane of the centre of gravity will not lead to torsion.

■ Für die Berechnung von $W_{pl.y}$ wurde eine doppelrechteckige Spannungsverteilung angenommen. Der angegebene Wert ist daher nur anwendbar, wenn zwei oder mehr U-Profile so miteinander kombiniert sind, dass sie einen doppelsymmetrischen Querschnitt bilden, womit ein Biegemoment, das in der Schwerpunktebene angreift, keine Torsion hervorruft.

Fers U à ailes inclinées

Tolérances EN 10279: 2000

Etat de surface conforme à EN 10163-3: 1991, classe C, sous-classe 1

European channels with taper flanges

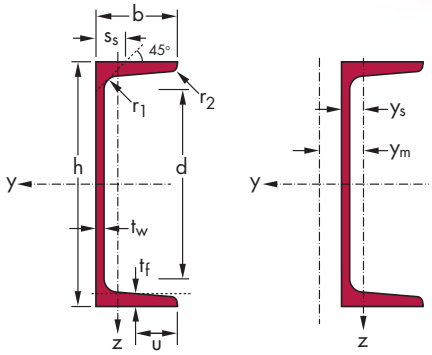
Tolerances: EN 10279: 2000

Surface condition according to EN 10163-3: 1991, class C, subclass 1

U-Profile mit geneigten inneren Flanschflächen

Toleranzen: EN 10279: 2000

Oberflächenbeschaffenheit gemäß EN 10163-3: 1991, Klasse C, Untergruppe 1



Désignation Designation Bezeichnung		Dimensions Abmessungen								Surface Oberfläche	
	G kg/m	h mm	b mm	t_w mm	t_f mm	r_1 mm	r_2 mm	d mm	A mm^2	A_L m^2/m	A_G m^2/t
									x 10^2		
U 40 x 20*	2,87	40	20	5	5,5	5	2,5	19	3,66	0,150	51,20
U 50 x 25*	3,86	50	25	5	6	6	3	26	4,92	0,180	48,22
U 60 x 30*	5,07	60	30	6	6	6	3	36	6,46	0,220	44,06
U 65 x 42*	7,09	65	42	5,5	7,5	7,5	4	34	9,03	0,280	39,58

* Tonnage minimum et conditions de livraison nécessitent un accord préalable.

* Minimum tonnage and delivery conditions upon agreement.

* Die Mindestmengen pro Bestellung sowie die Lieferbedingungen sind im Voraus zu vereinbaren.

Notations pages 211-215 / Bezeichnungen Seiten 211-215

Désignation Designation Bezeichnung	Valeurs statiques / Section properties / Statische Kennwerte														Classification ENV 1993-1-1				EN 10025:1993	EN 10113-3:1993	EN 10225:2001
	axe fort y-y strong axis y-y starke Achse y-y					axe faible z-z weak axis z-z schwache Achse z-z									pure bending y-y		pure compression				
G kg/m	I_y mm^4	$W_{el.y}$ mm^3	$W_{pl.y}$ ■ mm^3	i_y mm	A_{vz} mm^2	I_z mm^4	$W_{el.z}$ mm^3	$W_{pl.z'}$ mm^3	i_z mm	s_s mm	I_t mm^4	I_w mm^6	y_s mm	y_m mm	S 235	S 355	S 235	S 355			
	x 10^4	x 10^3	x 10^3	x 10	x 10^2	x 10^4	x 10^3	x 10^3	x 10		x 10^4	x 10^9	x 10	x 10							
U 40 x 20 2,87	7,62	3,81	4,91	1,44	1,96	1,15	0,86	1,65	0,56	13,4	0,39	0,003	0,67	1,03	1	1	1	1	✔		
U 50 x 25 3,86	16,9	6,76	8,52	1,85	2,52	2,50	1,48	2,84	0,71	14,6	0,59	0,009	0,81	1,36	1	1	1	1	✔		
U 60 x 30 5,07	31,7	10,56	13,3	2,21	3,54	4,53	2,16	4,19	0,84	15,8	0,89	0,024	0,90	1,52	1	1	1	1	✔		
U 65 x 42 7,09	57,7	17,77	21,7	2,53	3,68	14,1	5,06	9,38	1,25	18,0	1,61	0,082	1,39	2,58	1	1	1	1	✔		

■ $W_{pl.y}$ est calculé selon l'hypothèse d'un diagramme de contraintes bi-rectangulaire et n'est applicable que si deux ou plusieurs fers U sont associés de façon à constituer une section doublement symétrique pour laquelle un moment de flexion agissant dans le plan du centre de gravité n'engendre pas de torsion.

■ $W_{pl.y}$ is determined assuming a bi-rectangular stress block distribution. Thus, the given value applies only if two or more channels are combined in such a way to form a doubly symmetric cross-section so that the bending moment acting in the plane of the centre of gravity will not lead to torsion.

■ Für die Berechnung von $W_{pl.y}$ wurde eine doppelrechteckige Spannungsverteilung angenommen. Der angegebene Wert ist daher nur anwendbar, wenn zwei oder mehr U-Profile so miteinander kombiniert sind, dass sie einen doppelsymmetrischen Querschnitt bilden, womit ein Biegemoment, das in der Schwerpunktebene angreift, keine Torsion hervorruft.

Cornières à ailes égales▾

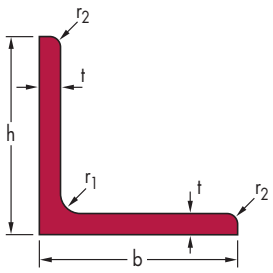
Dimensions: EN 10056-1: 1998
Tolérances: EN 10056-2: 1994
Etat de surface conforme à EN 10163-3: 1991, classe C, sous-classe 1

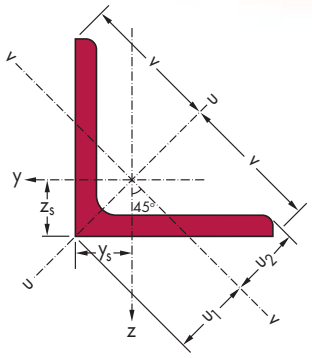
Equal leg angles▾

Dimensions: EN 10056-1: 1998
Tolerances: EN 10056-2: 1994
Surface condition according to EN 10163-3: 1991, class C, subclass 1

Gleichschenkliger Winkelstahl▾

Abmessungen: EN 10056-1: 1998
Toleranzen: EN 10056-2: 1994
Oberflächenbeschaffenheit gemäß EN 10163-3: 1991, Klasse C, Untergruppe 1





Désignation Designation Bezeichnung		Dimensions Abmessungen					Position des axes Position of axes Lage der Achsen				Surface Oberfläche	
	G kg/m	h = b mm	t mm	r_1 mm	r_2 mm	A mm²	$z_s = y_s$ mm	v mm	u_1 mm	u_2 mm	A_L m²/m	A_G m²/t
						x 10²	x 10	x 10	x 10	x 10		
L 20 x 20 x 3-	0,882	20	3	3,5	2	1,12	0,60	1,41	0,84	0,70	0,080	87,40
L 25 x 25 x 3×/-	1,12	25	3	3,5	2	1,42	0,72	1,77	1,02	0,88	0,100	86,88
L 25 x 25 x 4×/-	1,45	25	4	3,5	2	1,85	0,76	1,77	1,08	0,89	0,100	66,67
L 30 x 30 x 3×/-	1,36	30	3	5	2,5	1,74	0,84	2,12	1,18	1,05	0,120	84,87
L 30 x 30 x 4×/-	1,78	30	4	5	2,5	2,27	0,88	2,12	1,24	1,06	0,120	65,02
L 35 x 35 x 4×/-	2,09	35	4	5	2,5	2,67	1,00	2,47	1,42	1,24	0,140	64,82
L 40 x 40 x 4×/-	2,42	40	4	6	3	3,08	1,12	2,83	1,58	1,40	0,150	64,07
L 40 x 40 x 5×/-	2,97	40	5	6	3	3,79	1,16	2,83	1,64	1,41	0,150	52,07
L 45 x 45 x 4,5×/-	3,06	45	4,5	7	3,5	3,90	1,26	3,18	1,78	1,58	0,170	56,83
L 50 x 50 x 4×/-	3,06	50	4	7	3,5	3,89	1,36	3,54	1,92	1,75	0,190	63,49
L 50 x 50 x 5×/-	3,77	50	5	7	3,5	4,80	1,40	3,54	1,99	1,76	0,190	51,46
L 50 x 50 x 6×/-	4,47	50	6	7	3,5	5,69	1,45	3,54	2,04	1,77	0,190	43,41
L 60 x 60 x 5×/-	4,57	60	5	8	4	5,82	1,64	4,24	2,32	2,11	0,230	51,04
L 60 x 60 x 6×/-	5,42	60	6	8	4	6,91	1,69	4,24	2,39	2,11	0,230	42,99
L 60 x 60 x 8×/-	7,09	60	8	8	4	9,03	1,77	4,24	2,50	2,14	0,230	32,89
L 65 x 65 x 7-	6,83	65	7	9	4,5	8,70	1,85	4,60	2,61	2,29	0,250	36,95
L 70 x 70 x 6-	6,38	70	6	9	4,5	8,13	1,93	4,95	2,73	2,46	0,270	42,68
L 70 x 70 x 7-	7,38	70	7	9	4,5	9,40	1,97	4,95	2,79	2,47	0,270	36,91
L 75 x 75 x 6-	6,85	75	6	10	5	8,73	2,04	5,30	2,89	2,63	0,290	42,44
L 75 x 75 x 8-	8,99	75	8	10	5	11,4	2,13	5,30	3,01	2,65	0,290	32,37

▾ Autres dimensions sur demande. Le rayon r_2 peut être inférieur en fonction du procédé de laminage.
× Avec arêtes vives sur commande.
- Profilé conforme à EN 10056-1: 1998.

▾ Other dimensions on request. The r_2 radius may be smaller depending on the rolling process.
× Available with sharp edges.
- Section in accordance with EN 10056-1: 1998.

▾ Andere Abmessungen auf Anfrage. Der Radius r_2 kann je nach Walzprozess kleiner sein.
× Auch mit scharfen Kanten erhältlich.
- Profil gemäß EN 10056-1: 1998.

Notations pages 211-215 / Bezeichnungen Seiten 211-215

Désignation Designation Bezeichnung		Valeurs statiques / Section properties / Statische Kennwerte								Classification ENV 1993-1-1				
		axe y-y / axe z-z axis y-y / axis z-z Achse y-y / Achse z-z			axe u-u axis u-u Achse u-u		axe v-v axis v-v Achse v-v			pure compression		EN 10025:1993	EN 10113-3:1993	EN 10225:2001
	G	$I_y = I_z$	$W_{el.y} = W_{el.z}$	$i_y = i_y$	I_u	i_u	I_v	i_v	I_{yz}	S 235	S 355			
	kg/m	mm^4	mm^3	mm	mm^4	mm	mm^4	mm	mm^4					
		x 10^4	x 10^3	x 10	x 10^4	x 10	x 10^4	x 10	x 10^4					
L 20 x 20 x 3	0,882	0,39	0,28	0,59	0,61	0,74	0,16	0,38	-0,23	1	1	✔		
L 25 x 25 x 3	1,12	0,80	0,45	0,75	1,26	0,94	0,33	0,48	-0,47	1	2	✔		
L 25 x 25 x 4	1,45	1,01	0,58	0,74	1,60	0,93	0,43	0,48	-0,59	1	1	✔		
L 30 x 30 x 3	1,36	1,40	0,65	0,90	2,23	1,13	0,58	0,58	-0,83	1	4	✔		
L 30 x 30 x 4	1,78	1,80	0,85	0,89	2,86	1,12	0,75	0,57	-1,05	1	1	✔		
L 35 x 35 x 4	2,09	2,95	1,18	1,05	4,69	1,33	1,22	0,68	-1,73	1	2	✔		
L 40 x 40 x 4	2,42	4,47	1,55	1,21	7,10	1,52	1,84	0,77	-2,63	1	4	✔		
L 40 x 40 x 5	2,97	5,43	1,91	1,20	8,61	1,51	2,25	0,77	-3,18	1	1	✔		
L 45 x 45 x 4,5	3,06	7,15	2,20	1,35	11,35	1,71	2,94	0,87	-4,20	1	4	✔		
L 50 x 50 x 4	3,06	8,97	2,46	1,52	14,25	1,91	3,69	0,97	-5,28	4	4	✔		
L 50 x 50 x 5	3,77	10,96	3,05	1,51	17,42	1,90	4,51	0,97	-6,45	1	4	✔		
L 50 x 50 x 6	4,47	12,84	3,61	1,50	20,37	1,89	5,31	0,97	-7,53	1	2	✔		
L 60 x 60 x 5	4,57	19,37	4,45	1,82	30,78	2,30	7,97	1,17	-11,41	4	4	✔		
L 60 x 60 x 6	5,42	22,79	5,29	1,82	36,21	2,29	9,38	1,17	-13,41	1	4	✔		
L 60 x 60 x 8	7,09	29,15	6,89	1,80	46,20	2,26	12,11	1,16	-17,04	1	1	✔		
L 65 x 65 x 7	6,83	33,43	7,18	1,96	53,09	2,47	13,78	1,26	-19,65	1	3	✔		
L 70 x 70 x 6	6,38	36,88	7,27	2,13	58,61	2,69	15,16	1,37	-21,73	4	4	✔		
L 70 x 70 x 7	7,38	42,30	8,41	2,12	67,19	2,67	17,40	1,36	-24,90	1	4	✔		
L 75 x 75 x 6	6,85	45,57	8,35	2,28	72,40	2,88	18,74	1,46	-26,83	4	4	✔		
L 75 x 75 x 8	8,99	58,87	10,96	2,27	93,49	2,86	24,25	1,45	-34,62	1	4	✔		

Cornières à ailes égales▾ (suite)

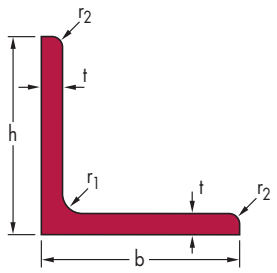
Dimensions: EN 10056-1: 1998
Tolérances: EN 10056-2: 1994
Etat de surface conforme à EN 10163-3: 1991, classe C, sous-classe 1

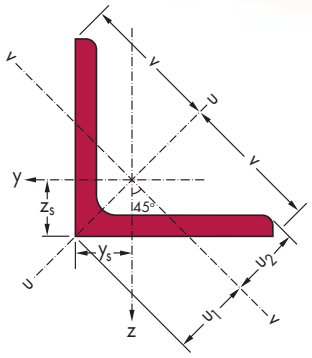
Equal leg angles▾ (continued)

