



聚美集團

CHOO BEE GROUP

# STEEL HOLLOW SECTIONS

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6a) Structural Steel Hollow Sections

European Standard ( Extracts from BS EN 10219 : 2006 )

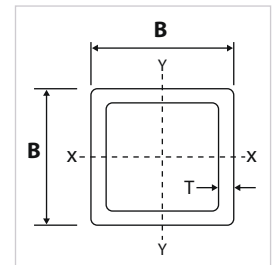
<p><b>General Information</b></p>	<p>BS EN 10219 specifies the tolerances and technical delivery conditions for cold formed welded structural hollow sections of circular, square or rectangular forms and applies to structural hollow sections formed cold without subsequent heat treatment.</p>																																																							
<p><b>Chemical Composition</b></p>	<p>The Chemical analysis shall conform to the requirements given in Table 1 for the appropriate grade.</p> <p>Table 1. Chemical composition –Cast analysis for product thickness ≤ 40 mm</p> <table border="1"> <thead> <tr> <th rowspan="2">Steel Grade</th> <th colspan="7">% By Mass, Maximum</th> </tr> <tr> <th>C</th> <th>Si</th> <th>Mn</th> <th>P</th> <th>S</th> <th>N</th> <th>CEV</th> </tr> </thead> <tbody> <tr> <td>S235JRH</td> <td>0.17</td> <td>-</td> <td>1.40</td> <td>0.040</td> <td>0.040</td> <td>0.009</td> <td>0.35</td> </tr> <tr> <td>S275J0H</td> <td>0.20</td> <td>-</td> <td>1.50</td> <td>0.035</td> <td>0.035</td> <td>0.009</td> <td>0.40</td> </tr> <tr> <td>S275J2H</td> <td>0.20</td> <td>-</td> <td>1.50</td> <td>0.030</td> <td>0.030</td> <td>-</td> <td>0.40</td> </tr> <tr> <td>S355J0H</td> <td>0.22</td> <td>0.55</td> <td>1.60</td> <td>0.035</td> <td>0.035</td> <td>0.009</td> <td>0.45</td> </tr> <tr> <td>S355J2H</td> <td>0.22</td> <td>0.55</td> <td>1.60</td> <td>0.030</td> <td>0.030</td> <td>-</td> <td>0.45</td> </tr> </tbody> </table>	Steel Grade	% By Mass, Maximum							C	Si	Mn	P	S	N	CEV	S235JRH	0.17	-	1.40	0.040	0.040	0.009	0.35	S275J0H	0.20	-	1.50	0.035	0.035	0.009	0.40	S275J2H	0.20	-	1.50	0.030	0.030	-	0.40	S355J0H	0.22	0.55	1.60	0.035	0.035	0.009	0.45	S355J2H	0.22	0.55	1.60	0.030	0.030	-	0.45
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<p><b>Mechanical Strength (Tensile Test)</b></p>	<p>For Tensile test. The yield strength, tensile strength and elongation of the test piece shall conform to the requirements given in Table 2 for the appropriate grade.</p> <p>Table 2. Mechanical properties of non-alloy steel hollow sections in thickness ≤ 40 mm</p> <table border="1"> <thead> <tr> <th rowspan="3">Steel Grade</th> <th colspan="2">Minimum Yield Strength MPa</th> <th colspan="2">Tensile Strength MPa</th> <th>Minimum Elongation %</th> </tr> <tr> <th colspan="2">Specified Thickness mm</th> <th colspan="2">Specified Thickness mm</th> <th>Specified Thickness mm</th> </tr> <tr> <th>≤ 16</th> <th>&gt; 16 ≤ 40</th> <th>&lt; 3</th> <th>≥ 3 ≤ 40</th> <th>≤ 40</th> </tr> </thead> <tbody> <tr> <td>S235JRH</td> <td>235</td> <td>225</td> <td>360 ~ 510</td> <td>360 ~ 510</td> <td>24</td> </tr> <tr> <td>S275J0H</td> <td>275</td> <td>265</td> <td>430 ~ 580</td> <td>410 ~ 560</td> <td>20</td> </tr> <tr> <td>S275J2H</td> <td>275</td> <td>265</td> <td>430 ~ 580</td> <td>410 ~ 560</td> <td>20</td> </tr> <tr> <td>S355J0H</td> <td>355</td> <td>345</td> <td>510 ~ 680</td> <td>470 ~ 630</td> <td>20</td> </tr> <tr> <td>S355J2H</td> <td>355</td> <td>345</td> <td>510 ~ 680</td> <td>470 ~ 630</td> <td>20</td> </tr> </tbody> </table>	Steel Grade	Minimum Yield Strength MPa		Tensile Strength MPa		Minimum Elongation %	Specified Thickness mm		Specified Thickness mm		Specified Thickness mm	≤ 16	> 16 ≤ 40	< 3	≥ 3 ≤ 40	≤ 40	S235JRH	235	225	360 ~ 510	360 ~ 510	24	S275J0H	275	265	430 ~ 580	410 ~ 560	20	S275J2H	275	265	430 ~ 580	410 ~ 560	20	S355J0H	355	345	510 ~ 680	470 ~ 630	20	S355J2H	355	345	510 ~ 680	470 ~ 630	20									
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<p><b>Impact Test</b></p>	<p>The absorbed energy value (J) Shall conform to the specified values given in Table 3 for the appropriate grade.</p> <p>Table 3. Impact Test Requirements</p> <table border="1"> <thead> <tr> <th rowspan="3">Steel Grade</th> <th colspan="3">Minimum Impact Energy J</th> </tr> <tr> <th colspan="3">At Test Temperature Of</th> </tr> <tr> <th>-20°C</th> <th>0°C</th> <th>20°C</th> </tr> </thead> <tbody> <tr> <td>S235JRH</td> <td>-</td> <td>-</td> <td>27</td> </tr> <tr> <td>S275J0H</td> <td>-</td> <td>27</td> <td>-</td> </tr> <tr> <td>S275J2H</td> <td>27</td> <td>-</td> <td>-</td> </tr> <tr> <td>S355J0H</td> <td>-</td> <td>27</td> <td>-</td> </tr> <tr> <td>S355J2H</td> <td>27</td> <td>-</td> <td>-</td> </tr> </tbody> </table>	Steel Grade	Minimum Impact Energy J			At Test Temperature Of			-20°C	0°C	20°C	S235JRH	-	-	27	S275J0H	-	27	-	S275J2H	27	-	-	S355J0H	-	27	-	S355J2H	27	-	-																									
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<b>Tolerances On Dimensions and Mass</b>	The tolerances on dimensions shall respectively conform to Table 4.			
	Table 4. Tolerance on dimensions			
	<b>Characteristic</b>	<b>Circular Hollow Sections</b>	<b>Square And Rectangular Hollow Sections</b>	
	Outside Dimension ( <i>D</i> , <i>B</i> and <i>H</i> )	± 1% with a minimum of ± 0.50 mm and a maximum of ± 10 mm	Side length mm	Tolerance
			<i>H</i> , <i>B</i> < 100	± 1% with a minimum of ± 0.50 mm
			100 ≤ <i>H</i> , <i>B</i> ≤ 200	± 0.80%
			<i>H</i> , <i>B</i> > 200	± 0.60%
	Thickness ( <i>T</i> )	For <i>D</i> ≤ 406.4 mm: <i>T</i> ≤ 5 mm ± 10% <i>T</i> > 5 mm ± 0.50 mm For <i>D</i> > 406.4 mm ± 10% with a maximum of ± 2 mm	<i>T</i> ≤ 5 mm ± 10% <i>T</i> > 5 mm ± 0.50 mm	
	Length	<b>Type Of Length</b>	<b>Range mm</b>	<b>Tolerance</b>
		Random length	4000 < <i>L</i> ≤ 16000 with a range of 2000 per order item	10 % of sections supplied may be below the minimum for the ordered range but not shorter than 75 % of the minimum range length
		Approximate length	≥ 4000	+ 50 mm 0
		Exact length	< 6000 6000 ≤ <i>L</i> ≤ 10000 > 10000	+ 5 mm 0 + 15 mm 0 + 5 mm + 1 mm/m 0
	Straightness	0.20% of total length and 3 mm over any 1 m length	0.15 % of total length and 3 mm over any 1 m length	
	Out-of-roundness ( <i>o</i> )	2% for hollow sections having a diameter to thickness ratio not exceeding 100	-	
	Concavity / convexity	-	Max. 0.8% with a minimum of 0.50 mm	
Radius of Corners	-	Thickness	External corner profile	
		<i>T</i> ≤ 6	1.6 <i>T</i> to 2.4 <i>T</i>	
		6 < <i>T</i> ≤ 10	2.0 <i>T</i> to 3.0 <i>T</i>	
		10 < <i>T</i>	2.4 <i>T</i> to 3.6 <i>T</i>	
Squareness of side	-	90° ± 1°		
Twist	-	2 mm plus 0.5 mm/m length		
Inner Flash	-			
End tolerance of diameter	-			
End Facing	-			
Mass ( <i>m</i> ) per unit length	± 6% on individual delivered lengths			

## Hollow Sections BS EN 10219

## 6a(i) Cold Formed Square Hollow Sections

(Dimensions and Properties in accordance to EN 10219:2006)



