

6. Hollow Sections

Structural steel tubes that can be circular, hollow or rectangular, each with its own attributes, used for a wide range of construction and industrial applications.

6.1 Hot Finished

- 6.1.1 Circular Hollow Section (CHS)
- 6.1.2 Rectangular Hollow Section (RHS)
- 6.1.3 Square Hollow Section (SHS)

6.2 Cold Formed

- 6.2.1 Circular Hollow Section (CHS)
- 6.2.2 Rectangular Hollow Section (RHS)
- 6.2.3 Square Hollow Section (SHS)

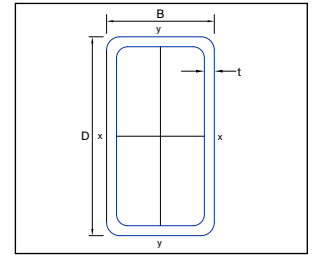
6.1 Hot Finished Hollow Sections

Standard specifications

Material	Yield strength						Tensile strength N/mm ²	Min. Elongation L ₀ =5.65√S ₀	Min. Charpy V-notch.	Dimensions & Tolerances
	N/mm ²									
<i>EN 10210</i>	≤16mm	>16 - ≤40mm	>40 - ≤63mm	>63 - ≤80mm	>80 - ≤100mm	>100 - ≤120mm	3-100mm			<i>EN10210</i>
S275J0H	275	265	255	245	235	225	410-560	19-23 %	27J @ 0°C	
S275J2H	275	265	255	245	235	225	410-560	19-23 %	27J @ -20°C	
S355J0H	355	345	335	325	315	295	470-630	18-22 %	27J @ 0°C	
S355J2H	355	345	335	325	315	295	470-630	18-22 %	27J @ -20°C	
S355NH	355	345	335	-	-	-	470-630	22%	40J @ -20°C	
S420NH	420	400	390	-	-	-	520-680	19%	40J @ -20°C	
S460NH	460	440	430	-	-	-	540-720	17%	40J @ -20°C	

* S460NH only available up to 16mm thickness

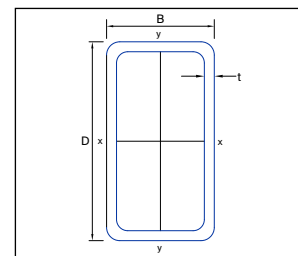
6.1.2 Hot Finished Rectangular Hollow Section (RHS)