Dimensions: EN 10056-1: 1998
Tolerances: EN 10056-2: 1994
Surface condition according to EN 10163-3: 1991, class C, subclass 1

Gleichschenkliger Winkelstahl▾ (Fortsetzung)

Abmessungen: EN 10056-1: 1998
Toleranzen: EN 10056-2: 1994
Oberflächenbeschaffenheit gemäß EN 10163-3: 1991, Klasse C, Untergruppe 1





Désignation Designation Bezeichnung		Dimensions Abmessungen					Position des axes Position of axes Lage der Achsen				Surface Oberfläche	
	G kg/m	h = b mm	t mm	r_1 mm	r_2 mm	A mm²	$z_s = y_s$ mm	v mm	u_1 mm	u_2 mm	A_L m²/m	A_G m²/t
						x 10²	x 10	x 10	x 10	x 10		
L 80 x 80 x 8-	9,63	80	8	10	5	12,3	2,26	5,66	3,19	2,83	0,310	32,34
L 80 x 80 x 10-	11,9	80	10	10	5	15,1	2,34	5,66	3,30	2,85	0,310	26,26
L 90 x 90 x 7-	9,61	90	7	11	5,5	12,2	2,45	6,36	3,47	3,16	0,350	36,48
L 90 x 90 x 8-	10,9	90	8	11	5,5	13,9	2,50	6,36	3,53	3,17	0,350	32,15
L 90 x 90 x 9-	12,2	90	9	11	5,5	15,5	2,54	6,36	3,59	3,18	0,350	28,77
L 90 x 90 x 10-	13,4	90	10	11	5,5	17,1	2,58	6,36	3,65	3,19	0,350	26,07
L 100 x 100 x 8*/+/-	12,2	100	8	12	6	15,5	2,74	7,07	3,87	3,52	0,390	32,00
L 100 x 100 x 10*/+/-	15,0	100	10	12	6	19,2	2,82	7,07	3,99	3,54	0,390	25,92
L 100 x 100 x 12*/+/-	17,8	100	12	12	6	22,7	2,90	7,07	4,11	3,57	0,390	21,86
L 110 x 110 x 10*/+	16,6	110	10	13	6,5	21,2	3,06	7,78	4,33	3,88	0,429	25,79
L 110 x 110 x 12*	19,7	110	12	13	6,5	25,1	3,15	7,78	4,45	3,91	0,429	21,73
L 120 x 120 x 10-	18,2	120	10	13	6,5	23,2	3,31	8,49	4,69	4,24	0,469	25,76
L 120 x 120 x 11	19,9	120	11	13	6,5	25,4	3,36	8,49	4,75	4,25	0,469	23,54
L 120 x 120 x 12-	21,6	120	12	13	6,5	27,5	3,40	8,49	4,80	4,26	0,469	21,69
L 120 x 120 x 13	23,3	120	13	13	6,5	29,7	3,44	8,49	4,86	4,28	0,469	20,12
L 120 x 120 x 15	26,6	120	15	13	6,5	33,9	3,51	8,49	4,97	4,31	0,469	17,60
L 130 x 130 x 12-/*	23,6	130	12	14	7	30,0	3,64	9,19	5,15	4,60	0,508	21,59
L 140 x 140 x 10*	21,4	140	10	15	7,5	27,2	3,79	9,90	5,37	4,93	0,547	25,59
L 140 x 140 x 13*	27,4	140	13	15	7,5	35,0	3,92	9,90	5,55	4,96	0,547	19,94

▾ Autres dimensions sur demande. Le rayon r_2 peut être inférieur en fonction du procédé de laminage.
- Profilé conforme à EN 10056-1: 1998.
* Tonnage minimum et conditions de livraison nécessitent un accord préalable.
\+ Commande minimale: 40 t par profilé et qualité ou suivant accord.

▾ Other dimensions on request. The r_2 radius may be smaller depending on the rolling process.
- Section in accordance with EN 10056-1: 1998.
* Minimum tonnage and delivery conditions upon agreement.
\+ Minimum order: 40 t per section and grade or upon agreement.

▾ Andere Abmessungen auf Anfrage. Der Radius r_2 kann je nach Walzprozess kleiner
- Profil gemäß EN 10056-1: 1998.
* Die Mindestmengen pro Bestellung sowie die Lieferbedingungen sind im Voraus zu vereinbaren.
\+ Mindestbestellmenge: 40 t pro Profil und Güte oder nach Vereinbarung.

Notations pages 211-215 / Bezeichnungen Seiten 211-215

Désignation Designation Bezeichnung		Valeurs statiques / Section properties / Statische Kennwerte								Classification ENV 1993-1-1				
		axe y-y / axe z-z axis y-y / axis z-z Achse y-y / Achse z-z			axe u-u axis u-u Achse u-u		axe v-v axis v-v Achse v-v			pure compression		EN 10025:1993	EN 10113-3:1993	EN 10225:2001
	G kg/m	$I_y = I_z$ mm^4	$W_{el.y} = W_{el.z}$ mm^3	$i_y = i_y$ mm	I_u mm^4	i_u mm	I_v mm^4	i_v mm	I_{yz} mm^4	S 235	S 355			
		x 10^4	x 10^3	x 10	x 10^4	x 10	x 10^4	x 10	x 10^4					
L 80 x 80 x 8	9,63	72,25	12,58	2,43	114,8	3,06	29,72	1,56	-42,53	1	4	✔		
L 80 x 80 x 10	11,9	87,50	15,45	2,41	138,8	3,03	36,23	1,55	-51,27	1	1	✔		
L 90 x 90 x 7	9,61	92,55	14,13	2,75	147,1	3,47	38,02	1,76	-54,53	4	4	✔		
L 90 x 90 x 8	10,9	104,4	16,05	2,74	165,9	3,46	42,87	1,76	-61,51	3	4	✔		
L 90 x 90 x 9	12,2	115,8	17,93	2,73	184,0	3,44	47,63	1,75	-68,20	1	4	✔		
L 90 x 90 x 10	13,4	126,9	19,77	2,72	201,5	3,43	52,32	1,75	-74,60	1	3	✔		
L 100 x 100 x 8	12,2	144,8	19,94	3,06	230,2	3,85	59,47	1,96	-85,37	4	4	✔		
L 100 x 100 x 10	15,0	176,7	24,62	3,04	280,7	3,83	72,65	1,95	-104,0	1	4	✔		
L 100 x 100 x 12	17,8	206,7	29,12	3,02	328,0	3,80	85,42	1,94	-121,3	1	2	✔		
L 110 x 110 x 10	16,6	238,0	29,99	3,35	378,2	4,23	97,72	2,15	-140,3	2	4	✔		
L 110 x 110 x 12	19,7	279,1	35,54	3,33	443,3	4,20	115,0	2,14	-164,1	1	3	✔		
L 120 x 120 x 10	18,2	312,9	36,03	3,67	497,6	4,63	128,3	2,35	-184,6	4	4	✔		
L 120 x 120 x 11	19,9	340,6	39,41	3,66	541,5	4,62	139,8	2,35	-200,9	2	4	✔		
L 120 x 120 x 12	21,6	367,7	42,73	3,65	584,3	4,61	151,0	2,34	-216,6	1	4	✔		
L 120 x 120 x 13	23,3	394,0	46,01	3,64	625,9	4,59	162,2	2,34	-231,8	1	3	✔		
L 120 x 120 x 15	26,6	444,9	52,43	3,62	705,6	4,56	184,2	2,33	-260,7	1	1	✔		
L 130 x 130 x 12	23,6	472,2	50,44	3,97	750,6	5,00	193,7	2,54	-278,5	2	4	✔		
L 140 x 140 x 10	21,4	504,4	49,43	4,30	802,0	5,43	206,8	2,76	-297,6	4	4	✔		
L 140 x 140 x 13	27,4	638,5	63,37	4,27	1015	5,39	262,0	2,74	-376,6	2	4	✔		

Cornières à ailes égales▼ (suite)

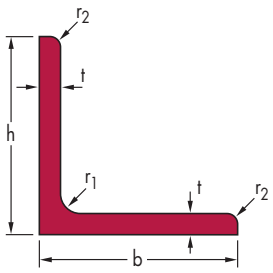
Dimensions: EN 10056-1: 1998
Tolérances: EN 10056-2: 1994
Etat de surface conforme à EN 10163-3: 1991, classe C, sous-classe 1

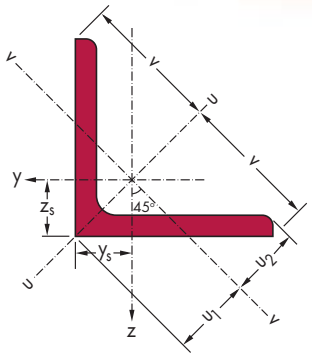
Equal leg angles▼ (continued)

Dimensions: EN 10056-1: 1998
Tolerances: EN 10056-2: 1994
Surface condition according to EN 10163-3: 1991, class C, subclass 1

Gleichschenkliger Winkelstahl▼ (Fortsetzung)

Abmessungen: EN 10056-1: 1998
Toleranzen: EN 10056-2: 1994
Oberflächenbeschaffenheit gemäß EN 10163-3: 1991, Klasse C, Untergruppe 1





Désignation Designation Bezeichnung		Dimensions Abmessungen					Position des axes Position of axes Lage der Achsen				Surface Oberfläche	
	G kg/m	h = b mm	t mm	r_1 mm	r_2 mm	A mm²	$z_s = y_s$ mm	v mm	u_1 mm	u_2 mm	A_L m²/m	A_G m²/t
						x 10^2	x 10	x 10	x 10	x 10		
L 150 x 150 x 10-/+	23,0	150	10	16	8	29,3	4,03	10,61	5,71	5,28	0,586	25,51
L 150 x 150 x 12-/+	27,3	150	12	16	8	34,8	4,12	10,61	5,83	5,29	0,586	21,44
L 150 x 150 x 14+	31,6	150	14	16	8	40,3	4,21	10,61	5,95	5,32	0,586	18,53
L 150 x 150 x 15-/+	33,8	150	15	16	8	43,0	4,25	10,61	6,01	5,33	0,586	17,36
L 150 x 150 x 18+	40,1	150	18	16	8	51,0	4,37	10,61	6,17	5,37	0,586	14,63
L 160 x 160 x 14+	33,9	160	14	17	8,5	43,2	4,45	11,31	6,29	5,66	0,625	18,46
L 160 x 160 x 15-/+	36,2	160	15	17	8,5	46,1	4,49	11,31	6,35	5,67	0,625	17,30
L 160 x 160 x 16+	38,4	160	16	17	8,5	49,0	4,53	11,31	6,41	5,69	0,625	16,28
L 160 x 160 x 17+	40,7	160	17	17	8,5	51,8	4,57	11,31	6,46	5,70	0,625	15,37
L 180 x 180 x 13+	35,7	180	13	18	9	45,5	4,90	12,73	6,93	6,35	0,705	19,74
L 180 x 180 x 14+	38,3	180	14	18	9	48,8	4,94	12,73	6,99	6,36	0,705	18,40
L 180 x 180 x 15+	40,9	180	15	18	9	52,1	4,98	12,73	7,05	6,37	0,705	17,23
L 180 x 180 x 16-/+	43,5	180	16	18	9	55,4	5,02	12,73	7,10	6,38	0,705	16,20
L 180 x 180 x 17+	46,0	180	17	18	9	58,7	5,06	12,73	7,16	6,40	0,705	15,30
L 180 x 180 x 18-/+	48,6	180	18	18	9	61,9	5,10	12,73	7,22	6,41	0,705	14,50
L 180 x 180 x 19+	51,1	180	19	18	9	65,1	5,14	12,73	7,27	6,42	0,705	13,78
L 180 x 180 x 20+	53,7	180	20	18	9	68,4	5,18	12,73	7,33	6,44	0,705	13,13

▼ Autres dimensions sur demande. Le rayon r_2 peut être inférieur en fonction du procédé de laminage.
- Profilé conforme à EN 10056-1: 1998.
+ Commande minimale: 40 t par profilé et qualité ou suivant accord.

▼ Other dimensions on request. The r_2 radius may be smaller depending on the rolling process.
- Section in accordance with EN 10056-1: 1998.
+ Minimum order: 40 t per section and grade or upon agreement.

▼ Andere Abmessungen auf Anfrage. Der Radius r_2 kann je nach Walzprozess kleiner sein.
- Profil gemäß EN 10056-1: 1998.
+ Mindestbestellmenge: 40 t pro Profil und Güte oder nach Vereinbarung.