## Square Hollow Sections

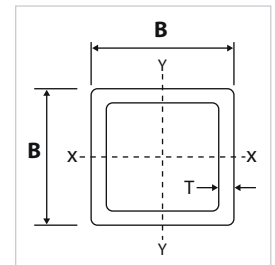
Designation Size	Calculated Weight			Cross Sectional Area	Second Moment of Area	Radius of Gyration	Elastic Section Modulus	Plastic Section Modulus	Torsional Inertia Constant	Torsional Modulus Constant	Super Ficial Area per Metre Length	Nominal Length per Tonne
	$B \times B \times T$	$M$										
mm x mm x mm	kg / m	kg / ft	lb/ft	cm <sup>2</sup>	cm <sup>4</sup>	cm	cm <sup>3</sup>	cm <sup>3</sup>	cm <sup>4</sup>	cm <sup>3</sup>	m <sup>2</sup> / m	m
<b>20 x 20 x 2.0</b>	1.05	0.320	0.706	1.34	0.692	0.720	0.692	0.877	1.21	1.06	0.0731	953
<b>25 x 25 x 2.0</b>	1.36	0.415	0.914	1.74	1.48	0.924	1.19	1.47	2.53	1.80	0.0931	733
<b>x 2.5</b>	1.64	0.500	1.102	2.09	1.69	0.899	1.35	1.71	2.97	2.07	0.0914	610
<b>x 3.0</b>	1.89	0.576	1.270	2.41	1.84	0.874	1.47	1.91	3.33	2.27	0.0897	529
<b>30 x 30 x 2.0</b>	1.68	0.512	1.129	2.14	2.72	1.13	1.81	2.21	4.54	2.75	0.113	596
<b>x 2.5</b>	2.03	0.619	1.364	2.59	3.16	1.10	2.10	2.61	5.40	3.20	0.111	492
<b>x 3.0</b>	2.36	0.719	1.586	3.01	3.50	1.08	2.34	2.96	6.15	3.58	0.110	423
<b>40 x 40 x 2.0</b>	2.31	0.704	1.552	2.94	6.94	1.54	3.47	4.13	11.3	5.23	0.153	434
<b>x 2.5</b>	2.82	0.860	1.895	3.59	8.22	1.51	4.11	4.97	13.6	6.21	0.151	355
<b>x 3.0</b>	3.30	1.006	2.217	4.21	9.32	1.49	4.66	5.72	15.8	7.07	0.150	303
<b>x 4.0</b>	4.20	1.280	2.822	5.35	11.1	1.44	5.54	7.01	19.4	8.48	0.146	238
<b>50 x 50 x 2.0</b>	2.93	0.893	1.969	3.74	14.1	1.95	5.66	6.66	22.6	8.51	0.193	341
<b>x 2.5</b>	3.60	1.097	2.419	4.59	16.9	1.92	6.78	8.07	27.5	10.2	0.191	278
<b>x 3.0</b>	4.25	1.295	2.856	5.41	19.5	1.90	7.79	9.39	32.1	11.8	0.190	236
<b>x 4.0</b>	5.45	1.661	3.662	6.95	23.7	1.85	9.49	11.7	40.4	14.4	0.186	183
<b>x 5.0</b>	6.56	1.999	4.408	8.36	27.0	1.80	10.8	13.7	47.5	16.6	0.183	152
<b>60 x 60 x 2.0</b>	3.56	1.085	2.392	4.54	25.1	2.35	8.38	9.79	39.8	12.6	0.233	281
<b>x 2.5</b>	4.39	1.338	2.950	5.59	30.3	2.33	10.1	11.9	48.7	15.2	0.231	228
<b>x 3.0</b>	5.19	1.582	3.487	6.61	35.1	2.31	11.7	14.0	57.1	17.7	0.230	193
<b>x 4.0</b>	6.71	2.045	4.509	8.55	43.6	2.26	14.5	17.6	72.6	22.0	0.226	149
<b>x 5.0</b>	8.13	2.478	5.463	10.4	50.5	2.21	16.8	20.9	86.4	25.6	0.223	123
<b>x 6.0</b>	9.45	2.880	6.350	12.0	56.1	2.16	18.7	23.7	98.4	28.6	0.219	106
<b>x 6.3</b>	9.55	2.911	6.417	12.2	54.4	2.11	18.1	23.4	100	28.8	0.213	105
<b>70 x 70 x 2.5</b>	5.17	1.576	3.474	6.59	49.4	2.74	14.1	16.5	78.5	21.2	0.271	193
<b>x 3.0</b>	6.13	1.868	4.119	7.81	57.5	2.71	16.4	19.4	92.4	24.7	0.270	163
<b>x 4.0</b>	7.97	2.429	5.355	10.1	72.1	2.67	20.6	24.8	119	31.1	0.266	126
<b>x 5.0</b>	9.70	2.957	6.518	12.4	84.6	2.62	24.2	29.6	142	36.7	0.263	103
<b>x 6.0</b>	11.3	3.444	7.593	14.4	95.2	2.57	27.2	33.8	163	41.4	0.259	88.3
<b>x 6.3</b>	11.5	3.505	7.727	14.7	93.8	2.53	26.8	33.8	168	42.1	0.253	86.7
<b>80 x 80 x 3.0</b>	7.07	2.155	4.751	9.01	87.8	3.12	22.0	25.8	140	33.0	0.310	141
<b>x 4.0</b>	9.22	2.810	6.195	11.7	111	3.07	27.8	33.1	180	41.8	0.306	108
<b>x 5.0</b>	11.3	3.444	7.593	14.4	131	3.03	32.9	39.7	218	49.7	0.303	88.7
<b>x 6.0</b>	13.2	4.023	8.870	16.8	149	2.98	37.3	45.8	252	56.6	0.299	75.7
<b>x 6.3</b>	13.5	4.115	9.071	17.2	149	2.94	37.1	46.1	261	57.9	0.293	74.0
<b>x 8.0</b>	16.4	4.999	11.020	20.8	168	2.84	42.1	53.9	307	66.6	0.286	61.1
<b>90 x 90 x 3.0</b>	8.01	2.441	5.382	10.2	127	3.53	28.3	33.0	201	42.5	0.350	125
<b>x 4.0</b>	10.5	3.200	7.055	13.3	162	3.48	36.0	42.6	261	54.2	0.346	95.4
<b>x 5.0</b>	12.8	3.901	8.601	16.4	193	3.43	42.9	51.4	316	64.7	0.343	77.9
<b>x 6.0</b>	15.1	4.602	10.146	19.2	220	3.39	49.0	59.5	368	74.2	0.339	66.2
<b>x 6.3</b>	15.5	4.724	10.415	19.7	221	3.35	49.1	60.3	382	76.2	0.333	64.6
<b>x 8.0</b>	18.9	5.761	12.700	24.0	255	3.25	56.6	71.3	456	88.8	0.326	53.0
<b>100 x 100 x 3.0</b>	8.96	2.731	6.021	11.4	177	3.94	35.4	41.2	279	53.2	0.390	112
<b>x 4.0</b>	11.7	3.566	7.862	14.9	226	3.89	45.3	53.3	362	68.1	0.386	85.2
<b>x 5.0</b>	14.4	4.389	9.676	18.4	271	3.84	54.2	64.6	441	81.7	0.383	69.4
<b>x 6.0</b>	17.0	5.182	11.423	21.6	311	3.79	62.3	75.1	514	94.1	0.379	58.9
<b>x 6.3</b>	17.5	5.334	11.759	22.2	314	3.76	62.8	76.4	536	97.0	0.373	57.3
<b>x 8.0</b>	21.4	6.523	14.379	27.2	366	3.67	73.2	91.1	645	114	0.366	46.8
<b>x 10.0</b>	25.6	7.803	17.202	32.6	411	3.55	82.2	105	750	130	0.357	39.1
<b>x 12.0</b>	28.3	8.626	19.016	36.1	408	3.36	81.6	110	794	136	0.338	35.3
<b>x 12.5</b>	29.1	8.870	19.553	37.0	410	3.33	82.1	111	804	137	0.336	34.4

Note : Calculated based on 1kg= 2.2046 lb and 1m=3.2808 feet

## Hollow Sections BS EN 10219

## 6a(i) Cold Formed Square Hollow Sections

(Dimensions and Properties in accordance to EN 10219:2006)



## Square Hollow Sections

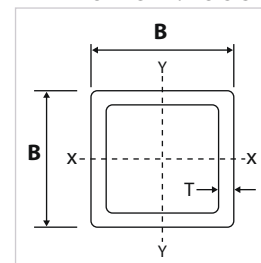
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<b>120 x 120 x 3.0</b>	10.8	3.292	7.257	13.8	312	4.76	52.1	60.2	488	78.2	0.470	92.3
<b>x 4.0</b>	14.2	4.328	9.541	18.1	402	4.71	67.0	78.3	637	101	0.466	70.2
<b>x 5.0</b>	17.5	5.334	11.759	22.4	485	4.66	80.9	95.4	778	122	0.463	57.0
<b>x 6.0</b>	20.7	6.309	13.909	26.4	562	4.61	93.7	112	913	141	0.459	48.2
<b>x 6.3</b>	21.4	6.523	14.379	27.3	572	4.58	95.3	114	955	146	0.453	46.7
<b>x 8.0</b>	26.4	8.047	17.739	33.6	677	4.49	113	138	1163	175	0.446	37.9
<b>x 10.0</b>	31.8	9.693	21.368	40.6	777	4.38	129	162	1376	203	0.437	31.4
<b>x 12.0</b>	35.8	10.912	24.055	45.7	806	4.20	134	174	1518	219	0.418	27.9
<b>x 12.5</b>	36.9	11.247	24.794	47.0	817	4.17	136	178	1551	223	0.416	27.1
<b>140 x 140 x 4.0</b>	16.8	5.121	11.289	21.3	652	5.52	93.1	108	1023	140	0.546	59.7
<b>x 5.0</b>	20.7	6.309	13.909	26.4	791	5.48	113	132	1256	170	0.543	48.3
<b>x 6.0</b>	24.5	7.468	16.462	31.2	920	5.43	131	155	1479	198	0.539	40.8
<b>x 6.3</b>	25.4	7.742	17.067	32.3	941	5.39	134	160	1550	205	0.533	39.4
<b>x 8.0</b>	31.4	9.571	21.099	40.0	1127	5.30	161	194	1901	248	0.526	31.8
<b>x 10.0</b>	38.1	11.613	25.601	48.6	1312	5.20	187	230	2274	291	0.517	26.2
<b>x 12.0</b>	43.4	13.228	29.162	55.3	1398	5.03	200	253	2567	322	0.498	23.1
<b>x 12.5</b>	44.8	13.655	30.103	57.0	1425	5.00	204	259	2634	329	0.496	22.3
<b>150 x 150 x 4.0</b>	18.0	5.486	12.095	22.9	808	5.93	108	125	1265	162	0.586	55.5
<b>x 5.0</b>	22.3	6.797	14.984	28.4	982	5.89	131	153	1554	197	0.583	44.9
<b>x 6.0</b>	26.4	8.047	17.739	33.6	1146	5.84	153	180	1833	230	0.579	37.9
<b>x 6.3</b>	27.4	8.352	18.411	34.8	1174	5.80	156	185	1922	239	0.573	36.6
<b>x 8.0</b>	33.9	10.333	22.779	43.2	1412	5.71	188	226	2364	289	0.566	29.5
<b>x 10.0</b>	41.3	12.588	27.751	52.6	1653	5.61	220	269	2839	341	0.557	24.2
<b>x 12.0</b>	47.1	14.356	31.648	60.1	1780	5.44	237	298	3231	380	0.538	21.2
<b>x 12.5</b>	48.7	14.844	32.723	62.0	1817	5.41	242	306	3321	389	0.536	20.5
<b>x 16.0</b>	58.7	17.892	39.443	74.8	2009	5.18	268	351	3830	440	0.518	17.0
<b>160 x 160 x 4.0</b>	19.3	5.883	12.968	24.5	987	6.34	123	143	1541	185	0.626	51.9
<b>x 5.0</b>	23.8	7.254	15.992	30.4	1202	6.29	150	175	1896	226	0.623	42.0
<b>x 6.0</b>	28.3	8.626	19.016	36.0	1405	6.25	176	206	2239	264	0.619	35.4
<b>x 6.3</b>	29.3	8.931	19.688	37.4	1442	6.21	180	213	2349	275	0.613	34.1
<b>x 8.0</b>	36.5	11.125	24.526	46.4	1741	6.12	218	260	2897	334	0.606	27.4
<b>x 10.0</b>	44.4	13.533	29.834	56.6	2048	6.02	256	311	3490	395	0.597	22.5
<b>x 12.0</b>	50.9	15.514	34.201	64.9	2224	5.86	278	346	3997	443	0.578	19.6
<b>x 12.5</b>	52.6	16.032	35.344	67.0	2275	5.83	284	356	4114	455	0.576	19.0
<b>x 16.0</b>	63.7	19.416	42.802	81.2	2546	5.60	318	413	4799	520	0.558	15.7
<b>180 x 180 x 4.0</b>	21.8	6.645	14.648	27.7	1422	7.16	158	182	2210	237	0.706	45.9
<b>x 5.0</b>	27.0	8.230	18.142	34.4	1737	7.11	193	224	2724	290	0.703	37.1
<b>x 6.0</b>	32.1	9.784	21.569	40.8	2037	7.06	226	264	3223	340	0.699	31.2
<b>x 6.3</b>	33.3	10.150	22.375	42.4	2096	7.03	233	273	3383	354	0.693	30.0
<b>x 8.0</b>	41.5	12.649	27.885	52.8	2546	6.94	283	336	4189	432	0.686	24.1
<b>x 10.0</b>	50.7	15.453	34.067	64.6	3017	6.84	335	404	5074	515	0.677	19.7
<b>x 12.0</b>	58.5	17.831	39.308	74.5	3322	6.68	369	454	5865	584	0.658	17.1
<b>x 12.5</b>	60.5	18.440	40.652	77.0	3406	6.65	378	467	6050	600	0.656	16.5
<b>x 16.0</b>	73.8	22.494	49.589	94.0	3887	6.43	432	550	7178	698	0.638	13.6
<b>200 x 200 x 4.0</b>	24.3	7.407	16.328	30.9	1968	7.97	197	226	3049	295	0.786	41.2
<b>x 5.0</b>	30.1	9.174	20.225	38.4	2410	7.93	241	279	3763	362	0.783	33.2
<b>x 6.0</b>	35.8	10.912	24.055	45.6	2833	7.88	283	330	4459	426	0.779	27.9
<b>x 6.3</b>	37.2	11.339	24.996	47.4	2922	7.85	292	341	4682	444	0.773	26.8
<b>x 8.0</b>	46.5	14.173	31.245	59.2	3566	7.76	357	421	5815	544	0.766	21.5
<b>x 10.0</b>	57.0	17.374	38.300	72.6	4251	7.65	425	508	7072	651	0.757	17.6
<b>x 12.0</b>	66.0	20.117	44.348	84.1	4730	7.50	473	576	8230	743	0.738	15.2
<b>x 12.5</b>	68.3	20.818	45.893	87.0	4859	7.47	486	594	8502	765	0.736	14.6
<b>x 16.0</b>	83.8	25.542	56.308	107	5625	7.26	562	706	10210	901	0.718	11.9