Designation		Mass per Metre	Area of Section	Second Moment of Area		Radius of Gyration		Elastic Modulus		Plastic Modulus		Torsional Constants		Surface Area per Metre	
Size	Thickness			Axis x-x	Axis y-y	Axis x-x	Axis y-y	Axis x-x	Axis y-y	Axis x-x	Axis y-y	J	C		
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	
50x25	2.5	2.72	3.43	10.4	3.39	1.74	0.994	4.16	2.71	5.33	3.22	8.42	4.61	0.144	
	3	3.22	4.04	11.9	3.83	1.72	0.973	4.76	3.06	6.18	3.71	9.64	5.20	0.142	
	3.2 *	3.41	4.28	12.5	3.98	1.71	0.964	4.98	3.18	6.50	3.89	10.1	5.41	0.142	
	4 *	4.07	5.19	14.4	4.48	1.66	0.929	5.75	3.59	7.67	4.54	11.6	6.11	0.140	
50x30	2.5	2.92	3.68	11.8	5.22	1.79	1.19	4.73	3.48	5.92	4.11	11.7	5.73	0.154	
	3	3.45	4.34	13.6	5.94	1.77	1.17	5.43	3.96	6.88	4.76	13.5	6.51	0.152	
	3.2 *	3.66	4.60	14.2	6.20	1.76	1.16	5.68	4.13	7.25	5.00	14.2	6.80	0.152	
	4	4.46	5.59	16.5	7.08	1.72	1.13	6.60	4.72	8.59	5.88	16.6	7.77	0.150	
50x40	2.5	3.71	4.68	22.8	12.1	2.21	1.60	7.61	6.03	9.32	7.02	25.1	9.73	0.194	
	3	4.39	5.54	26.5	13.9	2.18	1.58	8.82	6.95	10.9	8.19	29.2	11.2	0.192	
	3.2 *	4.66	5.88	27.8	14.6	2.18	1.57	9.27	7.29	11.5	8.64	30.8	11.7	0.192	
	4	5.72	7.19	32.8	17.0	2.14	1.54	10.9	8.52	13.8	10.3	36.7	13.7	0.190	
60x40	5	6.97	8.73	38.1	19.5	2.09	1.50	12.7	9.77	16.4	12.2	43.0	15.7	0.187	
	6	8.15	10.2	42.3	21.4	2.04	1.45	14.1	10.7	18.6	13.7	48.2	17.3	0.185	
	6.3	8.49	10.6	43.4	21.9	2.02	1.44	14.5	11.0	19.2	14.2	49.5	17.6	0.184	
	8	10.00	12.8	47.9	23.7	1.94	1.36	16.0	11.9	22.1	16.1	55.4	19.2	0.179	
	80x40	3	5.34	6.74	54.2	18.0	2.84	1.63	13.6	9.00	17.1	10.4	43.8	15.3	0.232
		3.2 *	5.67	7.16	57.2	18.9	2.83	1.63	14.3	9.46	18.0	11.0	46.2	16.1	0.232
4		6.97	8.79	68.2	22.2	2.79	1.59	17.1	11.1	21.8	13.2	55.2	18.9	0.230	
5		8.54	10.7	80.3	25.7	2.74	1.55	20.1	12.9	26.1	15.7	65.1	21.9	0.227	
80x50	6	10.00	12.6	90.5	28.5	2.68	1.50	22.6	14.2	30.0	17.8	73.4	24.2	0.225	