Notations pages 211-215 / Bezeichnungen Seiten 211-215

Désignation Designation Bezeichnung		Valeurs statiques / Section properties / Statische Kennwerte								Classification ENV 1993-1-1				
		axe y-y / axe z-z axis y-y / axis z-z Achse y-y / Achse z-z			axe u-u axis u-u Achse u-u		axe v-v axis v-v Achse v-v			pure compression				
	G	$I_y = I_z$	$W_{el.y} = W_{el.z}$	$i_y = i_y$	I_u	i_u	I_v	i_v	I_{yz}	S 235	S 355	EN 10025:1993	EN 10113-3:1993	EN 10225:2001
	kg/m	mm^4	mm^3	mm	mm^4	mm	mm^4	mm	mm^4					
		x 10^4	x 10^3	x 10	x 10^4	x 10	x 10^4	x 10	x 10^4					
L 150 x 150 x 10	23,0	624,0	56,91	4,62	992,0	5,82	256,0	2,96	-368,0	4	4	✔		
L 150 x 150 x 12	27,3	736,9	67,75	4,60	1172	5,80	302,0	2,94	-434,9	4	4	✔		
L 150 x 150 x 14	31,6	845,4	78,33	4,58	1344	5,77	346,9	2,93	-498,5	2	4	✔		
L 150 x 150 x 15	33,8	898,1	83,52	4,57	1427	5,76	368,9	2,93	-529,1	1	4	✔		
L 150 x 150 x 18	40,1	1050	98,74	4,54	1666	5,71	433,8	2,92	-616,2	1	2	✔		
L 160 x 160 x 14	33,9	1034	89,50	4,89	1644	6,17	423,8	3,13	-610,0	3	4	✔		
L 160 x 160 x 15	36,2	1099	95,50	4,88	1747	6,16	450,8	3,13	-648,0	2	4	✔		
L 160 x 160 x 16	38,4	1163	101,4	4,87	1848	6,14	477,6	3,12	-685,1	1	4	✔		
L 160 x 160 x 17	40,7	1225	107,2	4,86	1947	6,13	504,1	3,12	-721,3	1	4	✔		
L 180 x 180 x 13	35,7	1396	106,5	5,54	2221	6,99	571,6	3,55	-824,5	4	4	✔		
L 180 x 180 x 14	38,3	1493	114,3	5,53	2375	6,98	611,3	3,54	-882,0	4	4	✔		
L 180 x 180 x 15	40,9	1589	122,0	5,52	2527	6,96	650,5	3,53	-938,0	4	4	✔		
L 180 x 180 x 16	43,5	1682	129,7	5,51	2675	6,95	689,4	3,53	-993,0	3	4	✔		
L 180 x 180 x 17	46,0	1775	137,2	5,50	2822	6,94	727,8	3,52	-1047	2	4	✔		
L 180 x 180 x 18	48,6	1866	144,7	5,49	2965	6,92	766,0	3,52	-1100	1	4	✔		
L 180 x 180 x 19	51,1	1955	152,1	5,48	3106	6,91	803,8	3,51	-1151	1	4	✔		
L 180 x 180 x 20	53,7	2043	159,4	5,47	3244	6,89	841,3	3,51	-1202	1	3	✔		

Cornières à ailes égales▼ (suite)

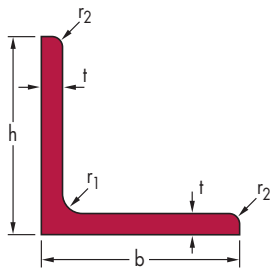
Dimensions: EN 10056-1: 1998 / ASTM A6/A6M - 02≺
Tolérances: EN 10056-2: 1994
Etat de surface conforme à EN 10163-3: 1991, classe C, sous-classe 1

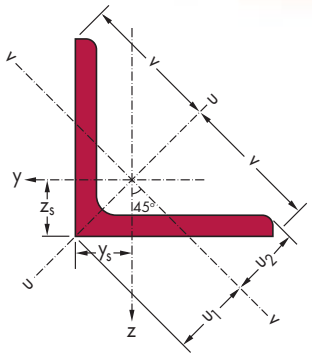
Equal leg angles▼ (continued)

Dimensions: EN 10056-1: 1998 / ASTM A6/A6M - 02≺
Tolerances: EN 10056-2: 1994
Surface condition according to EN 10163-3: 1991, class C, subclass 1

Gleichschenkliger Winkelstahl▼ (Fortsetzung)

Abmessungen: EN 10056-1: 1998 / ASTM A6/A6M - 02≺
Toleranzen: EN 10056-2: 1994
Oberflächenbeschaffenheit gemäß EN 10163-3: 1991, Klasse C, Untergruppe 1





Désignation Designation Bezeichnung		Dimensions Abmessungen					Position des axes Position of axes Lage der Achsen				Surface Oberfläche	
	G kg/m	h = b mm	t mm	r_1 mm	r_2 mm	A mm²	$z_s = y_s$ mm	v mm	u_1 mm	u_2 mm	A_L m²/m	A_G m²/t
						x 10²	x 10	x 10	x 10	x 10		
L 200 x 200 x 15+	45,6	200	15	18	9	58,1	5,48	14,14	7,75	7,08	0,785	17,20
L 200 x 200 x 16-/+	48,5	200	16	18	9	61,8	5,52	14,14	7,81	7,09	0,785	16,18
L 200 x 200 x 17+	51,4	200	17	18	9	65,5	5,56	14,14	7,87	7,10	0,785	15,27
L 200 x 200 x 18-/+	54,3	200	18	18	9	69,1	5,60	14,14	7,93	7,12	0,785	14,46
L 200 x 200 x 19+	57,1	200	19	18	9	72,7	5,64	14,14	7,98	7,13	0,785	13,74
L 200 x 200 x 20-/+	59,9	200	20	18	9	76,3	5,68	14,14	8,04	7,15	0,785	13,09
L 200 x 200 x 21+	62,8	200	21	18	9	79,9	5,72	14,14	8,09	7,16	0,785	12,50
L 200 x 200 x 22+	65,6	200	22	18	9	83,5	5,76	14,14	8,15	7,18	0,785	11,97
L 200 x 200 x 23+	68,3	200	23	18	9	87,1	5,80	14,14	8,20	7,19	0,785	11,48
L 200 x 200 x 24-/+	71,1	200	24	18	9	91,0	5,84	14,14	8,26	7,21	0,785	11,03
L 200 x 200 x 25+	73,9	200	25	18	9	94,1	5,88	14,14	8,31	7,23	0,785	10,62
L 200 x 200 x 26+	76,6	200	26	18	9	97,6	5,91	14,14	8,36	7,25	0,785	10,24
L 250 x 250 x 20+	75,6	250	20	18	9	96,4	6,93	17,68	9,81	8,91	0,985	13,02
L 250 x 250 x 21+	79,2	250	21	18	9	101	6,97	17,68	9,86	8,93	0,985	12,43
L 250 x 250 x 22+	82,8	250	22	18	9	106	7,01	17,68	9,92	8,94	0,985	11,89
L 250 x 250 x 23+	86,4	250	23	18	9	110	7,05	17,68	9,97	8,96	0,985	11,40
L 250 x 250 x 24+	90,0	250	24	18	9	115	7,09	17,68	10,03	8,98	0,985	10,95
L 250 x 250 x 25+	93,5	250	25	18	9	119	7,13	17,68	10,08	8,99	0,985	10,53
L 250 x 250 x 26+	97,0	250	26	18	9	124	7,17	17,68	10,13	9,01	0,985	10,15
L 250 x 250 x 27+	101	250	27	18	9	128	7,20	17,68	10,19	9,03	0,985	9,79
L 250 x 250 x 28-/+	104	250	28	18	9	133	7,24	17,68	10,24	9,04	0,985	9,47
L 250 x 250 x 35-/+	128	250	35	18	9	163	7,50	17,68	10,61	9,17	0,985	7,69
L 203 x 203 x 19≺/+	57,9	203	19	8	4	73,6	5,76	14,35	8,15	7,38	0,805	13,94
L 203 x 203 x 22,2≺/+	67,0	203	22,2	8	4	85,0	5,88	14,35	8,32	7,44	0,805	12,03
L 203 x 203 x 25,4≺/+	75,9	203	25,4	8	4	96,8	6,00	14,35	8,48	7,50	0,805	10,60
L 203 x 203 x 28,6≺/+	84,7	203	28,6	8	4	108	6,11	14,35	8,65	7,57	0,805	9,50

▼ Autres dimensions sur demande. Le rayon r_2 peut être inférieur en fonction du procédé de laminage.
\+ Commande minimale: 40 t par profilé et qualité ou suivant accord.
\- Profilé conforme à EN 10056-1: 1998.
≺ Profilé conforme à ASTM A6/A6M - 02.

▼ Other dimensions on request. The r_2 radius may be smaller depending on the rolling process.
\+ Minimum order: 40 t per section and grade or upon agreement.
\- Section in accordance with EN 10056-1: 1998.
≺ Section in accordance with ASTM A6/A6M - 02.

▼ Andere Abmessungen auf Anfrage. Der Radius r_2 kann je nach Walzprozess kleiner sein.
\+ Mindestbestellmenge: 40 t pro Profil und Güte oder nach Vereinbarung.
\- Profil gemäß EN 10056-1: 1998.
≺ Profil gemäß ASTM A6/A6M - 02.

Notations pages 211-215 / Bezeichnungen Seiten 211-215

Désignation Designation Bezeichnung		Valeurs statiques / Section properties / Statische Kennwerte								Classification ENV 1993-1-1				
		axe y-y / axe z-z axis y-y / axis z-z Achse y-y / Achse z-z			axe u-u axis u-u Achse u-u		axe v-v axis v-v Achse v-v			pure compression				
	G kg/m	$I_y = I_z$ mm^4	$W_{el.y} = W_{el.z}$ mm^3	$i_y = i_y$ mm	I_u mm^4	i_u mm	I_v mm^4	i_v mm	I_{yz} mm^4	S 235	S 355	EN 10025:1993	EN 10113-3:1993	EN 10225:2001
		x 10^4	x 10^3	x 10	x 10^4	x 10	x 10^4	x 10	x 10^4					
L 200 x 200 x 15	45,6	2209	152,2	6,17	3516	7,78	903,0	3,94	-1306	4	4	✔		
L 200 x 200 x 16	48,5	2341	161,7	6,16	3726	7,77	957,0	3,94	-1384	4	4	✔		
L 200 x 200 x 17	51,4	2472	171,2	6,14	3932	7,75	1011	3,93	-1461	4	4	✔		
L 200 x 200 x 18	54,3	2600	180,6	6,13	4135	7,74	1064	3,92	-1536	3	4	✔		
L 200 x 200 x 19	57,1	2726	189,9	6,12	4335	7,72	1117	3,92	-1609	2	4	✔		
L 200 x 200 x 20	59,9	2851	199,1	6,11	4532	7,70	1169	3,91	-1681	1	4	✔		
L 200 x 200 x 21	62,8	2973	208,2	6,10	4725	7,69	1221	3,91	-1752	1	4	✔		
L 200 x 200 x 22	65,6	3094	217,3	6,09	4915	7,67	1273	3,90	-1821	1	3	✔		
L 200 x 200 x 23	68,3	3213	226,3	6,08	5102	7,66	1324	3,90	-1889	1	2	✔		
L 200 x 200 x 24	71,1	3331	235,2	6,06	5286	7,64	1375	3,90	-1955	1	2	✔		
L 200 x 200 x 25	73,9	3446	244,0	6,05	5467	7,62	1426	3,89	-2020	1	1	✔		
L 200 x 200 x 26	76,6	3560	252,7	6,04	5645	7,61	1476	3,89	-2084	1	1	✔		
L 250 x 250 x 20	75,6	5743	317,9	7,72	9144	9,74	2341	4,93	-3401	4	4	✔		
L 250 x 250 x 21	79,2	5997	332,7	7,71	9548	9,73	2447	4,92	-3550	4	4	✔		
L 250 x 250 x 22	82,8	6249	347,4	7,70	9946	9,71	2551	4,92	-3697	3	4	✔		
L 250 x 250 x 23	86,4	6497	362,0	7,68	10339	9,69	2655	4,91	-3842	2	4	✔		
L 250 x 250 x 24	90,0	6743	376,5	7,67	10727	9,68	2759	4,91	-3984	2	4	✔		
L 250 x 250 x 25	93,5	6986	390,9	7,66	11110	9,66	2861	4,90	-4124	1	4	✔		
L 250 x 250 x 26	97,0	7226	405,2	7,65	11488	9,64	2963	4,90	-4262	1	4	✔		
L 250 x 250 x 27	101	7463	419,3	7,63	11861	9,62	3065	4,89	-4398	1	3	✔		
L 250 x 250 x 28	104	7697	433,4	7,62	12229	9,61	3166	4,89	-4532	1	2	✔		
L 250 x 250 x 35	128	9264	529,4	7,54	14669	9,48	3859	4,86	-5405	1	1	✔		
L 8 x 8 x 3/4	57,9	2881	198,2	6,26	4588	7,90	1174	3,99	-1707	2	4	✔		
L 8 x 8 x 7/8	67,0	3293	228,4	6,21	5236	7,84	1350	3,98	-1943	1	3	✔		
L 8 x 8 x 1	75,9	3686	257,7	6,17	5850	7,78	1522	3,97	-2164	1	1	✔		
L 8 x 8 x 1 1/8	84,7	4062	286,3	6,13	6432	7,72	1692	3,96	-2370	1	1	✔		

Cornières à ailes égales▾

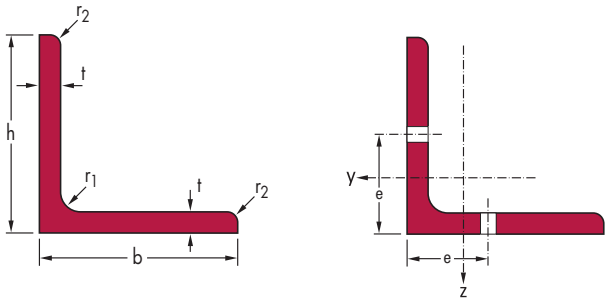
Dimensions: EN 10056-1: 1998
Tolérances: EN 10056-2: 1994
Etat de surface conforme à EN 10163-3: 1991, classe C, sous-classe 1

Equal leg angles▾

Dimensions: EN 10056-1: 1998
Tolerances: EN 10056-2: 1994
Surface condition according to EN 10163-3: 1991, class C, subclass 1

Gleichschenkliger Winkelstahl▾

Abmessungen: EN 10056-1: 1998
Toleranzen: EN 10056-2: 1994
Oberflächenbeschaffenheit gemäß EN 10163-3: 1991, Klasse C, Untergruppe 1



Désignation Designation Bezeichnung		Dimensions Abmessungen					Dimensions de construction Dimensions for detailing Konstruktionsmaße			
	G kg/m	h = b mm	t mm	r_1 mm	r_2 mm	A mm^2	Ø	e_{min} mm	e_{max} mm	A_{net} mm^2
						x 10^2				x 10^2
L 20 x 20 x 3-	0,882	20	3	3,5	2	1,12	-	-	-	-
L 25 x 25 x 3x/-	1,12	25	3	3,5	2	1,42	-	-	-	-
L 25 x 25 x 4x/-	1,45	25	4	3,5	2	1,85	-	-	-	-
L 30 x 30 x 3x/-	1,36	30	3	5	2,5	1,74	-	-	-	-
L 30 x 30 x 4x/-	1,78	30	4	5	2,5	2,27	-	-	-	-
L 35 x 35 x 4x/-	2,09	35	4	5	2,5	2,67	-	-	-	-
L 40 x 40 x 4x/-	2,42	40	4	6	3	3,08	-	-	-	-
L 40 x 40 x 5x/-	2,97	40	5	6	3	3,79	-	-	-	-
L 45 x 45 x 4,5x/-	3,06	45	4,5	7	3,5	3,90	-	-	-	-
L 50 x 50 x 4x/-	3,06	50	4	7	3,5	3,89	-	-	-	-
L 50 x 50 x 5x/-	3,77	50	5	7	3,5	4,80	-	-	-	-
L 50 x 50 x 6x/-	4,47	50	6	7	3,5	5,69	-	-	-	-
L 60 x 60 x 5x/-	4,57	60	5	8	4	5,82	M 12	35	40,5	5,17
L 60 x 60 x 6x/-	5,42	60	6	8	4	6,91	M 12	36	40,5	6,13
L 60 x 60 x 8x/-	7,09	60	8	8	4	9,03	M 12	38	40,5	7,99
L 65 x 65 x 7-	6,83	65	7	9	4,5	8,70	M 16	37	38	7,44
L 70 x 70 x 6-	6,38	70	6	9	4,5	8,13	M 16	36	43	7,05
L 70 x 70 x 7-	7,38	70	7	9	4,5	9,40	M 16	37	43	8,14
L 75 x 75 x 6-	6,85	75	6	10	5	8,73	M 16	36	48	7,67
L 75 x 75 x 8-	8,99	75	8	10	5	11,4	M 16	38	48	10,03

▾ Autres dimensions sur demande. Le rayon r_2 peut être inférieur en fonction du procédé de laminage.
x Avec arêtes vives sur commande.
- Profilé conforme à EN 10056-1: 1998.