Note : Calculated based on 1kg= 2.2046 lb and 1m=3.2808 feet

## Hollow Sections BS EN 10219

## 6a(i) Cold Formed Square Hollow Sections

(Dimensions and Properties in accordance to EN 10219:2006)



## Square Hollow Sections

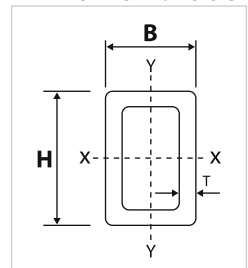
Designation Size	Calculated Weight			Cross Sectional Area	Second Moment of Area	Radius of Gyration	Elastic Section Modulus	Plastic Section Modulus	Torsional Inertia Constant	Torsional Modulus Constant	Super ficial Area per Metre Length	Nominal Length per Tonne
	$B \times B \times T$	$M$										
mm x mm x mm	kg / m	kg / ft	lb/ft	cm <sup>2</sup>	cm <sup>4</sup>	cm	cm <sup>3</sup>	cm <sup>3</sup>	cm <sup>4</sup>	cm <sup>3</sup>	m <sup>2</sup> / m	m
<b>220 x 220 x 5.0</b>	33.2	10.119	22.308	42.4	3238	8.74	294	340	5038	442	0.863	30.1
<b>x 6.0</b>	39.6	12.070	26.609	50.4	3813	8.70	347	402	5976	521	0.859	25.3
<b>x 6.3</b>	41.2	12.558	27.684	52.5	3940	8.66	358	417	6277	543	0.853	24.3
<b>x 8.0</b>	51.5	15.697	34.605	65.6	4828	8.58	439	516	7815	668	0.846	19.4
<b>x 10.0</b>	63.2	19.263	42.466	80.6	5782	8.47	526	625	9533	804	0.837	15.8
<b>x 12.0</b>	73.5	22.403	49.387	93.7	6487	8.32	590	712	11150	922	0.818	13.6
<b>x 12.5</b>	76.2	23.226	51.201	97.0	6674	8.29	607	735	11530	951	0.816	13.1
<b>x 16.0</b>	93.9	28.621	63.095	120	7812	8.08	710	881	13970	1129	0.798	10.7
<b>250 x 250 x 5.0</b>	38.0	11.582	25.534	48.4	4805	9.97	384	442	7443	577	0.983	26.3
<b>x 6.0</b>	45.2	13.777	30.371	57.6	5672	9.92	454	524	8843	681	0.979	22.1
<b>x 6.3</b>	47.1	14.356	31.648	60.0	5873	9.89	470	544	9290	711	0.973	21.2
<b>x 8.0</b>	59.1	18.014	39.711	75.2	7229	9.80	578	676	11600	878	0.966	16.9
<b>x 10.0</b>	72.7	22.159	48.850	92.6	8707	9.70	697	822	14200	1062	0.957	13.8
<b>x 12.0</b>	84.8	25.847	56.980	108	9859	9.55	789	944	16690	1226	0.938	11.8
<b>x 12.5</b>	88.0	26.822	59.130	112	10160	9.52	813	975	17280	1266	0.936	11.4
<b>x 16.0</b>	109	33.223	73.241	139	12050	9.32	964	1180	21150	1520	0.918	9.18
<b>260 x 260 x 6.0</b>	47.1	14.356	31.648	60.0	6405	10.3	493	569	9970	739	1.02	21.2
<b>x 6.3</b>	49.1	14.966	32.992	62.6	6635	10.3	510	591	10480	772	1.01	20.4
<b>x 8.0</b>	61.6	18.776	41.391	78.4	8178	10.2	629	734	13090	955	1.01	16.2
<b>x 10.0</b>	75.8	23.104	50.933	96.6	9865	10.1	759	894	16040	1156	0.997	13.2
<b>x 12.0</b>	88.6	27.005	59.533	113	11200	9.96	862	1028	18880	1337	0.978	11.3
<b>x 12.5</b>	91.9	28.011	61.751	117	11550	9.93	888	1063	19550	1381	0.976	10.9
<b>x 16.0</b>	114	34.747	76.601	145	13740	9.73	1057	1289	23990	1663	0.958	8.77
<b>300 x 300 x 6.0</b>	54.7	16.673	36.755	69.6	9964	12.0	664	764	15430	997	1.18	18.3
<b>x 6.3</b>	57.0	17.374	38.300	72.6	10340	11.9	689	795	16220	1042	1.17	17.5
<b>x 8.0</b>	71.6	21.824	48.111	91.2	12800	11.8	853	991	20310	1293	1.17	14.0
<b>x 10.0</b>	88.4	26.944	59.399	113	15520	11.7	1035	1211	24970	1572	1.16	11.3
<b>x 12.0</b>	104	31.699	69.881	132	17770	11.6	1184	1402	29510	1829	1.14	9.65
<b>x 12.5</b>	108	32.918	72.569	137	18350	11.6	1223	1451	30600	1892	1.14	9.30
<b>x 16.0</b>	134	40.843	90.039	171	22080	11.4	1472	1774	37840	2299	1.12	7.46
<b>350 x 350 x 8.0</b>	84.2	25.664	56.577	107	20680	13.9	1182	1366	32560	1787	1.37	11.9
<b>x 10.0</b>	104	31.699	69.881	133	25190	13.8	1439	1675	40130	2182	1.36	9.61
<b>x 12.0</b>	123	37.490	82.648	156	29050	13.6	1660	1949	47600	2552	1.34	8.16
<b>x 12.5</b>	127	38.710	85.336	162	30050	13.6	1717	2020	49390	2642	1.34	7.86
<b>x 16.0</b>	159	48.463	106.838	203	36510	13.4	2086	2488	61480	3238	1.32	6.28
<b>400 x 400 x 10.0</b>	120	36.576	80.632	153	38220	15.8	1911	2214	60430	2892	1.56	8.35
<b>x 12.0</b>	141	42.977	94.743	180	44320	15.7	2216	2587	71840	3395	1.54	7.07
<b>x 12.5</b>	147	44.806	98.774	187	45880	15.7	2294	2683	74600	3518	1.54	6.81
<b>x 16.0</b>	184	56.083	123.636	235	56150	15.5	2808	3322	93280	4336	1.52	5.43

Note : Calculated based on 1kg= 2.2046 lb and 1m=3.2808 feet

# Hollow Sections BS EN 10219

## 6a(ii) Cold Formed Rectangular Hollow Sections

(Dimensions and Properties in accordance to EN 10219:2006)