	6.3	10.50	13.1	93.3	29.2	2.67	1.49	23.3	14.6	31.1	18.4	75.6	24.8	0.224	
	8	12.80	16.0	106	32.1	2.58	1.42	26.5	16.1	36.5	21.2	85.8	27.4	0.219	
	10 *	14.90	18.9	115	33.7	2.47	1.33	28.8	16.9	41.3	23.5	92.5	28.9	0.214	
90x50	3	5.81	7.34	63.1	30.2	2.93	2.03	15.8	12.1	19.4	13.9	64.8	19.7	0.252	
	4 *	7.53	9.59	79.8	37.7	2.88	1.98	19.9	15.1	24.9	17.8	82.6	24.6	0.250	
	5 *	9.33	11.7	94.4	44.1	2.84	1.94	23.6	17.7	29.9	21.3	98.4	28.8	0.247	
	6 *	11.00	13.8	107	49.5	2.79	1.90	26.8	19.8	34.4	24.4	112	32.3	0.245	
	8 *	14.11	17.6	127	57.4	2.69	1.81	31.7	23.0	42.2	29.6	135	37.5	0.239	
100x50	10 *	16.40	20.9	140	62.1	2.59	1.72	35.0	24.8	48.3	33.4	150	40.6	0.234	
	3	6.28	7.94	84.4	33.5	3.26	2.05	18.8	13.4	23.2	15.3	76.5	22.4	0.272	
	3.2 *	6.63	8.44	89.1	35.3	3.25	2.04	19.8	14.1	24.6	16.2	80.9	23.6	0.272	
	3.6 *	7.46	9.42	98.3	38.7	3.23	2.03	21.8	15.5	27.2	18.0	89.4	25.9	0.271	
	4	8.15	10.4	107	41.9	3.21	2.01	23.8	16.8	29.8	19.6	97.5	28.0	0.270	
	5	10.10	12.7	127	49.2	3.16	1.97	28.3	19.7	36.0	23.5	116	32.9	0.267	
	6	11.90	15.0	145	55.4	3.11	1.92	32.2	22.1	41.6	27.0	133	37.0	0.265	
	6.3	12.50	15.6	150	57.0	3.10	1.91	33.3	22.8	43.2	28.0	138	38.1	0.264	
	8	15.30	19.2	174	64.6	3.01	1.84	38.6	25.8	51.4	32.9	160	43.2	0.259	
	10 *	18.00	22.9	194	70.2	2.91	1.75	43.0	28.1	59.3	37.4	179	47.1	0.254	
100x50	3	6.75	8.54	110	36.8	3.58	2.08	21.9	14.7	27.3	16.8	88.4	25.0	0.292	
	3.2 *	7.18	9.08	116	38.8	3.57	2.07	23.2	15.5	28.9	17.7	93.4	26.4	0.292	
	4	8.86	11.2	140	46.2	3.53	2.03	27.9	18.5	35.2	21.5	113	31.4	0.290	
	5	10.90	13.7	167	54.3	3.48	1.99	33.3	21.7	42.6	25.8	135	36.9	0.287	
	6	12.90	16.2	190	61.2	3.43	1.95	38.1	24.5	49.4	29.7	154	41.6	0.285	
	6.3	13.40	16.9	197	63.0	3.42	1.93	39.4	25.2	51.3	30.8	160	42.9	0.284	
	8	16.60	20.8	230	71.7	3.33	1.86	46.0	28.7	61.4	36.3	186	48.9	0.279	