▾ Other dimensions on request. The r_2 radius may be smaller depending on the rolling process.
x Available with sharp edges.
- Section in accordance with EN 10056-1: 1998.

▾ Andere Abmessungen auf Anfrage. Der Radius r_2 kann je nach Walzprozess kleiner sein.
x Auch mit scharfen Kanten erhältlich.
- Profil gemäß EN 10056-1: 1998.

Notations pages 211-215 / Bezeichnungen Seiten 211-215

Désignation Designation Bezeichnung		Dimensions Abmessungen					Dimensions de construction Dimensions for detailing Konstruktionsmaße			
	G kg/m	h = b mm	t mm	r_1 mm	r_2 mm	A mm²	Ø	e_{min} mm	e_{max} mm	A_{net} mm²
						x 10²				x 10²
L 80 x 80 x 8-	9,63	80	8	10	5	12,3	M 16	38	53	10,83
L 80 x 80 x 10-	11,9	80	10	10	5	15,1	M 16	40	53	13,31
L 90 x 90 x 7-	9,61	90	7	11	5,5	12,2	M 24	47	51	10,42
L 90 x 90 x 8-	10,9	90	8	11	5,5	13,9	M 24	48	51	11,81
L 90 x 90 x 9-	12,2	90	9	11	5,5	15,5	M 24	49	51	13,18
L 90 x 90 x 10-	13,4	90	10	11	5,5	17,1	M 24	50	51	14,53
L 100 x 100 x 8*/+/-	12,2	100	8	12	6	15,5	M 27	48	53	13,11
L 100 x 100 x 10*/+/-	15,0	100	10	12	6	19,2	M 27	50	53	16,15
L 100 x 100 x 12*/+/-	17,8	100	12	12	6	22,7	M 27	52	53	19,11
L 110 x 110 x 10*/+	16,6	110	10	13	6,5	21,2	M 27	50	62	18,18
L 110 x 110 x 12*	19,7	110	12	13	6,5	25,1	M 27	52	62	21,54
L 120 x 120 x 10-	18,2	120	10	13	6,5	23,2	M 27	50	72	20,18
L 120 x 120 x 11	19,9	120	11	13	6,5	25,4	M 27	51	72	22,07
L 120 x 120 x 12-	21,6	120	12	13	6,5	27,5	M 27	52	72	23,94
L 120 x 120 x 13	23,3	120	13	13	6,5	29,7	M 27	53	72	25,79
L 120 x 120 x 15	26,6	120	15	13	6,5	33,9	M 27	55	72	29,43
L 130 x 130 x 12-/*	23,6	130	12	14	7	30,0	M 27	52	82	26,37
L 140 x 140 x 10*	21,4	140	10	15	7,5	27,2	M 27	51	92	24,24
L 140 x 140 x 13*	27,4	140	13	15	7,5	35,0	M 27	54	92	31,05

- Profilé conforme à EN 10056-1: 1998.
+ Commande minimale: 40 t par profilé et qualité ou suivant accord.
* Tonnage minimum et conditions de livraison nécessitent un accord préalable.

- Section in accordance with EN 10056-1: 1998.
+ Minimum order: 40 t per section and grade or upon agreement.
* Minimum tonnage and delivery conditions upon agreement.

- Profil gemäß EN 10056-1: 1998.
+ Mindestbestellmenge: 40 t pro Profil und Güte oder nach Vereinbarung.
* Die Mindestmengen pro Bestellung sowie die Lieferbedingungen sind im Voraus zu vereinbaren.

Cornières à ailes égales▼ (suite)

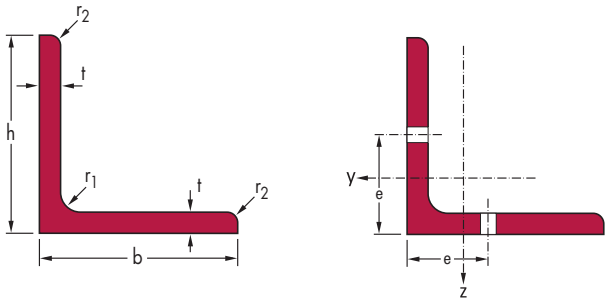
Dimensions: EN 10056-1: 1998 / ASTM A6/A6M - 02ᵃ
Tolérances: EN 10056-2: 1994
Etat de surface conforme à EN 10163-3: 1991, classe C, sous-classe 1

Equal leg angles▼ (continued)

Dimensions: EN 10056-1: 1998 / ASTM A6/A6M - 02ᵃ
Tolerances: EN 10056-2: 1994
Surface condition according to EN 10163-3: 1991, class C, subclass 1

Gleichschenkliger Winkelstahl▼ (Fortsetzung)

Abmessungen: EN 10056-1: 1998 / ASTM A6/A6M - 02ᵃ
Toleranzen: EN 10056-2: 1994
Oberflächenbeschaffenheit gemäß EN 10163-3: 1991, Klasse C, Untergruppe 1



Désignation Designation Bezeichnung		Dimensions Abmessungen					Dimensions de construction Dimensions for detailing Konstruktionsmaße			
	G kg/m	h = b mm	t mm	r_1 mm	r_2 mm	A mm²	Ø	e_{min} mm	e_{max} mm	A_{net} mm²
						x 10²				x 10²
L 150 x 150 x 10-/+	23,0	150	10	16	8	29,3	M 27	52	102	26,27
L 150 x 150 x 12-/+	27,3	150	12	16	8	34,8	M 27	54	102	31,23
L 150 x 150 x 14+	31,6	150	14	16	8	40,3	M 27	56	102	36,11
L 150 x 150 x 15-/+	33,8	150	15	16	8	43,0	M 27	57	102	38,52
L 150 x 150 x 18+	40,1	150	18	16	8	51,0	M 27	61	102	45,63
L 160 x 160 x 14+	33,9	160	14	17	8,5	43,2	M 27	57	111	38,95
L 160 x 160 x 15-/+	36,2	160	15	17	8,5	46,1	M 27	58	111	41,56
L 160 x 160 x 16+	38,4	160	16	17	8,5	49,0	M 27	60	111	44,15
L 160 x 160 x 17+	40,7	160	17	17	8,5	51,8	M 27	61	111	46,72
L 180 x 180 x 13+	35,7	180	13	18	9	45,5	M 27	57	131	41,56
L 180 x 180 x 14+	38,3	180	14	18	9	48,8	M 27	58	131	44,59
L 180 x 180 x 15+	40,9	180	15	18	9	52,1	M 27	59	131	47,6
L 180 x 180 x 16-/+	43,5	180	16	18	9	55,4	M 27	61	131	50,59
L 180 x 180 x 17+	46,0	180	17	18	9	58,7	M 27	62	131	53,56
L 180 x 180 x 18-/+	48,6	180	18	18	9	61,9	M 27	63	131	56,51
L 180 x 180 x 19+	51,1	180	19	18	9	65,1	M 27	64	131	59,44
L 180 x 180 x 20+	53,7	180	20	18	9	68,4	M 27	65	131	62,35

▼ Autres dimensions sur demande. Le rayon r_2 peut être inférieur en fonction du procédé de laminage.
- Profilé conforme à EN 10056-1: 1998.
+ Commande minimale: 40 t par profilé et qualité ou suivant accord.

▼ Other dimensions on request. The r_2 radius may be smaller depending on the rolling process.
- Section in accordance with EN 10056-1: 1998.
+ Minimum order: 40 t per section and grade or upon agreement.

▼ Andere Abmessungen auf Anfrage. Der Radius r_2 kann je nach Walzprozess kleiner sein.
- Profil gemäß EN 10056-1: 1998.
+ Mindestbestellmenge: 40 t pro Profil und Güte oder nach Vereinbarung.

Notations pages 211-215 / Bezeichnungen Seiten 211-215

Désignation Designation Bezeichnung		Dimensions Abmessungen					Dimensions de construction Dimensions for detailing Konstruktionsmaße			
	G kg/m	h = b mm	t mm	r_1 mm	r_2 mm	A mm²	Ø	e_{min} mm	e_{max} mm	A_{net} mm²
						x 10²				x 10²
L 200 x 200 x 15+	45,6	200	15	18	9	58,1	M 27	59	151	53,6
L 200 x 200 x 16-/+	48,5	200	16	18	9	61,8	M 27	61	151	56,99
L 200 x 200 x 17+	51,4	200	17	18	9	65,5	M 27	62	151	60,36
L 200 x 200 x 18-/+	54,3	200	18	18	9	69,1	M 27	63	151	63,71
L 200 x 200 x 19+	57,1	200	19	18	9	72,7	M 27	64	151	67,04
L 200 x 200 x 20-/+	59,9	200	20	18	9	76,3	M 27	65	151	70,35
L 200 x 200 x 21+	62,8	200	21	18	9	79,9	M 27	66	151	73,64
L 200 x 200 x 22+	65,6	200	22	18	9	83,5	M 27	67	151	76,91
L 200 x 200 x 23+	68,3	200	23	18	9	87,1	M 27	68	151	80,16
L 200 x 200 x 24-/+	71,1	200	24	18	9	91,0	M 27	69	151	83,39
L 200 x 200 x 25+	73,9	200	25	18	9	94,1	M 27	70	151	86,6
L 200 x 200 x 26+	76,6	200	26	18	9	97,6	M 27	71	151	89,79
L 250 x 250 x 20+	75,6	250	20	18	9	96,4	M 27	40	240	96,35
L 250 x 250 x 21+	79,2	250	21	18	9	101	M 27	41	246	100,94
L 250 x 250 x 22+	82,8	250	22	18	9	106	M 27	42	246	105,51
L 250 x 250 x 23+	86,4	250	23	18	9	110	M 27	43	246	110,06
L 250 x 250 x 24+	90,0	250	24	18	9	115	M 27	44	246	114,59
L 250 x 250 x 25+	93,5	250	25	18	9	119	M 27	45	246	119,1
L 250 x 250 x 26+	97,0	250	26	18	9	124	M 27	46	246	123,59
L 250 x 250 x 27+	101	250	27	18	9	128	M 27	47	246	128,06
L 250 x 250 x 28-/+	104	250	28	18	9	133	M 27	48	246	132,51
L 250 x 250 x 35-/+	128	250	35	18	9	163	M 27	78	205	152,6
L 203 x 203 x 19≺/+	57,9	203	19	8	4	73,6	M 27	64	155	67,9
L 203 x 203 x 22,2≺/+	67,0	203	22,2	8	4	85,0	M 27	67	155	78,61
L 203 x 203 x 25,4≺/+	75,9	203	25,4	8	4	96,8	M 27	70	155	89,12
L 203 x 203 x 28,6≺/+	84,7	203	28,6	8	4	108	M 27	73	155	99,43

\+ Commande minimale: 40 t par profilé et qualité ou suivant accord.
\- Profilé conforme à EN 10056-1: 1998.
≺ Profilé conforme à ASTM A6/A6M - 02.

\+ Minimum order: 40 t per section and grade or upon agreement.
\- Section in accordance with EN 10056-1: 1998.
≺ Section in accordance with ASTM A6/A6M - 02.

\+ Mindestbestellmenge: 40 t pro Profil und Güte oder nach Vereinbarung.
\- Profil gemäß EN 10056-1: 1998.
≺ Profil gemäß ASTM A6/A6M - 02.

Cornières à ailes inégales▾

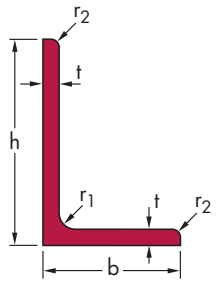
Dimensions: EN 10056-1: 1998
Tolérances: EN 10056-2: 1994
Etat de surface conforme à EN 10163-3: 1991, classe C, sous-classe 1

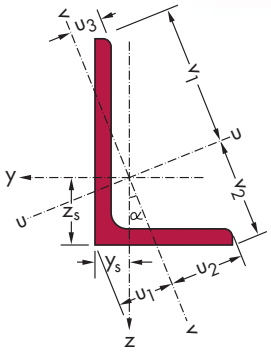
Unequal leg angles▾

Dimensions: EN 10056-1: 1998
Tolerances: EN 10056-2: 1994
Surface condition according to EN 10163-3: 1991, class C, subclass 1

Ungleichschenkliger Winkelstahl▾

Abmessungen: EN 10056-1: 1998
Toleranzen: EN 10056-2: 1994
Oberflächenbeschaffenheit gemäß EN 10163-3: 1991, Klasse C, Untergruppe 1





Désignation Designation Bezeichnung		Dimensions Abmessungen						Position des axes Position of axes Lage der Achsen							Surface Oberfläche	
	G kg/m	h mm	b mm	t mm	r_1 mm	r_2 mm	A mm²	z_s mm	y_s mm	v_1 mm	v_2 mm	u_1 mm	u_2 mm	u_3 mm	A_L m²/m	A_G m²/t
							x 10^2	x 10	x 10	x 10	x 10	x 10	x 10	x 10		
L 120 x 80 x 8*	12,2	120	80	8	11	5,5	15,5	3,83	1,87	8,23	5,97	3,25	4,19	2,09	0,391	32,12
L 120 x 80 x 10*	15,0	120	80	10	11	5,5	19,1	3,92	1,95	8,19	6,01	3,35	4,17	2,15	0,391	26,01
L 120 x 80 x 12*	17,8	120	80	12	11	5,5	22,7	4,00	2,03	8,14	6,04	3,45	4,16	2,20	0,391	21,93
L 150 x 75 x 9+	15,4	150	75	9	12	6	19,6	5,26	1,57	9,82	6,59	2,85	4,41	1,61	0,440	28,59
L 150 x 75 x 10+	17,0	150	75	10	12	6	21,7	5,31	1,61	9,78	6,62	2,90	4,39	1,65	0,440	25,87
L 150 x 75 x 11+	18,6	150	75	11	12	6	23,7	5,35	1,65	9,75	6,65	2,95	4,37	1,68	0,440	23,64
L 150 x 75 x 12+	20,2	150	75	12	12	6	25,7	5,40	1,69	9,72	6,68	2,99	4,36	1,72	0,440	21,78
L 150 x 90 x 10-/+	18,2	150	90	10	12	6	23,2	5,00	2,04	10,10	7,07	3,61	4,97	2,20	0,470	25,84
L 150 x 90 x 11+	19,9	150	90	11	12	6	25,3	5,04	2,08	10,07	7,09	3,66	4,95	2,23	0,470	23,61
L 150 x 100 x 10-/+	19,0	150	100	10	12	6	24,2	4,81	2,34	10,27	7,48	4,08	5,25	2,64	0,490	25,83
L 150 x 100 x 12-/+	22,5	150	100	12	12	6	28,7	4,90	2,42	10,23	7,52	4,18	5,23	2,70	0,490	21,72
L 150 x 100 x 14+	26,1	150	100	14	12	6	33,2	4,98	2,50	10,19	7,55	4,28	5,22	2,75	0,490	18,79
L 200 x 100 x 10-/+	23,0	200	100	10	15	7,5	29,2	6,93	2,01	13,15	8,74	3,72	5,94	2,09	0,587	25,58
L 200 x 100 x 12-/+	27,3	200	100	12	15	7,5	34,8	7,03	2,10	13,08	8,81	3,82	5,89	2,17	0,587	21,49
L 200 x 100 x 14+	31,6	200	100	14	15	7,5	40,3	7,12	2,18	13,01	8,86	3,91	5,85	2,24	0,587	18,57

▾ Autres dimensions sur demande. Le rayon r_2 peut être inférieur en fonction du procédé de laminage.
\+ Commande minimale: 40 t par profilé et qualité ou suivant accord.
\- Profilé conforme à EN 10056-1: 1998.
* Tonnage minimum et conditions de livraison nécessitent un accord préalable.