### Rectangular Hollow Sections

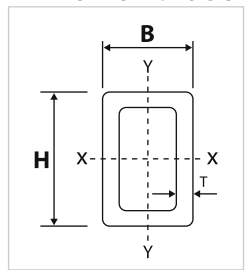
Designation Size	Calculated Weight			Cross Sectional Area	Second Moment of Area		Radius of Gyration		Elastic Section Modulus		Plastic Section Modulus		Torsional Inertia Constant	Super Ficial Area per Metre Length		Nominal Length per Tonne	
	<i>H x B x T</i>	<i>M</i>			<i>A</i>	<i>I<sub>xx</sub></i>	<i>I<sub>yy</sub></i>	<i>i<sub>xx</sub></i>	<i>i<sub>yy</sub></i>	<i>W<sub>el xx</sub></i>	<i>W<sub>el yy</sub></i>	<i>W<sub>pl xx</sub></i>		<i>W<sub>pl yy</sub></i>	<i>L<sub>t</sub></i>		<i>C<sub>t</sub></i>
mm x mm x mm	kg / m	kg / ft	lb/ft	cm <sup>2</sup>	cm <sup>4</sup>	cm <sup>4</sup>	cm	cm	cm <sup>3</sup>	cm <sup>3</sup>	cm <sup>3</sup>	cm <sup>3</sup>	cm <sup>4</sup>	cm <sup>3</sup>	m <sup>2</sup> / m	m	
40 x 20 x 2.0	1.68	0.512	1.129	2.14	4.05	1.34	1.38	0.793	2.02	1.34	2.61	1.60	3.45	2.36	0.113	596	
	x 2.5	2.03	0.619	1.364	2.59	4.69	1.54	1.35	0.770	2.35	1.54	3.09	1.88	4.06	2.72	0.111	492
	x 3.0	2.36	0.719	1.586	3.01	5.21	1.68	1.32	0.748	2.60	1.68	3.50	2.12	4.57	3.00	0.110	423
50 x 30 x 2.0	2.31	0.704	1.552	2.94	9.54	4.29	1.80	1.21	3.81	2.86	4.74	3.33	9.77	4.84	0.153	434	
	x 2.5	2.82	0.860	1.895	3.59	11.3	5.05	1.77	1.19	4.52	3.37	5.70	3.98	11.7	5.72	0.151	355
	x 3.0	3.30	1.006	2.217	4.21	12.8	5.70	1.75	1.16	5.13	3.80	6.57	4.58	13.5	6.49	0.150	303
50 x 30 x 4.0	4.20	1.280	2.822	5.35	15.3	6.69	1.69	1.12	6.10	4.46	8.05	5.58	16.5	7.71	0.146	238	
	60 x 40 x 2.0	2.93	0.893	1.969	3.74	18.4	9.83	2.22	1.62	6.14	4.92	7.47	5.65	20.7	8.12	0.193	341
	x 2.5	3.60	1.097	2.419	4.59	22.1	11.7	2.19	1.60	7.36	5.87	9.06	6.84	25.1	9.72	0.191	278
60 x 40 x 3.0	4.25	1.295	2.856	5.41	25.4	13.4	2.17	1.58	8.46	6.72	10.5	7.94	29.3	11.2	0.190	236	
	x 4.0	5.45	1.661	3.662	6.95	31.0	16.3	2.11	1.53	10.3	8.14	13.2	9.89	36.7	13.7	0.186	183
	x 5.0	6.56	1.999	4.408	8.36	35.3	18.4	2.06	1.48	11.8	9.21	15.4	11.5	42.8	15.6	0.183	152
70 x 50 x 2.0	3.56	1.085	2.392	4.54	31.5	18.8	2.63	2.03	8.99	7.50	10.8	8.58	37.5	12.2	0.233	281	
	x 2.5	4.39	1.338	2.950	5.59	38.0	22.6	2.61	2.01	10.9	9.04	13.2	10.4	45.8	14.7	0.231	228
	x 3.0	5.19	1.582	3.487	6.61	44.1	26.1	2.58	1.99	12.6	10.4	15.4	12.2	53.6	17.1	0.230	193
70 x 50 x 4.0	6.71	2.045	4.509	8.55	54.7	32.2	2.53	1.94	15.6	12.9	19.5	15.4	68.1	21.2	0.226	149	
	x 5.0	8.13	2.478	5.463	10.4	63.5	37.2	2.48	1.90	18.1	14.9	23.1	18.2	80.8	24.6	0.223	123
	80 x 40 x 2.0	3.56	1.085	2.392	4.54	37.4	12.7	2.87	1.67	9.34	6.36	11.6	7.17	30.9	11.0	0.233	281
x 2.5		4.39	1.338	2.950	5.59	45.1	15.3	2.84	1.65	11.3	7.63	14.1	8.72	37.6	13.2	0.231	228
x 3.0		5.19	1.582	3.487	6.61	52.3	17.6	2.81	1.63	13.1	8.78	16.5	10.2	43.9	15.3	0.230	193
80 x 40 x 4.0	6.71	2.045	4.509	8.55	64.8	21.5	2.75	1.59	16.2	10.7	20.9	12.8	55.2	18.8	0.226	149	
	x 5.0	8.13	2.478	5.463	10.4	75.1	24.6	2.69	1.54	18.8	12.3	24.7	15.0	65.0	21.7	0.223	123
	80 x 60 x 2.0	4.19	1.277	2.815	5.34	49.5	31.9	3.05	2.44	12.4	10.6	14.7	12.1	61.2	17.1	0.273	239
x 2.5		5.17	1.576	3.474	6.59	60.1	38.6	3.02	2.42	15.0	12.9	18.0	14.8	75.1	20.7	0.271	193
x 3.0		6.13	1.868	4.119	7.81	70.0	44.9	3.00	2.40	17.5	15.0	21.2	17.4	88.3	24.1	0.270	163
80 x 60 x 4.0	7.97	2.429	5.355	10.1	87.9	56.1	2.94	2.35	22.0	18.7	27.0	22.1	113	30.3	0.266	126	
	x 5.0	9.70	2.957	6.518	12.4	103	65.7	2.89	2.31	25.8	21.9	32.2	26.4	136	35.7	0.263	103
	90 x 50 x 2.0	4.19	1.277	2.815	5.34	57.9	23.4	3.29	2.09	12.9	9.35	15.7	10.5	53.4	15.9	0.273	239
x 2.5		5.17	1.576	3.474	6.59	70.3	28.2	3.27	2.07	15.6	11.3	19.3	12.8	65.3	19.2	0.271	193
x 3.0		6.13	1.868	4.119	7.81	81.9	32.7	3.24	2.05	18.2	13.1	22.6	15.0	76.7	22.4	0.270	163
90 x 50 x 4.0	7.97	2.429	5.355	10.1	103	40.7	3.18	2.00	22.8	16.3	28.8	19.1	97.7	28.0	0.266	126	
	x 5.0	9.70	2.957	6.518	12.4	121	47.4	3.12	1.96	26.8	18.9	34.4	22.7	116	32.7	0.263	103
	100 x 40 x 2.5	5.17	1.576	3.474	6.59	79.3	18.8	3.47	1.69	15.9	9.39	20.2	10.6	50.5	16.8	0.271	193
x 3.0		6.13	1.868	4.119	7.81	92.3	21.7	3.44	1.67	18.5	10.8	23.7	12.4	59.0	19.4	0.270	163
x 4.0		7.97	2.429	5.355	10.1	116	26.7	3.38	1.62	23.1	13.3	30.3	15.7	74.5	24.0	0.266	126
100 x 40 x 5.0	9.70	2.957	6.518	12.4	136	30.8	3.31	1.58	27.1	15.4	36.1	18.5	87.9	27.9	0.263	103	
	100 x 50 x 2.5	5.56	1.695	3.736	7.09	91.2	31.1	3.59	2.09	18.2	12.4	22.7	14.0	75.4	21.5	0.291	180
		x 3.0	6.60	2.012	4.435	8.41	106	36.1	3.56	2.07	21.3	14.4	26.7	16.4	88.6	25.0	0.290
x 4.0		8.59	2.618	5.772	10.9	134	44.9	3.50	2.03	26.8	18.0	34.1	20.9	113	31.3	0.286	116
100 x 50 x 5.0	10.50	3.200	7.055	13.4	158	52.5	3.44	1.98	31.6	21.0	40.8	25.0	135	36.8	0.283	95.4	
	x 6.0	12.30	3.749	8.265	15.6	179	58.7	3.38	1.94	35.8	23.5	46.9	28.5	154	41.4	0.279	81.5
	x 6.3	12.50	3.810	8.399	15.9	176	58.2	3.32	1.91	35.1	23.3	46.9	28.6	158	42.1	0.273	79.9
100 x 60 x 2.5	5.96	1.817	4.005	7.59	103	46.9	3.69	2.49	20.6	15.6	25.1	17.7	103	26.2	0.311	168	
	x 3.0	7.07	2.155	4.751	9.01	121	54.6	3.66	2.46	24.1	18.2	29.6	20.8	122	30.6	0.310	141
	x 4.0	9.22	2.810	6.195	11.7	153	68.7	3.60	2.42	30.5	22.9	37.9	26.6	156	38.7	0.306	108
100 x 60 x 5.0	11.3	3.444	7.593	14.4	181	80.8	3.55	2.37	36.2	26.9	45.6	31.9	188	45.8	0.303	88.7	
	x 6.0	13.2	4.023	8.870	16.8	205	91.2	3.49	2.33	41.1	30.4	52.5	36.6	216	51.9	0.299	75.7
	x 6.3	13.5	4.115	9.071	17.2	203	90.9	3.44	2.30	40.7	30.3	52.8	36.9	223	53.0	0.293	74.0
100 x 80 x 2.5	6.74	2.054	4.529	8.59	127	90.2	3.84	3.24	25.4	22.5	30.0	25.8	166	35.7	0.351	148	
	x 3.0	8.01	2.441	5.382	10.2	149	106	3.82	3.22	29.8	26.4	35.4	30.4	196	41.9	0.350	125
	x 4.0	10.5	3.200	7.055	13.3	189	134	3.77	3.17	37.9	33.5	45.6	39.2	254	53.4	0.346	95.4
100 x 80 x 5.0	12.8	3.901	8.601	16.4	226	160	3.72	3.12	45.2	39.9	55.1	47.2	308	63.7	0.343	77.9	
	x 6.0	15.1	4.602	10.146	19.2	258	182	3.67	3.08	51.7	45.5	63.8	54.7	357	73.0	0.339	66.2
	x 6.3	15.5	4.724	10.415	19.7	259	183	3.62	3.04	51.8	45.7	64.6	55.4	371	75.0	0.333	64.6

Note : Calculated based on 1kg= 2.2046 lb and 1m=3.2808 feet  
\*Please contact us for further clarification.