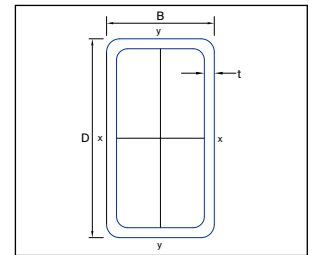
* Sizes not included in BS EN 10210 Part 2 (1997)

6.1.2 Hot Finished Rectangular Hollow Section (RHS)



Designation		Mass per Metre	Area of Section	Second Moment of Area		Radius of Gyration		Elastic Modulus		Plastic Modulus		Torsional Constants		Surface Area per Metre
Size	Thickness			Axis x-x	Axis y-y	Axis x-x	Axis y-y	Axis x-x	Axis y-y	Axis x-x	Axis y-y	J	C	
DxB	t	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
mm	mm													
100x60	3	7.22	9.14	124	55.7	3.68	2.47	24.7	18.6	30.2	21.2	121	30.7	0.312
	3.6 *	8.59	10.9	145	64.8	3.65	2.44	28.9	21.6	35.6	24.9	142	35.6	0.311
	5	11.70	14.7	189	83.6	3.58	2.38	37.8	27.9	47.4	32.9	188	45.9	0.307
	6	13.80	17.4	217	95.0	3.53	2.34	43.4	31.7	55.1	38.1	216	52.1	0.305
	6.3	14.40	18.1	225	98.1	3.52	2.33	45.0	32.7	57.3	39.5	224	53.8	0.304
	8	17.80	22.4	264	113	3.44	2.25	52.8	37.8	68.7	47.1	265	62.2	0.299
120x60	3.6 *	9.72	12.3	227	76.3	4.30	2.49	37.9	25.4	47.2	28.9	183	43.3	0.351
	5	13.30	16.7	299	98.8	4.23	2.43	49.9	32.9	63.1	38.4	242	56.0	0.347
	6	15.70	19.8	345	113	4.18	2.39	57.5	37.5	73.6	44.5	279	63.8	0.345
	6.3	16.40	20.7	358	116	4.16	2.37	59.7	38.8	76.7	46.3	290	65.9	0.344
	8	20.40	25.6	425	135	4.08	2.30	70.8	45.0	92.7	55.4	344	76.6	0.339
	10	24.30	30.9	488	152	3.97	2.21	81.4	50.5	109.2	64.4	396	86.1	0.334
120x80	5	14.80	18.7	365	193	4.42	3.21	60.9	48.2	74.6	56.1	401	77.9	0.387
	6	17.60	22.2	423	222	4.37	3.17	70.6	55.6	87.3	65.5	468	89.6	0.385
	6.3	18.40	23.2	440	230	4.36	3.15	73.3	57.6	91.0	68.2	487	92.9	0.384
	8	22.90	28.8	525	273	4.27	3.08	87.5	68.1	111	82.6	587	110	0.379
	10	27.90	34.9	609	313	4.18	2.99	102	78.1	131	97.3	688	126	0.374
150x100	5	18.70	23.7	739	392	5.58	4.07	98.5	78.5	119	90.1	807	127	0.487
	6	22.30	28.2	862	456	5.53	4.02	115	91.2	141	106	946	147	0.485
	6.3	23.30	29.5	898	474	5.52	4.01	120	94.8	147	110	986	153	0.484
	8	29.10	36.8	1087	569	5.44	3.94	145	114	180	135	1203	183	0.479
	10	35.70	44.9	1282	665	5.34	3.85	171	133	216	161	1432	214	0.474
	12.5	42.80	54.6	1488	763	5.22	3.74	198	153	256	190	1679	246	0.468
160x80	4.5 *	16.24	20.6	679	229	5.75	3.33	84.9	57.1	106	64.8	547	97.2	0.468
	5	18.00	22.7	744	249	5.72	3.31	93.0	62.3	116	71.1	600	106	0.467
	6	21.30	27.0	868	288	5.67	3.27	108	72.0	136	83.3	701	122	0.465
	6.3	22.30	28.2	903	299	5.66	3.26	113	74.8	142	86.8	730	127	0.464
	8	27.90	35.2	1091	356	5.57	3.18	136	89.0	175	106	883	151	0.459
	10	34.20	42.9	1284	411	5.47	3.10	161	103	209	125	1041	175	0.454
	12	39.50	50.3	1449	455	5.37	3.01	181	114	240	142	1175	194	0.449
	12.5	41.60	52.1	1485	465	5.34	2.99	186	116	247	146	1204	198	0.448
200x100	5	22.70	28.7	1495	505	7.21	4.19	149	101	185	114	1204	172	0.587
	6	27.00	34.2	1754	589	7.16	4.15	175	118	218	134	1414	200	0.585
	6.3	28.30	35.8	1829	613	7.15	4.14	183	123	228	140	1475	208	0.584
	8	35.40	44.8	2234	739	7.06	4.06	223	148	282	172	1804	251	0.579
	10	43.60	54.9	2664	869	6.96	3.98	266	174	341	206	2156	295	0.574
	12	50.80	64.7	3047	979	6.86	3.89	305	196	395	237	2469	333	0.569
	12.5	53.40	67.1	3136	1004	6.84	3.87	314	201	408	245	2541	341	0.568
	16 +	66.40	83.0	3678	1147	6.66	3.72	368	229	491	290	2982	391	0.559
200x120	16 *	71.38	89.4	4221	1813	6.87	4.50	422	302	550	377	4247	497	0.599
200x150	6 *	31.70	40.2	2318	1485	7.60	6.08	232	198	277	227	2820	313	0.685
	6.3 *	33.22	42.1	2420	1549	7.58	6.07	242	207	289	237	2947	326	0.684
	8 *	41.70	52.8	2971	1894	7.50	5.99	297	253	359	294	3643	398	0.679
	9 *	46.60	58.9	3276	2084	7.46	5.95	328	278	398	325	4033	437	0.677
	10 *	51.40	64.9	3568	2264	7.41	5.91	357	302	436	356	4409	475	0.674
	12 *	60.90	76.7	4109	2596	7.32	5.82	411	346	508	414	5119	543	0.669
	12.5 *	63.20	79.6	4236	2673	7.30	5.80	424	356	525	428	5287	559	0.668

Dimensions	EN10210-2
Specification	EN10210-1
Size Range	50mm x 30mm to 500mm x 300mm