▾ Other dimensions on request. The r_2 radius may be smaller depending on the rolling process.
\+ Minimum order: 40 t per section and grade or upon agreement.
\- Section in accordance with EN 10056-1: 1998.
* Minimum tonnage and delivery conditions upon agreement.

▾ Andere Abmessungen auf Anfrage. Der Radius r_2 kann je nach Walzprozess kleiner sein.
\+ Mindestbestellmenge: 40 t pro Profil und Güte oder nach Vereinbarung.
\- Profil gemäß EN 10056-1: 1998.
* Die Mindestmengen pro Bestellung sowie die Lieferbedingungen sind im Voraus zu vereinbaren.

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Désignation Designation Bezeichnung		Valeurs statiques / Section properties / Statische Kennwerte												Classification ENV 1993-1-1		EN 10025:1993	EN 10113-3:1993	EN 10225:2001
		axe y-y axis y-y Achse y-y			axe z-z axis z-z Achse z-z			axe u-u axis u-u Achse u-u		axe v-v axis v-v Achse v-v				pure compression				
	G kg/m	I_y mm^4	$W_{el.y}$ mm^3	i_y mm	I_z mm^4	$W_{el.z}$ mm^3	i_z mm	I_u mm^4	i_u mm	I_v mm^4	i_v mm	I_{yz} mm^4	α °	S 235	S 355			
		x 10^4	x 10^3	x 10	x 10^4	x 10^3	x 10	x 10^4	x 10	x 10^4	x 10	x 10^4						
L 120 x 80 x 8	12,2	225,7	27,63	3,82	80,76	13,17	2,28	260,0	4,10	46,39	1,73	-78,50	23,65	4	4	✔		
L 120 x 80 x 10	15,0	275,5	34,10	3,80	98,11	16,21	2,26	317,0	4,07	56,60	1,72	-95,34	23,53	3	4	✔		
L 120 x 80 x 12	17,8	322,8	40,37	3,77	114,3	19,14	2,24	370,7	4,04	66,46	1,71	-110,8	23,37	1	4	✔		
L 150 x 75 x 9	15,4	455,2	46,74	4,82	77,91	13,14	1,99	483,2	4,97	49,95	1,60	-106,4	14,72	4	4	✔		
L 150 x 75 x 10	17,0	500,6	51,65	4,81	85,37	14,50	1,99	531,1	4,95	54,87	1,59	-116,6	14,66	3	4	✔		
L 150 x 75 x 11	18,6	545,0	56,49	4,80	92,57	15,83	1,98	577,9	4,94	59,70	1,59	-126,3	14,59	3	4	✔		
L 150 x 75 x 12	20,2	588,4	61,27	4,78	99,55	17,14	1,97	623,5	4,92	64,45	1,58	-135,6	14,51	3	4	✔		
L 150 x 90 x 10	18,2	533,1	53,29	4,80	146,1	20,98	2,51	591,3	5,05	87,93	1,95	-160,9	19,87	4	4	✔		
L 150 x 90 x 11	19,9	580,7	58,30	4,79	158,7	22,91	2,50	643,7	5,04	95,71	1,94	-174,7	19,81	3	4	✔		
L 150 x 100 x 10	19,0	552,6	54,23	4,78	198,5	25,92	2,87	637,3	5,14	113,8	2,17	-192,8	23,72	4	4	✔		
L 150 x 100 x 12	22,5	650,5	64,38	4,76	232,6	30,69	2,85	749,3	5,11	133,9	2,16	-225,8	23,61	3	4	✔		
L 150 x 100 x 14	26,1	744,4	74,27	4,74	264,9	35,32	2,82	855,9	5,08	153,4	2,15	-256,8	23,48	2	4	✔		
L 200 x 100 x 10	23,0	1219	93,24	6,46	210,3	26,33	2,68	1294	6,65	134,5	2,14	-286,8	14,82	4	4	✔		
L 200 x 100 x 12	27,3	1440	111,0	6,43	247,2	31,28	2,67	1529	6,63	158,5	2,13	-337,3	14,74	4	4	✔		
L 200 x 100 x 14	31,6	1654	128,4	6,41	282,2	36,08	2,65	1755	6,60	181,7	2,12	-384,8	14,65	3	4	✔		

Cornières à ailes inégales▼ (suite)

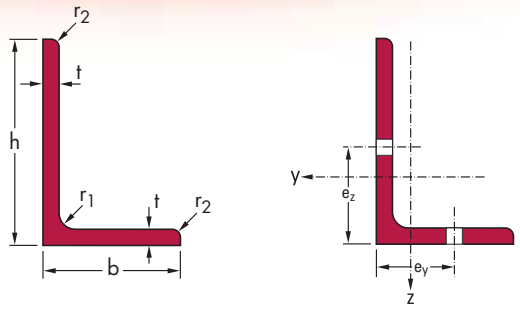
Dimensions: EN 10056-1: 1998
Tolérances: EN 10056-2: 1994
Etat de surface conforme à EN 10163-3: 1991, classe C, sous-classe 1

Unequal leg angles▼ (continued)

Dimensions: EN 10056-1: 1998
Tolerances: EN 10056-2: 1994
Surface condition according to EN 10163-3: 1991, class C, subclass 1

Ungleichschenkliger Winkelstahl▼ (Fortsetzung)

Abmessungen: EN 10056-1: 1998
Toleranzen: EN 10056-2: 1994
Oberflächenbeschaffenheit gemäß EN 10163-3: 1991, Klasse C, Untergruppe 1



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Désignation Designation Bezeichnung	Dimensions Abmessungen						Dimensions de construction / Dimensions for detailing / Konstruktionsmaße							
							aile longue / long leg / langer Schenkel				aile courte / short leg / kurzer Schenkel			
	G	h	b	t	r_1	r_2	A	$Ø_z$	$e_{z.\,min}$	$e_{z.\,max}$	$A_{z.\,net}$	$Ø_y$	$e_{y.\,min}$	$e_{y.\,max}$	$A_{y.net}$
	kg/m	mm	mm	mm	mm	mm	mm^2		mm	mm	mm^2		mm	mm	mm^2
							x 10^2				x 10^2				x 10^2
L 120 x 80 x 8*	12,2	120	80	8	11	5,5	15,49	M 27	48	72	13,09	M 16	38	51	14,05
L 120 x 80 x 10*	15,0	120	80	10	11	5,5	19,13	M 27	50	72	16,13	M 16	40	51	17,33
L 120 x 80 x 12*	17,8	120	80	12	11	5,5	22,69	M 27	52	72	19,09	M 16	42	51	20,53
L 150 x 75 x 9+	15,4	150	75	9	12	6	19,6	M 27	47	102	16,89	M 16	37	46	17,97
L 150 x 75 x 10+	17,0	150	75	10	12	6	21,7	M 27	48	102	18,65	M 16	38	46	19,85
L 150 x 75 x 11+	18,6	150	75	11	12	6	23,7	M 27	49	102	20,39	M 16	39	46	21,71
L 150 x 75 x 12+	20,2	150	75	12	12	6	25,7	M 27	50	102	22,11	M 16	40	46	23,55
L 150 x 90 x 10-/+	18,2	150	90	10	12	6	23,15	M 27	50	102	20,15	M 24	47	49	20,55
L 150 x 90 x 11+	19,9	150	90	11	12	6	25,34	M 27	51	102	22,04	M 24	48	49	22,48
L 150 x 100 x 10-/+	19,0	150	100	10	12	6	24,15	M 27	50	102	21,15	M 27	50	53	21,15
L 150 x 100 x 12-/+	22,5	150	100	12	12	6	28,71	M 27	52	102	25,11	M 27	52	53	25,11
L 150 x 100 x 14+	26,1	150	100	14	12	6	33,19	M 27	54	102	28,99	M 24	51	59	29,55
L 200 x 100 x 10-/+	23,0	200	100	10	15	7,5	29,24	M 27	54	150	26,24	M 27	51	53	26,24
L 200 x 100 x 12-/+	27,3	200	100	12	15	7,5	34,80	M 27	54	150	31,2	M 27	53	53	31,2
L 200 x 100 x 14+	31,6	200	100	14	15	7,5	40,28	M 27	55	151	36,08	M 24	52	59	36,64

▼ Autres dimensions sur demande. Le rayon r_2 peut être inférieur en fonction du procédé de
\+ Commande minimale: 40 t par profilé et qualité ou suivant accord.
\- Profilé conforme à EN 10056-1: 1998.
* Tonnage minimum et conditions de livraison nécessitent un accord préalable.

▼ Other dimensions on request. The r_2 radius may be smaller depending on the rolling process.
\+ Minimum order: 40 t per section and grade or upon agreement.
\- Section in accordance with EN 10056-1: 1998.
* Minimum tonnage and delivery conditions upon agreement.

▼ Andere Abmessungen auf Anfrage. Der Radius r_2 kann je nach Walzprozess kleiner sein.
\+ Mindestbestellmenge: 40 t pro Profil und Güte oder nach Vereinbarung.
\- Profil gemäß EN 10056-1: 1998.
* Die Mindestmengen pro Bestellung sowie die Lieferbedingungen sind im Voraus zu vereinbaren.

Larges plats

Dimensions: EU 79-69 et EU 58-78 (Fers plats)
Tolérances: EU 58-78 Fers plats
EU 91-82 Larges plats
Etat de surface conforme à EN 10163-3: 1991, classe C, sous-classe 1

Flat bars

Dimensions: EU 79-69 and EU 58-78 (Narrow flats)
Tolerances: EU 58-78 Narrow flats
EU 91-82 Wide flats
Surface condition according to EN 10163-3: 1991, class C, subclass 1

Flachstahl

Abmessungen: EU 79-69 und EU 58-78 (Flachstahl)
Toleranzen: EU 58-78 Flachstahl
EU 91-82 Breitflachstahl
Oberflächenbeschaffenheit gemäß EN 10163-3: 1991, Klasse C, Untergruppe 1

Masse / Mass / Masse kg/m

Largeur Width Breite b mm		**Epaisseur Thickness Dicke** a mm															EN 10025:1993
		5	6	7	8	10	12	14	15	16	18	20	25	30	35	40	
Fers plats Narrow flat bars Flachstahl	→40	1,57	1,88	2,20	2,51	3,14	3,77	4,40	4,71								✔
	→50	1,96	2,36	2,75	3,14	3,93	4,71	5,50	5,89								✔
	→60	2,36	2,83	3,30	3,77	4,71	5,65	6,59	7,07								✔
	→70	2,75	3,30	3,85	4,40	5,50	6,59	7,69	8,24								✔
	→80	3,14	3,77	4,40	5,02	6,28	7,54	8,79	9,42								✔
	→90	3,53	4,24	4,95	5,65	7,07	8,48	9,89	10,60								✔
	→100	3,93	4,71	5,50	6,28	7,85	9,42	10,99	11,78	12,56	14,13	15,70	19,63				✔
	→110				6,91	8,64	10,36	12,09	12,95	13,82	15,54	17,27	21,59				✔
	→120				7,54	9,42	11,30	13,19	14,13	15,07	16,96	18,84	23,55				✔
	→130				8,16	10,21	12,25	14,29	15,31	16,33	18,37	20,41	25,51				✔
	→140				8,79	10,99	13,19	15,39	16,49	17,58	19,78	21,98	27,48				✔
	→150				9,42	11,78	14,13	16,49	17,66	18,84	21,20	23,55	29,44				✔
Larges plats Flat bars Breitflachstahl	→160				10,05	12,56	15,07	17,58	18,84	20,10	22,61	25,12	31,40				✔
	→180				11,30	14,13	16,96	19,78	21,20	22,61	25,43	28,26	35,33				✔
	→200				12,56	15,70	18,84	21,98	23,55	25,12	28,26	31,40	39,25	47,1	55,0	62,8	✔
	*220					17,27	20,72		25,91			34,54	43,18	51,8	60,4	69,1	✔
	*250					19,63	23,55		29,44			39,25	49,06	58,9	68,7	78,5	✔
	*300					23,55	28,26		35,33			47,10	58,88	70,7	82,4	94,2	✔
	*350					27,48	32,97		41,21			54,95	68,69	82,4	96,2	109,9	✔
	*400					31,40	37,68		47,10			62,80	78,50	94,2	109,9	125,6	✔

* Tonnage minimum et conditions de livraison nécessitent un accord préalable.
→ Autres dimensions sur demande. Longueur: 6 m. Poids d'un paquet: ±200 kg.

* Minimum tonnage and delivery conditions upon agreement.
→ Other dimensions on request. Length: 6 m. Bundle weight: ±200 kg.