# Hollow Sections BS EN 10219

## 6a(ii) Cold Formed Rectangular Hollow Sections

(Dimensions and Properties in accordance to EN 10219:2006)



### Rectangular Hollow Sections

Designation Size	Weight			Cross Sectional Area	Second Moment of Area		Radius of Gyration		Elastic Section Modulus		Plastic Section Modulus		Torsional Inertia Constant	Superficial Area		Nominal Length per Tonne
														per Metre Length	per Metre Length	
<i>H x B x T</i>	<i>M</i>			<i>A</i>	<i>I<sub>xx</sub></i>	<i>I<sub>yy</sub></i>	<i>i<sub>xx</sub></i>	<i>i<sub>yy</sub></i>	<i>W<sub>el,xx</sub></i>	<i>W<sub>el,yy</sub></i>	<i>W<sub>pl,xx</sub></i>	<i>W<sub>pl,yy</sub></i>	<i>L<sub>t</sub></i>	<i>C<sub>t</sub></i>	<i>A<sub>s</sub></i>	<i>L</i>
mm x mm x mm	kg / m	kg / ft	lb/ft	cm <sup>2</sup>	cm <sup>4</sup>	cm <sup>4</sup>	cm	cm	cm <sup>3</sup>	cm <sup>3</sup>	cm <sup>3</sup>	cm <sup>3</sup>	cm <sup>4</sup>	cm <sup>3</sup>	m <sup>2</sup> / m	m
<b>120 x 60 x 2.5</b>	6.74	2.054	4.529	8.59	161	55.2	4.33	2.53	26.9	18.4	33.2	20.6	133	31.7	0.351	148
<b>x 3.0</b>	8.01	2.441	5.382	10.2	189	64.4	4.30	2.51	31.5	21.5	39.2	24.2	156	37.1	0.350	125
<b>x 4.0</b>	10.5	3.200	7.055	13.3	241	81.2	4.25	2.47	40.1	27.1	50.5	31.1	201	47.0	0.346	95.4
<b>x 5.0</b>	12.8	3.901	8.601	16.4	287	96.0	4.19	2.42	47.8	32.0	60.9	37.4	242	55.8	0.343	77.9
<b>x 6.0</b>	15.1	4.602	10.146	19.2	328	109	4.13	2.38	54.7	36.3	70.6	43.1	280	63.6	0.339	66.2
<b>x 6.3</b>	15.5	4.724	10.415	19.7	327	109	4.07	2.35	54.5	36.4	71.2	43.7	289	65.1	0.333	64.6
<b>x 8.0</b>	18.9	5.761	12.700	24.0	375	124	3.95	2.27	62.6	41.3	84.1	51.3	340	75.0	0.326	53.0
<b>120 x 80 x 3.0</b>	8.96	2.731	6.021	11.4	230	123	4.49	3.29	38.4	30.9	46.2	35.0	255	50.8	0.390	112
<b>x 4.0</b>	11.7	3.566	7.862	14.9	295	157	4.44	3.24	49.1	39.3	59.8	45.2	331	64.9	0.386	85.2
<b>x 5.0</b>	14.4	4.389	9.676	18.4	353	188	4.39	3.20	58.9	46.9	72.4	54.7	402	77.8	0.383	69.4
<b>x 6.0</b>	17.0	5.182	11.423	21.6	406	215	4.33	3.15	67.7	53.8	84.3	63.5	469	89.4	0.379	58.9
<b>x 6.3</b>	17.5	5.334	11.759	22.2	408	217	4.28	3.12	68.1	54.3	85.6	64.7	488	92.1	0.373	57.3
<b>x 8.0</b>	21.4	6.523	14.379	27.2	476	252	4.18	3.04	79.3	62.9	102	76.9	584	108	0.366	46.8
<b>140 x 80 x 4.0</b>	13.0	3.962	8.735	16.5	430	180	5.10	3.30	61.4	45.1	75.5	51.3	412	76.5	0.426	77.0
<b>x 5.0</b>	16.0	4.877	10.751	20.4	517	216	5.04	3.26	73.9	54.0	91.8	62.2	501	91.8	0.423	62.6
<b>x 6.0</b>	18.9	5.761	12.700	24.0	597	248	4.98	3.21	85.3	62.0	107	72.4	584	106	0.419	53.0
<b>x 6.3</b>	19.4	5.913	13.036	24.8	603	251	4.93	3.19	86.1	62.9	109	74.0	609	109	0.413	51.4
<b>x 8.0</b>	23.9	7.285	16.059	30.4	708	293	4.82	3.10	101	73.3	131	88.4	731	129	0.406	41.8
<b>150 x 100 x 4.0</b>	14.9	4.542	10.012	18.9	595	319	5.60	4.10	79.3	63.7	95.7	72.5	662	105	0.486	67.2
<b>x 5.0</b>	18.3	5.578	12.296	23.4	719	384	5.55	4.05	95.9	76.8	117	88.3	809	127	0.483	54.5
<b>x 6.0</b>	21.7	6.614	14.581	27.6	835	444	5.50	4.01	111	88.8	137	103	948	147	0.479	46.1
<b>x 6.3</b>	22.4	6.828	15.051	28.5	848	453	5.45	3.98	113	90.5	140	106	992	152	0.473	44.6
<b>x 8.0</b>	27.7	8.443	18.613	35.2	1008	536	5.35	3.90	134	107	169	128	1206	182	0.466	36.1
<b>x 10.0</b>	33.4	10.180	22.443	42.6	1162	614	5.22	3.80	155	123	199	150	1426	211	0.457	29.9
<b>x 12.0</b>	37.7	11.491	25.332	48.1	1207	642	5.01	3.65	161	128	215	163	1573	229	0.438	26.5
<b>x 12.5</b>	38.9	11.857	26.138	49.5	1225	651	4.97	3.63	163	130	220	166	1606	233	0.436	25.7
<b>160 x 80 x 4.0</b>	14.2	4.328	9.541	18.1	598	204	5.74	3.35	74.7	50.9	92.9	57.4	494	88.0	0.466	70.2
<b>x 5.0</b>	17.5	5.334	11.759	22.4	722	244	5.68	3.30	90.2	61.0	113	69.7	601	106	0.463	57.0
<b>x 6.0</b>	20.7	6.309	13.909	26.4	836	281	5.62	3.26	105	70.2	132	81.3	702	122	0.459	48.2
<b>x 6.3</b>	21.4	6.523	14.379	27.3	846	286	5.57	3.24	106	71.4	135	83.3	732	126	0.453	46.7
<b>x 8.0</b>	26.4	8.047	17.739	33.6	1001	335	5.46	3.16	125	83.7	163	100	882	150	0.446	37.9
<b>x 10.0</b>	31.8	9.693	21.368	40.6	1146	380	5.32	3.06	143	95.0	191	117	1031	172	0.437	31.4
<b>x 12.0</b>	35.8	10.912	24.055	45.7	1171	391	5.06	2.93	146	97.8	204	125	1111	183	0.418	27.9
<b>x 12.5</b>	36.9	11.247	24.794	47.0	1185	396	5.02	2.90	148	98.9	208	127	1129	185	0.416	27.1
<b>180 x 100 x 4.0</b>	16.8	5.121	11.289	21.3	926	374	6.59	4.18	103	74.8	126	84.0	854	127	0.546	59.7
<b>x 5.0</b>	20.7	6.309	13.909	26.4	1124	452	6.53	4.14	125	90.4	154	103	1045	154	0.543	48.3
<b>x 6.0</b>	24.5	7.468	16.462	31.2	1310	524	6.48	4.10	146	105	181	120	1227	179	0.539	40.8
<b>x 6.3</b>	25.4	7.742	17.067	32.3	1335	536	6.43	4.07	148	107	186	124	1283	185	0.533	39.4
<b>x 8.0</b>	31.4	9.571	21.099	40.0	1598	637	6.32	3.99	178	127	226	150	1565	222	0.526	31.8
<b>x 10.0</b>	38.1	11.613	25.601	48.6	1859	736	6.19	3.89	207	147	268	177	1859	260	0.517	26.2
<b>x 12.0</b>	43.4	13.228	29.162	55.3	1965	782	5.96	3.76	218	156	292	194	2073	285	0.498	23.1
<b>x 12.5</b>	44.8	13.655	30.103	57.0	2001	796	5.92	3.74	222	159	300	199	2122	290	0.496	22.3
<b>200 x 100 x 4.0</b>	18.0	5.486	12.095	22.9	1200	411	7.23	4.23	120	82.2	148	91.7	985	142	0.586	55.5
<b>x 5.0</b>	22.3	6.797	14.984	28.4	1459	497	7.17	4.19	146	99.4	181	112	1206	172	0.583	44.9
<b>x 6.0</b>	26.4	8.047	17.739	33.6	1703	577	7.12	4.14	170	115	213	132	1417	200	0.579	37.9
<b>x 6.3</b>	27.4	8.352	18.411	34.8	1739	591	7.06	4.12	174	118	219	135	1483	208	0.573	36.6
<b>x 8.0</b>	33.9	10.333	22.779	43.2	2091	705	6.95	4.04	209	141	267	165	1811	250	0.566	29.5
<b>x 10.0</b>	41.3	12.588	27.751	52.6	2444	818	6.82	3.94	244	164	318	195	2154	292	0.557	24.2
<b>x 12.0</b>	47.1	14.356	31.648	60.1	2607	876	6.59	3.82	261	175	350	215	2414	322	0.538	21.2
<b>x 12.5</b>	48.7	14.844	32.723	62.0	2659	892	6.55	3.79	266	178	359	221	2474	329	0.536	20.5
<b>200 x 120 x 4.0</b>	19.3	5.883	12.968	24.5	1353	618	7.43	5.02	135	103	164	115	1345	172	0.626	51.9
<b>x 5.0</b>	23.8	7.254	15.992	30.4	1649	750	7.37	4.97	165	125	201	141	1652	210	0.623	42.0
<b>x 6.0</b>	28.3	8.626	19.016	36.0	1929	874	7.32	4.93	193	146	237	166	1947	245	0.619	35.4
<b>x 6.3</b>	29.3	8.931	19.688	37.4	1976	898	7.27	4.90	198	150	244	172	2040	255	0.613	34.1
<b>x 8.0</b>	36.5	11.125	24.526	46.4	2386	1079	7.17	4.82	239	180	298	209	2507	308	0.606	27.4
<b>x 10.0</b>	44.4	13.533	29.834	56.6	2806	1262	7.04	4.72	281	210	356	250	3007	364	0.597	22.5
<b>x 12.0</b>	50.9	15.514	34.201	64.9	3031	1368	6.84	4.59	303	228	395	278	3419	406	0.578	19.6
<b>x 12.5</b>	52.6	16.032	35.344	67.0	3099	1397	6.80	4.57	310	233	406	285	3514	416	0.576	19.0

Note : Calculated based on 1kg= 2.2046 lb and 1m=3.2808 feet

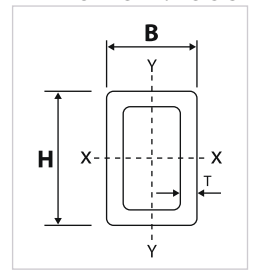
\*Please contact us for further clarification.