Designation		Mass per Metre	Area of Section	Second Moment of Area		Radius of Gyration		Elastic Modulus		Plastic Modulus		Torsional Constants		Surface Area per Metre
Size	Thickness			Axis x-x	Axis y-y	Axis x-x	Axis y-y	Axis x-x	Axis y-y	Axis x-x	Axis y-y	J	C	
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
250x150	6	36.40	46.2	3965	1796	9.27	6.24	317	239	385	270	3877	396	0.785
	6.3	38.00	48.4	4143	1874	9.25	6.22	331	250	402	283	4054	413	0.784
	8	48.00	60.8	5111	2298	9.17	6.15	409	306	501	350	5021	506	0.779
	10	59.30	74.9	6174	2755	9.08	6.06	494	367	611	426	6090	605	0.774
	12.5	73.00	92.1	7387	3265	8.96	5.96	591	435	740	514	7326	717	0.768
	16	91.50	115	8879	3873	8.79	5.80	710	516	906	625	8868	849	0.759
300x100	5 *	30.52	38.7	4146	731	10.3	4.34	276	146	354	161	2040	262	0.787
	6 *	36.20	46.2	4893	854	10.3	4.30	326	171	419	190	2399	306	0.785
	6.3 *	38.00	48.4	5111	890	10.3	4.29	341	178	439	199	2504	319	0.784
	10 *	58.80	74.9	7613	1275	10.1	4.13	508	255	666	296	3676	458	0.774
	12 *	70.30	88.7	8818	1447	9.97	4.04	588	289	779	343	4223	520	0.769
300x200	6	45.80	58.2	7486	4013	11.3	8.31	499	401	596	451	8100	651	0.985
	6.3	48.10	61.0	7829	4193	11.3	8.29	522	419	624	472	8476	681	0.984
	8	60.50	76.8	9717	5184	11.3	8.22	648	518	779	589	10560	840	0.979
	10	75.00	94.9	11820	6278	11.2	8.13	788	628	956	721	12910	1015	0.974
	12	89.15	113	13800	7294	11.1	8.05	920	729	1124	847	15140	1178	0.969
	12.5	92.60	117	14270	7537	11.0	8.02	952	754	1165	877	15680	1217	0.968
	16	117.00	147	17390	9109	10.9	7.87	1159	911	1441	1080	19250	1468	0.959
350x150	10 *	75.00	94.9	14320	3737	12.3	6.27	818	498	1035	566	9633	867	0.974
	12.5 *	92.60	117	17300	4450	12.2	6.17	988	593	1263	686	11620	1032	0.968
400x200	6.3 *	57.90	73.6	15700	5376	14.6	8.55	785	538	960	594	12610	917	1.18
	8	73.10	92.8	19560	6660	14.5	8.47	978	666	1203	743	15740	1135	1.18
	10	90.70	115	23910	8084	14.4	8.39	1196	808	1480	911	19260	1376	1.17
	12.5	112.00	142	29060	9738	14.3	8.28	1453	974	1813	1111	23440	1656	1.17
	16	142.00	179	35740	11820	14.1	8.13	1787	1182	2256	1374	28870	2010	1.16
450x250	8	85.40	109	30080	12140	16.6	10.6	1337	971	1622	1081	27080	1629	1.38
	10	106.00	135	36900	14820	16.5	10.5	1640	1185	2000	1331	33280	1986	1.37
	12.5	132.00	167	45030	17970	16.4	10.4	2001	1438	2458	1631	40720	2406	1.37
	16	167.00	211	55710	22040	16.2	10.2	2476	1763	3070	2029	50550	2947	1.36
500x200	10 *	106.00	135	41760	9891	17.6	8.6	1670	989	2105	1101	25870	1737	1.37
500x300	10	122.00	155	53760	24440	18.6	12.6	2150	1629	2595	1826	52450	2696	1.57
	12.5	152.00	192	65810	29780	18.5	12.5	2633	1985	3196	2244	64390	3281	1.57
	16	192.00	243	81780	36770	18.3	12.3	3271	2451	4005	2804	80330	4044	1.56