* Die Mindestmengen pro Bestellung sowie die Lieferbedingungen sind im Voraus zu vereinbaren.
→ Andere Abmessungen auf Anfrage. Länge: 6 m. Bündelgewicht: ±200 kg.

Carrés

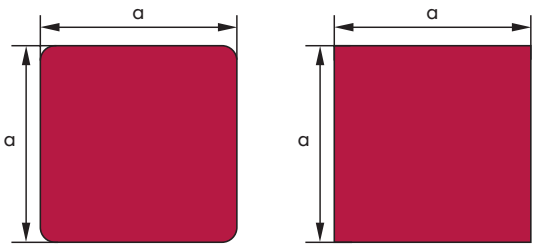
Dimensions: EU 79-69
Tolérances: EU 59-78
Etat de surface conforme à EN 10163-3: 1991, classe C, sous-classe 1

Square bars

Dimensions: EU 79-69
Tolerances: EU 59-78
Surface condition according to EN 10163-3: 1991, class C, subclass 1

Vierkantstahl

Abmessungen: EU 79-69
Toleranzen: EU 59-78
Oberflächenbeschaffenheit gemäß EN 10163-3: 1991, Klasse C, Untergruppe 1



a x a	Bords arrondis Rounded edges Gerundete Kanten	Bords pointus Sharp edges Scharfe Kanten	EN 10025:1993
	Masse / Mass / Masse kg/m	**Masse / Mass / Masse** kg/m	
45 x 45+	15,7		✔
50 x 50+	19,4		✔
55 x 55+	23,5		✔
60 x 60+	27,9		✔
65 x 65+	32,7		✔
70 x 70+	38,0		✔
80 x 80+	49,6		✔
85 x 85+	56,0		✔
90 x 90+		63,6	✔
95 x 95+	69,9		✔
100 x 100+	77,5	78,5	✔
110 x 110+		95,0	✔
120 x 120+		113	✔
130 x 130+		133	✔
140 x 140+	153		✔
150 x 150+	173		✔
160 x 160+	200		✔

+ Commande minimale: 40 t par profilé et qualité ou suivant accord.
+ Minimum order: 40 t per section and grade or upon agreement.
+ Mindestbestellmenge: 40 t pro Profil und Güte oder nach Vereinbarung.

Poutrelles IFB

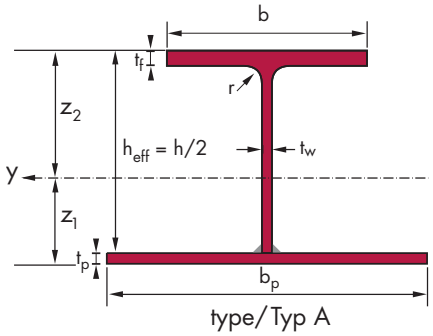
Etat de surface conforme à EN 10163-3: 1991, classe C, sous-classe 1

IFB beams

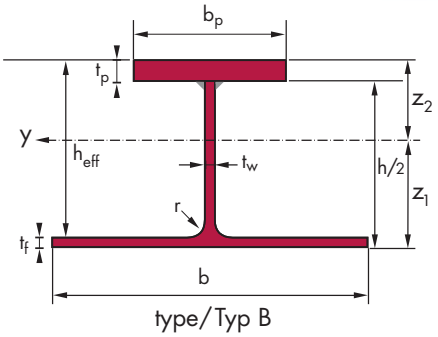
Surface condition according to EN 10163-3: 1991, class C, subclass 1

IFB-Träger

Oberflächenbeschaffenheit gemäß EN 10163-3: 1991, Klasse C, Untergruppe 1



type/Typ A



type/Typ B

Notations pages 211-215 / Bezeichnungen Seiten 211-215

Désignation Designation Bezeichnung				Dimensions Abmessungen						Valeurs statiques Section properties Statische Kennwerte			
	b_p x t_p mm x mm	type Typ	G kg/m	h_{eff} mm	b mm	t_w mm	t_f mm	r mm	A mm^2	I_y mm^4	$W_{el.y}$ mm^3	z_1 mm	z_2 mm
									x 10^2	x 10^4	x 10^3	x 10	x 10
1/2 IPE 400	380 x 10	A	63,0	200,0	180,0	8,6	13,5	21,0	80,2	6558	543	8,9	12,1
1/2 IPE O 400	390 x 12	A	74,6	202,0	182,0	9,7	15,5	21,0	95,0	7893	627	8,8	12,6
1/2 IPE 450	390 x 12	A	75,5	225,0	190,0	9,4	14,6	21,0	96,2	9857	707	9,8	13,9
1/2 IPE O 450	400 x 12	A	83,9	228,0	192,0	11,0	17,6	21,0	106,8	11230	833	10,5	13,5
1/2 IPE 500	400 x 12	A	83,0	250,0	200,0	10,2	16,0	21,0	105,8	13332	895	11,3	14,9
1/2 IPE O 500	410 x 15	A	101,9	253,0	202,0	12,0	19,0	21,0	129,9	16701	1071	11,2	15,6
1/2 IPE 550	410 x 15	A	101,0	275,0	210,0	11,1	17,2	24,0	128,7	19499	1145	12,0	17,0
1/2 IPE O 550	420 x 15	A	110,7	278,0	212,0	12,7	20,2	24,0	141,0	21825	1318	12,7	16,6
1/2 IPE 600	420 x 15	A	110,7	300,0	220,0	12,0	19,0	24,0	141,0	25375	1420	13,6	17,9
1/2 IPE O 600	430 x 15	A	127,9	305,0	224,0	15,0	24,0	24,0	162,9	29830	1749	14,9	17,1
1/2 IPE O 600	430 x 20	A	144,7	305,0	224,0	15,0	24,0	24,0	184,4	34206	1816	13,7	18,8
1/2 HE 220 M	430 x 15	A	109,3	120,0	226,0	15,5	26,0	18,0	139,2	4209	581	6,3	7,2
1/2 HE 240 M	450 x 20	A	149,0	135,0	248,0	18,0	32,0	21,0	189,8	7323	873	7,1	8,4
1/2 HE 260 B	460 x 12	A	89,8	130,0	260,0	10,0	17,5	24,0	114,4	4251	554	6,5	7,7
1/2 HE 260 M	470 x 20	A	160,0	145,0	268,0	18,0	32,5	24,0	203,8	9087	1038	7,7	8,8
1/2 HE 280 M	500 x 20	A	172,8	155,0	288,0	18,5	33,0	24,0	220,1	11218	1219	8,3	9,2
1/2 HE 280 M	500 x 25	A	192,4	155,0	288,0	18,5	33,0	24,0	245,1	12853	1275	7,9	10,1
1/2 HE 300 B	500 x 15	A	117,4	150,0	300,0	11,0	19,0	27,0	149,5	7482	820	7,4	9,1
1/2 HE 300 M	500 x 25	A	217,1	170,0	310,0	21,0	39,0	27,0	276,5	17044	1675	9,3	10,2
1/2 HE 320 B	500 x 15	A	122,2	160,0	300,0	11,5	20,5	27,0	155,7	8805	932	8,1	9,4
1/2 HE 320 M	500 x 25	A	220,6	179,5	309,0	21,0	40,0	27,0	281,0	19208	1812	9,9	10,6
1/2 HE 320 M	500 x 30	A	240,2	179,5	309,0	21,0	40,0	27,0	306,0	21543	1885	9,5	11,4
1/2 HE 340 B	500 x 15	A	126,0	170,0	300,0	12,0	21,5	27,0	160,4	10173	1034	8,7	9,8
1/2 HE 340 M	500 x 25	A	222,1	188,5	309,0	21,0	40,0	27,0	282,9	21298	1928	10,3	11,0
1/2 HE 340 M	500 x 30	A	241,7	188,5	309,0	21,0	40,0	27,0	307,9	23848	2002	9,9	11,9
1/2 HE 360 B	500 x 15	A	129,8	180,0	300,0	12,5	22,5	27,0	165,3	11660	1142	9,3	10,2
1/2 HE 360 M	500 x 25	A	223,3	197,5	308,0	21,0	40,0	27,0	284,4	23466	2039	10,7	11,5
1/2 HE 360 M	500 x 30	A	242,9	197,5	308,0	21,0	40,0	27,0	309,4	26233	2115	10,3	12,4

IFB = “Integrated Floor Beam”

IFB

Notations pages 211-215 / Bezeichnungen Seiten 211-215

Désignation Designation Bezeichnung				Dimensions Abmessungen						Valeurs statiques Section properties Statische Kennwerte			
	$b_p \times t_p$ mm x mm	type Typ	G kg/m	h_{eff} mm	b mm	t_w mm	t_f mm	r mm	A mm^2	I_y mm^4	$W_{el.y}$ mm^3	z_1 mm	z_2 mm
									x 10^2	x 10^4	x 10^3	x 10	x 10
1/2 HE 400 B	500 x 20	A	156,1	200,0	300,0	13,5	24,0	27,0	198,9	17419	1408	9,6	12,4
1/2 HE 400 M	500 x 25	A	226,0	216,0	307,0	21,0	40,0	27,0	287,9	28310	2274	11,6	12,5
1/2 HE 400 M	500 x 30	A	245,6	216,0	307,0	21,0	40,0	27,0	312,9	31558	2354	11,2	13,4
1/2 HE 450 B	500 x 20	A	164,1	225,0	300,0	14,0	26,0	27,0	209,0	22963	1708	11,1	13,4
1/2 HE 450 M	500 x 25	A	229,8	239,0	307,0	21,0	40,0	27,0	292,7	35066	2578	12,8	13,6
1/2 HE 450 M	500 x 30	A	249,4	239,0	307,0	21,0	40,0	27,0	317,7	38977	2663	12,3	14,6
1/2 HE 500 A	500 x 20	A	156,0	245,0	300,0	12,0	23,0	27,0	198,8	25944	1722	11,4	15,1
1/2 HE 500 B	500 x 20	A	172,2	250,0	300,0	14,5	28,0	27,0	219,3	29447	2035	12,5	14,5
1/2 HE 500 M	500 x 25	A	233,3	262,0	306,0	21,0	40,0	27,0	297,1	42529	2879	13,9	14,8
1/2 HE 500 M	500 x 30	A	252,9	262,0	306,0	21,0	40,0	27,0	322,1	47154	2970	13,3	15,9
1/2 HE 550 A	500 x 20	A	161,6	270,0	300,0	12,5	24,0	27,0	205,9	32356	1991	12,7	16,3
1/2 HE 550 B	500 x 20	A	178,2	275,0	300,0	15,0	29,0	27,0	227,0	36479	2336	13,9	15,6
1/2 HE 550 B	500 x 25	A	197,8	275,0	300,0	15,0	29,0	27,0	252,0	40971	2407	13,0	17,0
1/2 HE 550 M	500 x 25	A	237,2	286,0	306,0	21,0	40,0	27,0	302,2	51213	3206	15,1	16,0
1/2 HE 550 M	500 x 30	A	256,8	286,0	306,0	21,0	40,0	27,0	327,2	56660	3303	14,4	17,2
1/2 HE 550 M	500 x 35	A	276,5	286,0	306,0	21,0	40,0	27,0	352,2	61669	3388	13,9	18,2
1/2 HE 600 A	500 x 20	A	167,4	295,0	300,0	13,0	25,0	27,0	213,2	39636	2276	14,1	17,4
1/2 HE 600 B	500 x 20	A	184,5	300,0	300,0	15,5	30,0	27,0	235,0	44424	2654	15,3	16,7
1/2 HE 600 B	500 x 25	A	204,1	300,0	300,0	15,5	30,0	27,0	260,0	49850	2733	14,3	18,2
1/2 HE 600 M	500 x 30	A	260,5	310,0	305,0	21,0	40,0	27,0	331,8	66995	3631	15,5	18,5
1/2 HE 600 M	500 x 35	A	280,1	310,0	305,0	21,0	40,0	27,0	356,8	72791	3721	14,9	19,6
1/2 HE 650 A	500 x 20	A	173,3	320,0	300,0	13,5	26,0	27,0	220,8	47825	2578	15,5	18,5
1/2 HE 650 B	500 x 25	A	210,5	325,0	300,0	16,0	31,0	27,0	268,2	59791	3078	15,6	19,4
1/2 HE 650 M	500 x 25	A	244,8	334,0	305,0	21,0	40,0	27,0	311,9	71097	3863	17,5	18,4
1/2 HE 650 M	500 x 30	A	264,4	334,0	305,0	21,0	40,0	27,0	336,9	78374	3973	16,7	19,7
1/2 HE 650 M	500 x 35	A	284,1	334,0	305,0	21,0	40,0	27,0	361,9	85034	4069	16,0	20,9

Poutrelles IFB (suite)

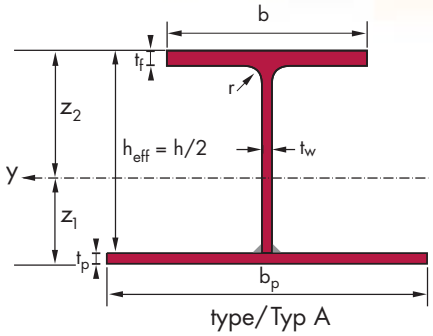
Etat de surface conforme à EN 10163-3: 1991, classe C, sous-classe 1

IFB beams (continued)

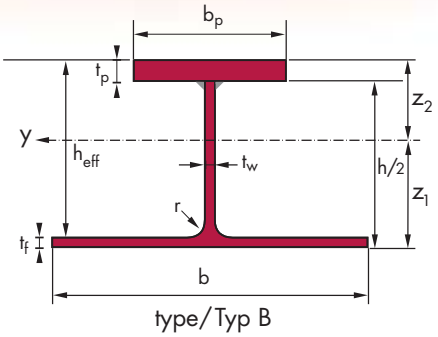
Surface condition according to EN 10163-3: 1991, class C, subclass 1

IFB-Träger (Fortsetzung)