# Hollow Sections BS EN 10219

## 6a(ii) Cold Formed Rectangular Hollow Sections

(Dimensions and Properties in accordance to EN 10219:2006)



### Rectangular Hollow Sections

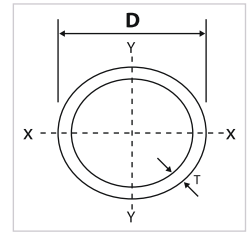
Designation Size	Calculated Weight			Cross Sectional Area	Second Moment of Area		Radius of Gyration		Elastic Section Modulus		Plastic Section Modulus		Torsional Inertia Constant	Super Ficial Area per Metre Length		Nominal Length per Tonne
					$I_{xx}$	$I_{yy}$	$i_{xx}$	$i_{yy}$	$W_{el\ xx}$	$W_{el\ yy}$	$W_{pl\ xx}$	$W_{pl\ yy}$		$C_t$	$A_s$	
$H \times B \times T$	$M$			$A$	$I_{xx}$	$I_{yy}$	$i_{xx}$	$i_{yy}$	$W_{el\ xx}$	$W_{el\ yy}$	$W_{pl\ xx}$	$W_{pl\ yy}$	$L_t$	$C_t$	$A_s$	$L$
mm x mm x mm	kg / m	kg / ft	lb/ft	cm <sup>2</sup>	cm <sup>4</sup>	cm <sup>4</sup>	cm	cm	cm <sup>3</sup>	cm <sup>3</sup>	cm <sup>3</sup>	cm <sup>3</sup>	cm <sup>4</sup>	cm <sup>3</sup>	m <sup>2</sup> / m	m
<b>250 x 150 x 5.0</b>	30.1	9.174	20.225	38.4	3304	1508	9.28	6.27	264	201	320	225	3285	337	0.783	33.2
<b>x 6.0</b>	35.8	10.912	24.055	45.6	3886	1768	9.23	6.23	311	236	378	266	3886	396	0.779	27.9
<b>x 6.3</b>	37.2	11.339	24.996	47.4	4001	1825	9.18	6.20	320	243	391	276	4078	412	0.773	26.8
<b>x 8.0</b>	46.5	14.173	31.245	59.2	4886	2219	9.08	6.12	391	296	482	340	5050	504	0.766	21.5
<b>x 10.0</b>	57.0	17.374	38.300	72.6	5825	2634	8.96	6.02	466	351	582	409	6121	602	0.757	17.6
<b>x 12.0</b>	66.0	20.117	44.348	84.1	6458	2925	8.77	5.90	517	390	658	463	7088	684	0.738	15.2
<b>x 12.5</b>	68.3	20.818	45.893	87.0	6633	3002	8.73	5.87	531	400	678	477	7315	704	0.736	14.6
<b>x 16.0</b>	83.8	25.542	56.308	106.8	7660	3453	8.47	5.69	613	460	805	566	8713	823	0.718	11.9
<b>260 x 180 x 5.0</b>	33.2	10.119	22.308	42.4	4121	2350	9.86	7.45	317	261	377	294	4695	426	0.863	30.1
<b>x 6.3</b>	41.2	12.558	27.684	52.5	5013	2856	9.77	7.38	386	317	463	361	5844	523	0.853	24.3
<b>x 8.0</b>	51.5	15.697	34.605	65.6	6145	3493	9.68	7.29	473	388	573	446	7267	642	0.846	19.4
<b>x 10.0</b>	63.2	19.263	42.466	80.6	7363	4174	9.56	7.20	566	464	694	540	8850	772	0.837	15.8
<b>x 12.0</b>	73.5	22.403	49.387	93.7	8245	4679	9.38	7.07	634	520	790	615	10330	884	0.818	13.6
<b>x 12.5</b>	76.2	23.226	51.201	97.0	8482	4812	9.35	7.04	652	535	815	635	10680	911	0.816	13.1
<b>x 16.0</b>	93.9	28.621	63.095	120	9923	5614	9.11	6.85	763	624	977	759	12890	1079	0.798	10.7
<b>300 x 100 x 6.0</b>	35.8	10.912	24.055	45.6	4777	842	10.2	4.30	318	168	411	188	2403	306	0.779	27.9
<b>x 6.3</b>	37.2	11.339	24.996	47.4	4907	868	10.2	4.28	327	174	425	194	2515	318	0.773	26.8
<b>x 8.0</b>	46.5	14.173	31.245	59.2	5978	1045	10.0	4.20	399	209	523	238	3080	385	0.766	21.5
<b>x 10.0</b>	57.0	17.374	38.300	72.6	7106	1224	9.90	4.11	474	245	631	285	3681	455	0.757	17.6
<b>x 12.0</b>	66.0	20.117	44.348	84.1	7808	1343	9.64	4.00	521	269	710	321	4177	508	0.738	15.2
<b>x 12.5</b>	68.3	20.818	45.893	87.0	8010	1374	9.59	3.97	534	275	732	330	4292	521	0.736	14.6
<b>x 16.0</b>	83.8	25.542	56.308	107	9157	1543	9.26	3.80	610	309	865	386	4939	592	0.718	11.9
<b>300 x 150 x 6.0</b>	40.5	12.344	27.213	51.6	6074	2080	10.8	6.35	405	277	500	309	4988	479	0.879	24.7
<b>x 6.3</b>	42.2	12.863	28.356	53.7	6266	2150	10.8	6.32	418	287	517	321	5234	499	0.873	23.7
<b>x 8.0</b>	52.8	16.093	35.478	67.2	7684	2623	10.7	6.25	512	350	640	396	6491	612	0.866	18.9
<b>x 10.0</b>	64.8	19.751	43.541	82.6	9209	3125	10.6	6.15	614	417	776	479	7879	733	0.857	15.4
<b>x 12.0</b>	75.4	22.982	50.664	96.1	10300	3498	10.4	6.03	687	466	883	546	9153	837	0.838	13.3
<b>x 12.5</b>	78.1	23.805	52.478	99.5	10590	3595	10.3	6.01	706	479	912	563	9452	862	0.836	12.8
<b>x 16.0</b>	96.4	29.383	64.775	123	12390	4174	10.0	5.83	826	557	1092	673	11330	1015	0.818	10.4
<b>300 x 200 x 6.0</b>	45.2	13.777	30.371	57.6	7370	3962	11.3	8.29	491	396	588	446	8115	651	0.979	22.1
<b>x 6.3</b>	47.1	14.356	31.648	60.0	7624	4104	11.3	8.27	508	410	610	463	8524	680	0.973	21.2
<b>x 8.0</b>	59.1	18.014	39.711	75.2	9389	5042	11.2	8.19	626	504	757	574	10630	838	0.966	16.9
<b>x 10.0</b>	72.7	22.159	48.850	92.6	11310	6058	11.1	8.09	754	606	921	698	12990	1012	0.957	13.8
<b>x 12.0</b>	84.8	25.847	56.980	108	12790	6854	10.9	7.96	853	685	1056	801	15240	1167	0.938	11.8
<b>x 12.5</b>	88.0	26.822	59.130	112	13180	7060	10.8	7.94	879	706	1091	828	15770	1204	0.936	11.4
<b>x 16.0</b>	109.0	33.223	73.241	139	15620	8340	10.6	7.75	1041	834	1319	1000	19220	1442	0.918	9.18
<b>350 x 250 x 6.0</b>	54.7	16.673	36.755	69.6	12460	7458	13.4	10.3	712	597	843	671	14550	967	1.18	18.3
<b>x 6.3</b>	57.0	17.374	38.300	72.6	12920	7744	13.3	10.3	738	620	876	698	15290	1010	1.17	17.5
<b>x 8.0</b>	71.6	21.824	48.111	91.2	16000	9573	13.2	10.2	914	766	1092	869	19140	1253	1.17	14.0
<b>x 10.0</b>	88.4	26.944	59.399	113	19410	11590	13.1	10.1	1109	927	1335	1062	23500	1522	1.16	11.3
<b>x 12.0</b>	104	31.699	69.881	132	22200	13260	13.0	10.0	1268	1061	1544	1229	27750	1770	1.14	9.65
<b>x 12.5</b>	108	32.918	72.569	137	22920	13690	12.9	9.99	1310	1095	1598	1272	28770	1830	1.14	9.30
<b>x 16.0</b>	134	40.843	90.039	171	27580	16430	12.7	9.81	1576	1315	1954	1554	35500	2220	1.12	7.46
<b>400 x 200 x 8.0</b>	71.6	21.824	48.111	91.2	18970	6517	14.4	8.45	949	652	1173	728	15820	1133	1.17	14.0
<b>x 12.5</b>	108	32.918	72.569	137	27100	9260	14.1	8.22	1355	926	1714	1062	23600	1644	1.14	9.30
<b>x 16.0</b>	134	40.843	90.039	171	32550	11060	13.8	8.05	1627	1106	2093	1294	28930	1984	1.12	7.46
<b>400 x 300 x 8.0</b>	84.2	25.664	56.577	107	25120	16210	15.3	12.3	1256	1081	1487	1224	31180	1747	1.37	11.9
<b>x 10.0</b>	104	31.699	69.881	133	30610	19730	15.2	12.2	1530	1315	1824	1501	38410	2132	1.36	9.61
<b>x 12.0</b>	123	37.490	82.648	156	35280	22750	15.0	12.1	1764	1516	2122	1747	45530	2492	1.34	8.16
<b>x 12.5</b>	127	38.710	85.336	162	36490	23520	15.0	12.0	1824	1568	2198	1810	47240	2580	1.34	7.86
<b>x 16.0</b>	159	48.463	106.838	203	44350	28540	14.8	11.9	2218	1902	2708	2228	58730	3159	1.32	6.28

Note : Calculated based on 1kg= 2.2046 lb and 1m=3.2808 feet

\*Please contact us for further clarification.