Oberflächenbeschaffenheit gemäß EN 10163-3: 1991, Klasse C, Untergruppe 1



type/Typ A



type/Typ B

Notations pages 211-215 / Bezeichnungen Seiten 211-215

Désignation Designation Bezeichnung				Dimensions Abmessungen						Valeurs statiques Section properties Statische Kennwerte			
	b_p x t_p mm x mm	type Typ	G kg/m	h_{eff} mm	b mm	t_w mm	t_f mm	r mm	A mm^2	I_y mm^4	$W_{el.y}$ mm^3	z_1 mm	z_2 mm
									x 10^2	x 10^4	x 10^3	x 10	x 10
1/2 HE 280 A	80 x 40	B	63,3	162,0	280,0	8,0	13,0	24,0	80,6	4004	396	7,4	10,1
1/2 HE 300 A	100 x 30	B	67,7	161,0	300,0	8,5	14,0	27,0	86,3	4375	417	7,0	10,5
1/2 HP 360x109	170 x 20	B	81,2	180,3	370,5	12,9	12,9	15,2	103,5	6739	606	8,2	11,1
1/2 HP 360x109	170 x 30	B	94,6	190,3	370,5	12,9	12,9	15,2	120,5	8714	831	9,8	10,5
1/2 HP 360x133	170 x 20	B	92,8	180,4	373,3	15,6	15,6	15,2	118,2	7509	635	7,8	11,8
1/2 HP 360x133	170 x 30	B	106,2	190,4	373,3	15,6	15,6	15,2	135,2	9768	866	9,3	11,3
1/2 HP 360x152	170 x 30	B	116,1	190,3	375,5	17,9	17,9	15,2	147,9	10583	894	9,0	11,8
1/2 HP 360x152	170 x 40	B	129,4	200,3	375,5	17,9	17,9	15,2	164,9	12904	1116	10,3	11,6
1/2 HP 400x122	190 x 20	B	91,0	180,0	390,0	14,0	14,0	15,0	116,0	7597	678	8,2	11,2
1/2 HP 400x122	190 x 30	B	105,9	190,0	390,0	14,0	14,0	15,0	135,0	9837	931	9,8	10,6
1/2 HP 400x140	190 x 30	B	114,8	190,0	392,0	16,0	16,0	15,0	146,3	10658	958	9,5	11,1
1/2 HP 400x140	190 x 40	B	129,7	200,0	392,0	16,0	16,0	15,0	165,3	12931	1199	10,8	10,8
1/2 HP 400x158	190 x 30	B	123,8	190,0	394,0	18,0	18,0	15,0	157,7	11435	984	9,2	11,6
1/2 HP 400x158	190 x 40	B	138,7	200,0	394,0	18,0	18,0	15,0	176,7	13926	1231	10,5	11,3
1/2 HP 400x176	190 x 30	B	132,8	190,0	396,0	20,0	20,0	15,0	169,2	12179	1010	8,9	12,1
1/2 HP 400x176	190 x 40	B	147,7	200,0	396,0	20,0	20,0	15,0	188,2	14874	1262	10,2	11,8
1/2 HP 400x194	190 x 30	B	141,9	190,0	398,0	22,0	22,0	15,0	180,7	12899	1036	8,7	12,5
1/2 HP 400x194	190 x 40	B	156,8	200,0	398,0	22,0	22,0	15,0	199,7	15785	1292	10,0	12,2

Poutrelles SFB

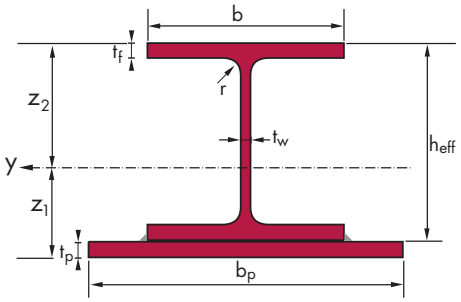
Etat de surface conforme à EN 10163-3: 1991, classe C, sous-classe 1

SFB beams

Surface condition according to EN 10163-3: 1991, class C, subclass 1

SFB-Träger

Oberflächenbeschaffenheit gemäß EN 10163-3: 1991, Klasse C, Untergruppe 1



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Désignation Designation Bezeichnung			Dimensions Abmessungen						Valeurs statiques Section properties Statische Kennwerte			
	$b_p \times t_p$	G	h_{eff}	b	t_w	t_f	r	A	I_y	$W_{el.y}$	z_1	z_2
	mm x mm	kg/m	mm	mm	mm	mm	mm	mm^2	mm^4	mm^3	mm	mm
								x 10^2	x 10^4	x 10^3	x 10	x 10
HEB 140	340 x 10	60,4	140,0	140,0	7,0	12,0	12,0	77,0	2580	250	4,7	10,3
HEM 140	350 x 10	90,7	160,0	146,0	13,0	22,0	12,0	115,6	5057	478	6,4	10,6
HEM 140	350 x 15	104,4	160,0	146,0	13,0	22,0	12,0	133,1	5735	501	6,0	11,5
HEM 140	350 x 20	118,2	160,0	146,0	13,0	22,0	12,0	150,6	6348	521	5,8	12,2
HEB 160	360 x 10	70,8	160,0	160,0	8,0	13,0	15,0	90,3	4058	356	5,6	11,4
HEM 160	370 x 10	105,2	180,0	166,0	14,0	23,0	15,0	134,1	7519	647	7,4	11,6
HEM 160	370 x 15	119,8	180,0	166,0	14,0	23,0	15,0	152,6	8465	675	7,0	12,5
HEM 160	370 x 20	134,3	180,0	166,0	14,0	23,0	15,0	171,1	9322	699	6,7	13,3
HEM 160	370 x 25	148,8	180,0	166,0	14,0	23,0	15,0	189,6	10122	723	6,5	14,0
HEB 180	380 x 10	81,1	180,0	180,0	8,5	14,0	15,0	103,3	6002	480	6,5	12,5
HEB 180	380 x 15	96,0	180,0	180,0	8,5	14,0	15,0	122,3	6734	497	6,0	13,5
HEM 180	390 x 10	119,5	200,0	186,0	14,5	24,0	15,0	152,3	10685	842	8,3	12,7
HEM 180	390 x 15	134,8	200,0	186,0	14,5	24,0	15,0	171,8	11952	875	7,8	13,7
HEM 180	390 x 20	150,1	200,0	186,0	14,5	24,0	15,0	191,3	13098	904	7,5	14,5
HEM 180	390 x 25	165,4	200,0	186,0	14,5	24,0	15,0	210,8	14165	932	7,3	15,2
HEB 200	400 x 10	92,7	200,0	200,0	9,0	15,0	18,0	118,1	8616	636	7,4	13,6
HEB 200	400 x 15	108,4	200,0	200,0	9,0	15,0	18,0	138,1	9628	656	6,8	14,7
HEM 200	410 x 10	135,2	220,0	206,0	15,0	25,0	18,0	172,3	14777	1076	9,3	13,7
HEM 200	410 x 15	151,3	220,0	206,0	15,0	25,0	18,0	192,8	16436	1114	8,8	14,7
HEM 200	410 x 20	167,4	220,0	206,0	15,0	25,0	18,0	213,3	17937	1149	8,4	15,6
HEM 200	410 x 25	183,5	220,0	206,0	15,0	25,0	18,0	233,8	19333	1181	8,1	16,4
HEM 200	410 x 30	199,6	220,0	206,0	15,0	25,0	18,0	254,3	20656	1212	8,0	17,0
HEB 220	420 x 10	104,4	220,0	220,0	9,5	16,0	18,0	133,0	11895	813	8,4	14,6
HEB 220	420 x 15	120,9	220,0	220,0	9,5	16,0	18,0	154,0	13243	838	7,7	15,8
HEB 220	420 x 20	137,4	220,0	220,0	9,5	16,0	18,0	175,0	14410	860	7,2	16,8
HEM 220	430 x 10	151,1	240,0	226,0	15,5	26,0	18,0	192,4	19826	1340	10,2	14,8
HEM 220	430 x 15	167,9	240,0	226,0	15,5	26,0	18,0	213,9	21941	1385	9,7	15,8
HEM 220	430 x 20	184,8	240,0	226,0	15,5	26,0	18,0	235,4	23859	1425	9,3	16,7
HEM 220	430 x 25	201,7	240,0	226,0	15,5	26,0	18,0	256,9	25638	1461	9,0	17,5
HEM 220	430 x 30	218,6	240,0	226,0	15,5	26,0	18,0	278,4	27320	1497	8,7	18,3

Poutrelles SFB (suite)

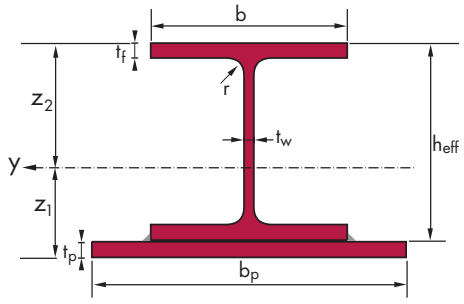
Etat de surface conforme à EN 10163-3: 1991, classe C, sous-classe 1

SFB beams (continued)

Surface condition according to EN 10163-3: 1991, class C, subclass 1

SFB-Träger (Fortsetzung)

Oberflächenbeschaffenheit gemäß EN 10163-3: 1991, Klasse C, Untergruppe 1



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Désignation Designation Bezeichnung			Dimensions Abmessungen						Valeurs statiques Section properties Statische Kennwerte			
	$b_p \times t_p$ mm x mm	G kg/m	h_{eff} mm	b mm	t_w mm	t_f mm	r mm	A mm^2	I_y mm^4	$W_{el.y}$ mm^3	z_1 mm	z_2 mm
								x 10^2	x 10^4	x 10^3	x 10	x 10
HEB 240	440 x 10	117,7	240,0	240,0	10,0	17,0	21,0	150,0	16121	1029	9,3	15,7
HEB 240	440 x 15	135,0	240,0	240,0	10,0	17,0	21,0	172,0	17883	1059	8,6	16,9
HEB 240	440 x 20	152,3	240,0	240,0	10,0	17,0	21,0	194,0	19414	1085	8,1	17,9
HEM 240	450 x 10	192,0	270,0	248,0	18,0	32,0	21,0	244,6	31491	1959	11,9	16,1
HEM 240	450 x 15	209,7	270,0	248,0	18,0	32,0	21,0	267,1	34545	2020	11,4	17,1
HEM 240	450 x 20	227,3	270,0	248,0	18,0	32,0	21,0	289,6	37361	2075	11,0	18,0
HEM 240	450 x 25	245,0	270,0	248,0	18,0	32,0	21,0	312,1	40001	2126	10,7	18,8
HEM 240	450 x 30	262,6	270,0	248,0	18,0	32,0	21,0	334,6	42510	2174	10,4	19,6
HEM 240	450 x 35	280,3	270,0	248,0	18,0	32,0	21,0	357,1	44923	2221	10,3	20,2
HEM 240	450 x 40	298,0	270,0	248,0	18,0	32,0	21,0	379,6	47268	2267	10,1	20,9
HEB 260	460 x 10	129,1	260,0	260,0	10,0	17,5	24,0	164,4	20962	1249	10,2	16,8
HEB 260	460 x 15	147,1	260,0	260,0	10,0	17,5	24,0	187,4	23176	1283	9,4	18,1
HEB 260	460 x 20	165,2	260,0	260,0	10,0	17,5	24,0	210,4	25099	1313	8,9	19,1
HEM 260	470 x 10	209,3	290,0	268,0	18,0	32,5	24,0	266,6	40022	2334	12,9	17,1
HEM 260	470 x 15	227,8	290,0	268,0	18,0	32,5	24,0	290,1	43732	2402	12,3	18,2
HEM 260	470 x 20	246,2	290,0	268,0	18,0	32,5	24,0	313,6	47153	2463	11,9	19,1
HEM 260	470 x 25	264,7	290,0	268,0	18,0	32,5	24,0	337,1	50357	2519	11,5	20,0
HEM 260	470 x 30	283,1	290,0	268,0	18,0	32,5	24,0	360,6	53396	2573	11,2	20,8
HEM 260	470 x 35	301,6	290,0	268,0	18,0	32,5	24,0	384,1	56312	2624	11,0	21,5
HEM 260	470 x 40	320,0	290,0	268,0	18,0	32,5	24,0	407,6	59136	2675	10,9	22,1
HEB 280	480 x 10	140,8	280,0	280,0	10,5	18,0	24,0	179,4	26666	1491	11,1	17,9
HEB 280	480 x 15	159,6	280,0	280,0	10,5	18,0	24,0	203,4	29402	1530	10,3	19,2
HEB 280	480 x 20	178,5	280,0	280,0	10,5	18,0	24,0	227,4	31782	1563	9,7	20,3
HEM 280	490 x 10	227,0	310,0	288,0	18,5	33,0	24,0	289,2	49970	2744	13,8	18,2
HEM 280	490 x 15	246,2	310,0	288,0	18,5	33,0	24,0	313,7	54422	2819	13,2	19,3
HEM 280	490 x 20	265,5	310,0	288,0	18,5	33,0	24,0	338,2	58528	2886	12,7	20,3
HEM 280	490 x 25	284,7	310,0	288,0	18,5	33,0	24,0	362,7	62371	2948	12,3	21,2
HEM 280	490 x 30	303,9	310,0	288,0	18,5	33,0	24,0	387,2	66010	3007	12,0	22,0
HEM 280	490 x 35	323,2	310,0	288,0	18,5	33,0	24,0	411,7	69494	3063	11,8	22,7
HEM 280	490 x 40	342,4	310,0	288,0	18,5	33,0	24,0	436,2	72860	3118	11,6	23,4

SFB = “Slim Floor Beam”

SFB

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Désignation Designation Bezeichnung			Dimensions Abmessungen						Valeurs statiques Section properties Statische Kennwerte			
	$b_p \times t_p$ mm x mm	G kg/m	h_{eff} mm	b mm	t_w mm	t_f mm	r mm	A mm^2	I_y mm^4	$W_{el.y}$ mm^3	z_1 mm	z_2 mm
								x 10^2	x 10^4	x 10^3	x 10	x 10
HEB 300	500 x 10	156,3	300,0	300,0	11,0	19,0	27,0	199,1	34165	1808	12,1	18,9
HEB 300	500 x 15	175,9	300,0	300,0	11,0	19,0	27,0	224,1	37557	1853	11,2	20,3
HEB 300	500 x 20	195,5	300,0	300,0	11,0	19,0	27,0	249,1	40521	1891	10,6	21,4
HEB 300	500 x 25	215,2	300,0	300,0	11,0	19,0	27,0	274,1	43185	1927	10,1	22,4
HEM 300	510 x 10	278,0	340,0	310,0	21,0	39,0	27,0	354,1	72574	3718	15,5	19,5
HEM 300	510 x 15	298,0	340,0	310,0	21,0	39,0	27,0	379,6	78460	3813	14,9	20,6
HEM 300	510 x 20	318,0	340,0	310,0	21,0	39,0	27,0	405,1	83961	3899	14,5	21,5
HEM 300	510 x 25	338,0	340,0	310,0	21,0	39,0	27,0	430,6	89158	3980	14,1	22,4
HEM 300	510 x 30	358,0	340,0	310,0	21,0	39,0	27,0	456,1	94113	4056	13,8	23,2
HEM 300	510 x 35	378,0	340,0	310,0	21,0	39,0	27,0	481,6	98877	4129	13,6	23,9
HEM 300	510 x 40	398,1	340,0	310,0	21,0	39,0	27,0	507,1	103490	4199	13,4	24,6
HEB 320	500 x 10	165,9	320,0	300,0	11,5	20,5	27,0	211,3	41220	2071	13,1	19,9
HEB 320	500 x 15	185,5	320,0	300,0	11,5	20,5	27,0	236,3	45202	2121	12,2	21,3
HEB 320	500 x 20	205,2	320,0	300,0	11,5	20,5	27,0	261,3	48699	2164	11,5	22,5
HEB 320	500 x 25	224,8	320,0	300,0	11,5	20,5	27,0	286,3	51847	2203	11,0	23,5

Notations et formules

Notations and formulae

Bezeichnungen und Formeln

Dans la mesure du possible, les désignations sont celles de l'Eurocode.

Les formules imprimées sur fond de couleur se rapportent uniquement aux poutrelles I et H à ailes parallèles.

Where possible, the designations correspond to those of the Eurocode.

The formulae printed on a coloured background are only valid for I and H sections with parallel flanges.

Die verwendeten Formeln stimmen so weit wie möglich mit denjenigen des Eurocode überein.

Die Formeln auf farbiger Unterlage beziehen sich auf parallelflanschige I- und H-Träger.

A **aire de section**

A **area of section**

A **Querschnittsfläche**

$$A = 2\, t_f\, b + (h - 2\, t_f)\, t_w + (4 - \pi)\, r^2$$

A_G **surface à peindre par unité de masse**

A_G **painting surface per unit mass**

A_G **Anstrichfläche pro Masseneinheit**

$$A_G = \frac{A_L}{A \cdot r_a}$$

A_L **surface à peindre par unité de longueur**

A_L **painting surface per unit length**

A_L **Anstrichfläche pro Längeneinheit**

$$A_L = [4\,(b - 2\,r) + 2\,(h - t_w) + 2\,\pi\,r]\ \frac{L}{L}$$

A_m **surface de l'élément métallique exposée au feu**
par unité de longueur

A_m **surface area of the steel section exposed to fire**
per unit length

A_m **dem Feuer ausgesetzte Fläche des Stahlträgers**
pro Längeneinheit

A_{net} **aire nette de la section**
après déduction d'un trou de boulon

A_{net} **net area of section**
after deduction of a single bolt hole

A_{net} **Netto-Querschnittsfläche**
nach Abzug eines einzelnen Schraubenlochs

A_p **surface interne de la protection contre le feu**
par unité de longueur

A_p **area of the inner surface of the fire protection material**
per unit length

A_p **innere Abwicklungsfläche der Feuerverkleidung**
pro Längeneinheit

A_{vz} **aire de cisaillement**
effort parallèle à l'âme

A_{vz} **shear area**
load parallel to web

A_{vz} **wirksame Schubfläche**
Lastrichtung in Stegebene

$$A_{vz} = A - 2\, b\, t_f + (t_w + 2\, r)\, t_f$$

a **inclinaison des axes principaux d'inertie**

a **inclination of main axes of inertia**

a **Neigung der Hauptträgheitsachsen**

b **largeur du profilé**

b **width of section**

b **Profilbreite**

d **hauteur de la portion droite de l'âme**

d **depth of straight portion of web**

d **Höhe des geraden Stegteils**

$$d = h - 2\, t_f - 2\, r$$

e_{min}, e_{max}
pinces admissibles
pour assemblages par boulon, calculées pour assurer une surface d'assise en dehors du rayon de congé et pour respecter les distances minimales et maximales des bords conformément à ENV 1993-1-1: 1992 § 6.5.1. Ces conditions sont également respectées pour des boulons d'un diamètre inférieur à Ø. Les valeurs sont calculées en prenant en compte des trous à jeu nominal de 2 mm pour les boulons M10 à M24, et de 3 mm pour les boulons M27.

Il y a lieu de vérifier au cas par cas la stabilité au voilement local et, si besoin est, les critères de résistance à la corrosion.

e_{min}, e_{max}
allowable edge distances
for bolted connections, determined for an arrangement of the contact area outside the radius of the root fillet and to satisfy the requirements of ENV 1993-1-1: 1992 § 6.5.1 for minimum and maximum edge distances. These conditions are also fulfilled for bolt diameters smaller than Ø. The values are calculated considering a nominal clearance in holes of 2 mm for M10 to M24 bolts and of 3 mm for M27 bolts.

Local buckling requirements and, if applicable, the resistance to corrosion have to be checked.

e_{min}, e_{max}
zulässiger Randabstand
für geschraubte Verbindungen zur Positionierung der Auflagerfläche außerhalb der Ausrundungen sowie zur Einhaltung der minimalen und maximalen Randabstände nach ENV 1993-1-1: 1992 § 6.5.1. Diese Bedingungen sind ebenfalls für Schraubendurchmesser kleiner als Ø erfüllt. Die Werte sind für ein Nennlochspiel von 2 mm für Schraubengrößen M10 bis M24 und von 3 mm für Schraubengröße M27 berechnet.

Von Fall zu Fall müssen die örtliche Beulsicherheit und gegebenenfalls der Korrosionswiderstand geprüft werden.

G **masse par unité de longueur**

G **mass per unit length**

G **Masse pro Längeneinheit**

$$G = A\, r_a$$

h **hauteur du profilé**

h_i **hauteur intérieure entre les ailes**

h **depth of section**

h_i **inner depth between flanges**

h **Profilhöhe**

h_i **innere Höhe zwischen Flanschen**

$$h_i = h - 2\, t_f$$

I **moment d'inertie de flexion**

I **second moment of area**

I **Flächenmoment 2. Grades**

$$I_y = \frac{1}{12}\,[b\, h^3 - (b - t_w)\,(h - 2\, t_f)^3] + 0{,}03\, r^4 + 0{,}2146\, r^2\,(h - 2\, t_f - 0{,}4468\, r)^2$$

$$I_z = \frac{1}{12}\,[2\, t_f\, b^3 + (h - 2\, t_f)\, t_w^3] + 0{,}03\, r^4 + 0{,}2146\, r^2\,(t_w + 0{,}4468\, r)^2$$

i **rayon de giration**

i **radius of gyration**

i **Trägheitshalbmesser**

$$i_y = \sqrt{\frac{I_y}{A}} \qquad i_z = \sqrt{\frac{I_z}{A}} \qquad i_u = \sqrt{\frac{I_u}{A}} \qquad i_v = \sqrt{\frac{I_v}{A}}$$

I_t **moment d'inertie de torsion**

I_t **torsion constant**

I_t **Torsionsflächenmoment 2. Grades**

$$I_t = \frac{2}{3}\,(b - 0{,}63\, t_f)\, t_f^3 + \frac{1}{3}\,(h - 2\, t_f)\, t_w^3 + 2\left(\frac{t_w}{t_f}\right)\left(0{,}145 + 0{,}1\,\frac{r}{t_f}\right)\left[\frac{(r + t_w/2)^2 + (r + t_f)^2 - r^2}{2\, r + t_f}\right]^4$$

I_w moment d'inertie de gauchissement
par rapport au centre de cisaillement

I_w warping constant
referred to the shear centre

I_w Wölbflächenmoment 2. Grades
bezogen auf den Schubmittelpunkt

$$I_w = \frac{t_f\ b^3}{24}\ (h\text{-}t_f)^2$$

I_{yz} moment d'inertie composé
(moment centrifuge)

I_{yz} centrifugal moment

I_{yz} Flächenzentrifugalmoment 2. Grades

p_{min}, p_{max} pinces admissibles
pour assemblages par boulon, calculées pour assurer une surface d'assise en dehors du rayon de congé et pour respecter les distances minimales et maximales des bords et la distance minimale des files situées de part et d'autre de l'âme conformément à ENV 1993-1-1 : 1992 § 6.5.1. Ces conditions sont également respectées pour des boulons d'un diamètre inférieur à Ø. Les valeurs sont calculées en prenant en compte des trous à jeu nominal de 2 mm pour les boulons M10 à M24, et de 3 mm pour les boulons M27.

Il est supposé que l'axe de référence pour le forage des trous est l'axe passant par l'âme à mi-épaisseur. Si tel n'est pas le cas, la valeur de pmin à appliquer peut différer légèrement en fonction des tolérances de laminage.

Il y a lieu de vérifier au cas par cas la stabilité au voilement local et, si besoin est, les critères de résistance à la corrosion.

p_{min}, p_{max} allowable edge distances
for bolted connections, determined for an arrangement of the contact area outside the radius of the root fillet and to satisfy the requirements of ENV 1993-1-1 : 1992 § 6.5.1 for minimum and maximum edge distances. These conditions are also fulfilled for bolt diameters smaller than Ø. The values are calculated considering a nominal clearance in holes of 2 mm for M10 to M24 bolts and of 3 mm for M27 bolts.

It is assumed that the reference axis for drilling the holes is the centre-line of the web. If not, the applicable pmin value may differ slightly depending on the rolling tolerances.

Local buckling requirements and, if applicable, the resistance to corrosion have to be checked.

p_{min}, p_{max} zulässiger Randabstand
für geschraubte Verbindungen zur Positionierung der Auflagerfläche außerhalb der Ausrundungen sowie zur Einhaltung der minimalen und maximalen Randabstände nach ENV 1993-1-1 : 1992 § 6.5.1. Diese Bedingungen sind ebenfalls für Schraubendurchmesser kleiner als Ø erfüllt. Die Werte sind für ein Nennlochspiel von 2 mm für Schraubengrößen M10 bis M24 und von 3 mm für Schraubengröße M27 berechnet.

Es wird angenommen, dass die Stegachse die Bezugsachse zur Bohrung der Löcher ist. Sollte dies nicht der Fall sein, kann sich der pmin-Wert in Abhängigkeit der Walztoleranzen leicht verändern.

Von Fall zu Fall müssen die örtliche Beulsicherheit und gegebenenfalls der Korrosionswiderstand geprüft werden.

Ø diamètre de boulon maximal

Ø maximum bolt diameter

Ø maximaler Schraubendurchmesser

r, r_1 rayon de congé

r, r_1 radius of root fillet

r, r_1 Ausrundungsradius

r_2 rayon de congé extérieur

r_2 toe radius

r_2 Abrundungsradius

r_a masse volumique de l'acier

r_a unit mass of steel

r_a Dichte des Stahls

s_s longueur d'appui rigide
suivant ENV 1993-1-1 § 5.7.2

s_s length of stiff bearing
according to ENV 1993-1-1 § 5.7.2

s_s Lastverteilungsbreite
gemäß ENV 1993-1-1 § 5.7.2

$$s_s = t_w + 2\ t_f + (4\text{-}2\ \sqrt{2})\ r$$

La longueur d'appui rigide de l'aile est la distance sur laquelle une charge est effectivement distribuée; elle influence la résistance de l'âme sans raidisseur d'un profilé adjacent aux efforts transversaux.

The length of stiff bearing on the flange is the distance over which an applied force is effectively distributed. It influences the resistance of the unstiffened web of an adjacent section to transverse forces.

Die Lastverteilungsbreite an den Flanschen ist die Breite, die für die Annahme einer tatsächlichen Lastverteilung zugrundegelegt werden darf. Sie beeinflusst den Widerstand des nicht ausgesteiften Stegs eines angrenzenden Profils gegenüber eingeleiteten Querlasten.

t	**épaisseur**	t	**thickness**	t	**Stärke**
t_f	**épaisseur d'aile**	t_f	**flange thickness**	t_f	**Flanschdicke**
t_w	**épaisseur d'âme**	t_w	**web thickness**	t_w	**Stegdicke**
u	**distance de la fibre extrême à l'axe principal v/major**	u	**distance of extreme fibre to minor v-axis**	u	**Abstand der äußeren Faser zur v-Hauptachse**
v	**distance de la fibre extrême à l'axe principal u**	v	**distance of extreme fibre to major u-axis**	v	**Abstand der äußeren Faser zur u-Hauptachse**
V	**volume de l'élément métallique** par unité de longueur	V	**volume of the steel member** per unit length	V	**Volumen des Stahlprofils** pro Längeneinheit
W_{el}	**module de flexion élastique**	W_{el}	**elastic section modulus**	W_{el}	**elastisches Widerstandsmoment**

$$W_y = \frac{2 \cdot I_y}{h} \qquad W_z = \frac{2 \cdot I_z}{b}$$

W_{pl}	**module de flexion plastique** Pour un dimensionnement plastique, la section doit appartenir à la classe 1 ou 2 selon la capacité de rotation requise.	W_{pl}	**plastic section modulus** For plastic design, the cross section must belong to class 1 or 2 according to the required rotation capacity.	W_{pl}	**plastisches Widerstandsmoment** Bei einer plastischen Bemessung muss das Profil der Klasse 1 oder 2, gemäß der erforderlichen Rotationskapazität, angehören.

$$W_{pl.y} = \frac{t_w\, h^2}{4} + (b - t_w)\,(h - t_f)\,t_f + \frac{4 - p}{2}\, r^2\,(h - 2\,t_f) + \frac{3\,p - 10}{3}\, r^3$$

$$W_{pl.z} = \frac{b^2\, t_f}{2} + \frac{h - 2\,t_f}{4}\, t_w^2 + r^3\left(\frac{10}{3} - p\right) + \left(2 - \frac{p}{2}\right) t_w\, r^2$$

	Pour les fers U : Wpl.z' module de flexion plastique par rapport à l'axe neutre plastique z', parallèle à l'axe z.		For channels: Wpl.z' plastic section modulus referred to plastic neutral z' axis which is parallel to z axis.		Für U-Profile: Wpl.z' plastisches Widerstandsmoment bezogen auf die plastische neutrale z'-Achse, die parallel zur z-Achse ist.
y_m	**distance du centre de cisaillement**	y_m	**distance of shear centre**	y_m	**Abstand des Schubmittelpunktes**
y_s	**distance du centre de gravité suivant l'axe y**	y_s	**distance of centre of gravity along y-axis**	y_s	**Schwerpunktabstand in Richtung y-Achse**
z_s, z_1, z_2	**distance du centre de gravité suivant l'axe z**	z_s, z_1, z_2	**distance of centre of gravity along z-axis**	z_s, z_1, z_2	**Schwerpunktabstand in Richtung z-Achse**