6a(iii) Cold Formed Circular Hollow Sections

(Dimensions and Properties in accordance to EN 10219:2006)



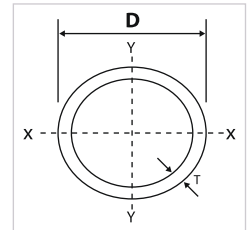
Circular Hollow Sections

Designation		Calculated Weight			Cross Sectional Area	Second Moment of Area	Radius of Gyration	Elastic Section Modulus	Plastic Section Modulus	Torsional Inertia Constant	Torsional Modulus Constant	Super Ficial Area per Metre Length	Nominal Length per Tonne
Outside Diameter	Thickness												
D	T	M			A	I	i	W <sub>el</sub>	W <sub>pl</sub>	I <sub>t</sub>	C <sub>t</sub>	A <sub>s</sub>	L
mm	mm	kg / m	kg / ft	lb/ft	cm <sup>2</sup>	cm <sup>4</sup>	cm	cm <sup>3</sup>	cm <sup>3</sup>	cm <sup>4</sup>	cm <sup>3</sup>	m <sup>2</sup> / m	m
21.3	2.0	0.95	0.290	0.638	1.21	0.571	0.686	0.536	0.748	1.14	1.07	0.067	1050
	2.5	1.16	0.354	0.779	1.48	0.664	0.671	0.623	0.889	1.33	1.25	0.067	863
	3.0	1.35	0.411	0.907	1.72	0.741	0.656	0.696	1.01	1.48	1.39	0.067	739
26.9	2.0	1.23	0.375	0.826	1.56	1.22	0.883	0.907	1.24	2.44	1.81	0.085	814
	2.5	1.50	0.457	1.008	1.92	1.44	0.867	1.07	1.49	2.88	2.14	0.085	665
	3.0	1.77	0.539	1.189	2.25	1.63	0.852	1.21	1.72	3.27	2.43	0.085	566
33.7	2.0	1.56	0.475	1.048	1.99	2.51	1.12	1.49	2.01	5.02	2.98	0.106	640
	2.5	1.92	0.585	1.290	2.45	3.00	1.11	1.78	2.44	6.00	3.56	0.106	520
	3.0	2.27	0.692	1.525	2.89	3.44	1.09	2.04	2.84	6.88	4.08	0.106	440
42.4	2.0	1.99	0.607	1.337	2.54	5.19	1.43	2.45	3.27	10.4	4.90	0.133	502
	2.5	2.46	0.750	1.653	3.13	6.26	1.41	2.95	3.99	12.5	5.91	0.133	407
	3.0	2.91	0.887	1.955	3.71	7.25	1.40	3.42	4.67	14.5	6.84	0.133	343
	4.0	3.79	1.155	2.547	4.83	8.99	1.36	4.24	5.92	18.0	8.48	0.133	264
48.3	2.0	2.28	0.695	1.532	2.91	7.81	1.64	3.23	4.29	15.6	6.47	0.152	438
	2.5	2.82	0.860	1.895	3.60	9.46	1.62	3.92	5.25	18.9	7.83	0.152	354
	3.0	3.35	1.021	2.251	4.27	11.00	1.61	4.55	6.17	22.0	9.11	0.152	298
	4.0	4.37	1.332	2.936	5.57	13.80	1.57	5.70	7.87	27.5	11.4	0.152	229
	5.0	5.34	1.628	3.588	6.80	16.20	1.54	6.69	9.42	32.3	13.4	0.152	187
60.3	2.0	2.88	0.878	1.935	3.66	15.60	2.06	5.17	6.80	31.2	10.3	0.189	348
	2.5	3.56	1.085	2.392	4.54	19.00	2.05	6.30	8.36	38.0	12.6	0.189	281
	3.0	4.24	1.292	2.849	5.40	22.20	2.03	7.37	9.86	44.4	14.7	0.189	236
	4.0	5.55	1.692	3.729	7.07	28.20	2.00	9.34	12.7	56.3	18.7	0.189	180
	5.0	6.82	2.079	4.583	8.69	33.50	1.96	11.10	15.3	67.0	22.2	0.189	147
76.1	2.0	3.65	1.113	2.453	4.66	32.00	2.62	8.40	11.0	64.0	16.8	0.239	274
	2.5	4.54	1.384	3.051	5.78	39.20	2.60	10.30	13.5	78.4	20.6	0.239	220
	3.0	5.41	1.649	3.635	6.89	46.10	2.59	12.10	16.0	92.2	24.2	0.239	185
	4.0	7.11	2.167	4.777	9.06	59.10	2.55	15.50	20.8	118	31.0	0.239	141
	5.0	8.77	2.673	5.893	11.2	70.90	2.52	18.60	25.3	142	37.3	0.239	114
	6.0	10.40	3.170	6.988	13.2	81.80	2.49	21.50	29.6	164	43.0	0.239	96.4
	6.3	10.80	3.292	7.257	13.8	84.80	2.48	22.30	30.8	170	44.6	0.239	92.2
88.9	2.0	4.29	1.308	2.883	5.46	51.60	3.07	11.60	15.1	103	23.2	0.279	233
	2.5	5.33	1.625	3.581	6.79	63.40	3.06	14.30	18.7	127	28.5	0.279	188
	3.0	6.36	1.939	4.274	8.10	74.80	3.04	16.80	22.1	150	33.6	0.279	157
	4.0	8.38	2.554	5.631	10.7	96.30	3.00	21.70	28.9	193	43.3	0.279	119
	5.0	10.30	3.139	6.921	13.2	116.00	2.97	26.20	35.2	233	52.4	0.279	96.7
	6.0	12.30	3.749	8.265	15.6	135.00	2.94	30.40	41.3	270	60.7	0.279	81.5
	6.3	12.80	3.901	8.601	16.3	140.00	2.93	31.50	43.1	280	63.1	0.279	77.9
101.6	2.0	4.91	1.497	3.299	6.26	77.60	3.52	15.30	19.8	155	30.6	0.319	204
	2.5	6.11	1.862	4.106	7.78	95.60	3.50	18.80	24.6	191	37.6	0.319	164
	3.0	7.29	2.222	4.898	9.29	113.00	3.49	22.30	29.2	226	44.5	0.319	137
	4.0	9.63	2.935	6.471	12.3	146.00	3.45	28.80	38.1	293	57.6	0.319	104
	5.0	11.90	3.627	7.996	15.2	177.00	3.42	34.90	46.7	355	69.9	0.319	84.0
	6.0	14.10	4.298	9.474	18.0	207.00	3.39	40.70	54.9	413	81.4	0.319	70.7
	6.3	14.80	4.511	9.945	18.9	215.00	3.38	42.30	57.3	430	84.7	0.319	67.5
114.3	2.5	6.89	2.100	4.630	8.78	137.00	3.95	24.00	31.3	275	48.0	0.359	145
	3.0	8.23	2.509	5.530	10.5	163.00	3.94	28.40	37.2	325	56.9	0.359	121
	4.0	10.90	3.322	7.324	13.9	211.00	3.90	36.90	48.7	422	73.9	0.359	91.9
	5.0	13.50	4.115	9.071	17.2	257.00	3.87	45.00	59.8	514	89.9	0.359	74.2
	6.0	16.00	4.877	10.751	20.4	300.00	3.83	52.50	70.4	600	105	0.359	62.4
	6.3	16.80	5.121	11.289	21.4	313	3.82	54.70	73.6	625	109	0.359	59.6
	8.0	21.00	6.401	14.111	26.7	379	3.77	66.40	90.6	759	133	0.359	47.7

Note : Calculated based on 1kg= 2.2046 lb and 1m=3.2808 feet  
 \*Please contact us for further clarification.

## 6a(iii) Cold Formed Circular Hollow Sections

(Dimensions and Properties in accordance to EN 10219:2006)



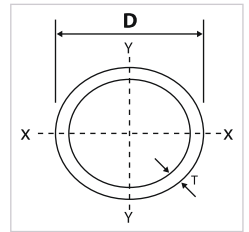
### Circular Hollow Sections

Designation		Calculated Weight			Cross Sectional Area	Second Moment of Area	Radius of Gyration	Elastic Section Modulus	Plastic Section Modulus	Torsional Inertia Constant	Torsional Modulus Constant	Super Ficial Area per Metre Length	Nominal Length per Tonne
Outside Diameter	Thickness				A	I	i	W <sub>el</sub>	W <sub>pl</sub>	L <sub>t</sub>	C <sub>t</sub>	A <sub>s</sub>	L
D	T	M			cm <sup>2</sup>	cm <sup>4</sup>	cm	cm <sup>3</sup>	cm <sup>3</sup>	cm <sup>4</sup>	cm <sup>3</sup>	m <sup>2</sup> / m	m
mm	mm	kg / m	kg / ft	lb/ft									
<b>139.7</b>	3.0	10.1	3.078	6.787	12.9	301	4.83	43.1	56.1	602	86.2	0.439	98.9
	4.0	13.4	4.084	9.004	17.1	393	4.80	56.2	73.7	786	112	0.439	74.7
	5.0	16.6	5.060	11.154	21.2	481	4.77	68.8	90.8	961	138	0.439	60.2
	6.0	19.8	6.035	13.304	25.2	564	4.73	80.8	107	1129	162	0.439	50.5
	6.3	20.7	6.309	13.909	26.4	589	4.72	84.3	112	1177	169	0.439	48.2
	8.0	26.0	7.925	17.470	33.1	720	4.66	103	139	1441	206	0.439	38.5
	10.0	32.0	9.754	21.502	40.7	862	4.60	123	169	1724	247	0.439	31.3
<b>168.3</b>	3.0	12.2	3.719	8.198	15.6	532	5.85	63.3	82.0	1065	127	0.529	81.8
	4.0	16.2	4.938	10.885	20.6	697	5.81	82.8	108	1394	166	0.529	61.7
	5.0	20.1	6.126	13.506	25.7	856	5.78	102	133	1712	203	0.529	49.7
	6.0	24.0	7.315	16.126	30.6	1009	5.74	120	158	2017	240	0.529	41.6
	6.3	25.2	7.681	16.933	32.1	1053	5.73	125	165	2107	250	0.529	39.7
	8.0	31.6	9.632	21.233	40.3	1297	5.67	154	206	2595	308	0.529	31.6
<b>177.8</b>	4.0	17.1	5.212	11.490	21.8	825	6.15	92.8	121	1650	186	0.559	58.3
	5.0	21.3	6.492	14.312	27.1	1014	6.11	114	149	2028	228	0.559	46.9
	6.0	25.4	7.742	17.067	32.4	1196	6.08	135	177	2392	269	0.559	39.3
	6.3	26.6	8.108	17.873	33.9	1250	6.07	141	185	2499	281	0.559	37.5
	8.0	33.5	10.211	22.510	42.7	1541	6.01	173	231	3083	347	0.559	29.9
	10.0	41.4	12.619	27.818	52.7	1862	5.94	209	282	3724	419	0.559	24.2
	12.0	49.1	14.966	32.992	62.5	2159	5.88	243	330	4318	486	0.559	20.4
<b>193.7</b>	4.0	18.7	5.700	12.565	23.8	1073	6.71	111	144	2146	222	0.609	53.4
	5.0	23.3	7.102	15.656	29.6	1320	6.67	136	178	2640	273	0.609	43.0
	6.0	27.8	8.473	18.680	35.4	1560	6.64	161	211	3119	322	0.609	36.0
	6.3	29.1	8.870	19.553	37.1	1630	6.63	168	221	3260	337	0.609	34.3
	8.0	36.6	11.156	24.593	46.7	2016	6.57	208	276	4031	416	0.609	27.3
	10.0	45.3	13.807	30.439	57.7	2442	6.50	252	338	4883	504	0.609	22.1
	12.0	53.8	16.398	36.150	68.5	2839	6.44	293	397	5678	586	0.609	18.6
<b>219.1</b>	4.0	21.2	6.462	14.245	27.0	1564	7.61	143	185	3128	286	0.688	47.1
	5.0	26.4	8.047	17.739	33.6	1928	7.57	176	229	3856	352	0.688	37.9
	6.0	31.5	9.601	21.166	40.2	2282	7.54	208	273	4564	417	0.688	31.7
	6.3	33.1	10.089	22.241	42.1	2386	7.53	218	285	4772	436	0.688	30.2
	8.0	41.6	12.680	27.952	53.1	2960	7.47	270	357	5919	540	0.688	24.0
	10.0	51.6	15.728	34.672	65.7	3598	7.40	328	438	7197	657	0.688	19.4
	12.0	61.3	18.684	41.190	78.1	4200	7.33	383	515	8400	767	0.688	16.3
<b>244.5</b>	4.0	21.2	6.462	14.245	27.0	1564	7.61	143	185	3128	286	0.688	47.1
	5.0	26.4	8.047	17.739	33.6	1928	7.57	176	229	3856	352	0.688	37.9
	6.0	31.5	9.601	21.166	40.2	2282	7.54	208	273	4564	417	0.688	31.7
	6.3	33.1	10.089	22.241	42.1	2386	7.53	218	285	4772	436	0.688	30.2
	8.0	41.6	12.680	27.952	53.1	2960	7.47	270	357	5919	540	0.688	24.0
	10.0	51.6	15.728	34.672	65.7	3598	7.40	328	438	7197	657	0.688	19.4
	12.0	61.3	18.684	41.190	78.1	4200	7.33	383	515	8400	767	0.688	16.3
<b>273.0</b>	5.0	29.5	8.992	19.822	37.6	2699	8.47	221	287	5397	441	0.768	33.9
	6.0	35.3	10.759	23.719	45.0	3199	8.43	262	341	6397	523	0.768	28.3
	6.3	37.0	11.278	24.862	47.1	3346	8.42	274	358	6692	547	0.768	27.0
	8.0	46.7	14.234	31.379	59.4	4160	8.37	340	448	8321	681	0.768	21.4
	10.0	57.8	17.617	38.838	73.7	5073	8.30	415	550	10150	830	0.768	17.3
	12.0	68.8	20.970	46.229	87.7	5938	8.23	486	649	11880	972	0.768	14.5
	12.5	71.5	21.793	48.043	91.1	6147	8.21	503	673	12300	1006	0.768	14.0
<b>323.9</b>	5.0	39.3	11.979	26.407	50.1	6369	11.3	393	509	12740	787	1.02	25.4
	6.0	47.0	14.326	31.581	59.9	7572	11.2	468	606	15150	935	1.02	21.3
	6.3	49.3	15.027	33.126	62.9	7929	11.2	490	636	15860	979	1.02	20.3
	8.0	62.3	18.989	41.862	79.4	9910	11.2	612	799	19820	1224	1.02	16.0
	10.0	77.4	23.592	52.008	98.6	12160	11.1	751	986	24320	1501	1.02	12.9
	12.0	92.3	28.133	62.020	118	14320	11.0	884	1168	28640	1768	1.02	10.8
	12.5	96.0	29.261	64.506	122	14850	11.0	917	1213	29690	1833	1.02	10.4

Note : Calculated based on 1kg= 2.2046 lb and 1m=3.2808 feet  
 \*Please contact us for further clarification.

6a(iii) Cold Formed Circular Hollow Sections

(Dimensions and Properties in accordance to EN 10219:2006)



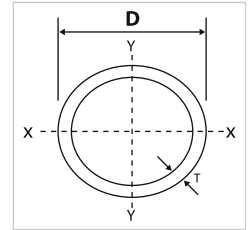
Circular Hollow Sections

Designation		Weight			Cross Sectional Area	Second Moment of Area	Radius of Gyration	Elastic Section Modulus	Plastic Section Modulus	Torsional Inertia Constant	Torsional Modulus Constant	Super Ficial Area per Metre Length	Nominal Length per Tonne
Outside Diameter	Thickness												
D	T	M			A	I	i	W <sub>el</sub>	W <sub>pl</sub>	L <sub>t</sub>	C <sub>t</sub>	A <sub>s</sub>	L
mm	mm	kg / m	kg / ft	lb/ft	cm <sup>2</sup>	cm <sup>4</sup>	cm	cm <sup>3</sup>	cm <sup>3</sup>	cm <sup>4</sup>	cm <sup>3</sup>	m <sup>2</sup> / m	m
<b>355.6</b>	5.0	43.2	13.167	29.028	55.1	8464	12.4	476	615	16930	952	1.12	23.1
	6.0	51.7	15.758	34.739	65.9	10070	12.4	566	733	20140	1133	1.12	19.3
	6.3	54.3	16.551	36.486	69.1	10550	12.4	593	769	21000	1188	1.12	18.4
	8.0	68.6	20.909	46.095	87.4	13200	12.3	742	967	26400	1485	1.12	14.6
	10.0	85.2	25.969	57.249	109	16220	12.2	912	1195	32450	1825	1.12	11.7
	12.0	102	31.090	68.537	130	19140	12.2	1076	1417	38280	2153	1.12	9.83
	12.5	106	32.309	71.225	135	19850	12.1	1117	1472	39700	2233	1.12	9.45
	16.0	134	40.843	90.039	171	24660	12.0	1387	1847	49330	2774	1.12	7.46
	20.0	166	50.597	111.541	211	29800	11.9	1676	2255	59580	3351	1.12	6.04
<b>406.4</b>	6.0	59.2	18.044	39.779	75.5	15130	14.2	745	962	30260	1489	1.28	16.9
	6.3	62.2	18.959	41.794	79.2	15850	14.1	780	1009	31700	1560	1.28	16.1
	8.0	78.6	23.957	52.814	100	19870	14.1	978	1270	39750	1956	1.28	12.7
	10.0	97.8	29.809	65.715	125	24480	14.0	1205	1572	48950	2409	1.28	10.2
	12.0	117	35.662	78.616	149	28940	14.0	1424	1867	57870	2848	1.28	8.57
	12.5	121	36.881	81.304	155	30030	13.9	1478	1940	60060	2956	1.28	8.24
	16.0	154	46.939	103.478	196	37450	13.8	1843	2440	74900	3686	1.28	6.49
	20.0	191	58.217	128.340	243	45430	13.7	2236	2989	90860	4472	1.28	5.25
25.0	235	71.628	157.905	300	54700	13.5	2692	3642	109400	5384	1.28	4.25	
<b>457.0</b>	6.0	66.7	20.330	44.818	85.0	21620	15.9	946	1220	43240	1892	1.44	15.0
	6.3	70.0	21.336	47.035	89.2	22650	15.9	991	1280	45310	1983	1.44	14.3
	8.0	88.6	27.005	59.533	113	28450	15.9	1245	1613	56900	2490	1.44	11.3
	10.0	110	33.528	73.913	140	35090	15.8	1536	1998	70180	3071	1.44	9.07
	12.0	132	40.234	88.695	168	41560	15.7	1819	2377	83110	3637	1.44	7.59
	12.5	137	41.758	92.055	175	43150	15.7	1888	2470	86290	3776	1.44	7.30
	16.0	174	53.035	116.917	222	53960	15.6	2361	3113	107900	4723	1.44	5.75
	20.0	216	65.837	145.138	275	65680	15.5	2874	3822	131400	5749	1.44	4.64
	25.0	266	81.077	178.735	339	79420	15.3	3475	4671	158800	6951	1.44	3.75
	30.0	316	96.317	212.331	402	92170	15.1	4034	5479	184400	8068	1.44	3.17
<b>508.0</b>	6.0	74.3	22.647	49.925	94.6	29810	17.7	1174	1512	59620	2347	1.60	13.5
	6.3	77.9	23.744	52.344	99.3	31250	17.7	1230	1586	62490	2460	1.60	12.8
	8.0	98.6	30.053	66.253	126	39280	17.7	1546	2000	78560	3093	1.60	10.1
	10.0	123	37.490	82.648	156	48520	17.6	1910	2480	97040	3820	1.60	8.14
	12.0	147	44.806	98.774	187	57540	17.5	2265	2953	115100	4530	1.60	6.81
	12.5	153	46.634	102.806	195	59760	17.5	2353	3070	119500	4705	1.60	6.55
	16.0	194	59.131	130.355	247	74910	17.4	2949	3874	149800	5898	1.60	5.15
	20.0	241	73.457	161.936	307	91430	17.3	3600	4766	182900	7199	1.60	4.15
	25.0	298	90.830	200.237	379	111000	17.1	4367	5837	221800	8734	1.60	3.36
30.0	354	107.899	237.865	451	129200	16.9	5086	6864	258400	10170	1.60	2.83	
<b>610.0</b>	6.0	89.4	27.249	60.071	114	51920	21.4	1702	2189	103900	3405	1.92	11.2
	6.3	93.8	28.590	63.028	119	54440	21.3	1785	2296	108900	3570	1.92	10.7
	8.0	119	36.271	79.960	151	68550	21.3	2248	2899	137100	4495	1.92	8.42
	10.0	148	45.110	99.446	188	84850	21.2	2782	3600	169700	5564	1.92	6.76
	12.0	177	53.950	118.932	225	100800	21.1	3305	4292	201700	6611	1.92	5.65
	12.5	184	56.083	123.636	235	104800	21.1	3435	4463	209000	6869	1.92	5.43
	16.0	234	71.323	157.233	299	131800	21.0	4321	5647	263600	8641	1.92	4.27
	20.0	291	88.697	195.533	371	161500	20.9	5295	6965	323000	10590	1.92	3.44
	25.0	361	110.033	242.569	459	196900	20.7	6456	8561	393800	12910	1.92	2.77
	30.0	429	130.759	288.260	547	230500	20.5	7557	10100	461000	15110	1.92	2.33
<b>711.0</b>	6.0	104	31.699	69.881	133	82570	24.9	2323	2982	165100	4645	2.23	9.59
	6.3	109	33.223	73.241	139	86590	24.9	2436	3129	173200	4871	2.23	9.13
	8.0	139	42.367	93.399	177	109200	24.9	3071	3954	218300	6141	2.23	7.21
	10.0	173	52.730	116.245	220	135300	24.8	3806	4914	270600	7612	2.23	5.78
	12.0	207	63.094	139.091	264	161000	24.7	4529	5864	322000	9057	2.23	4.83
	12.5	215	65.532	144.466	274	167300	24.7	4707	6099	334700	9415	2.23	4.64
	16.0	274	83.515	184.110	349	211000	24.6	5936	7730	422100	11870	2.23	3.65
	20.0	341	103.937	229.130	434	259400	24.4	7295	9552	518700	14590	2.23	2.93
	25.0	423	128.930	284.229	539	317400	24.3	8927	11770	634700	17850	2.23	2.36
	30.0	504	153.619	338.655	642	372800	24.1	10490	13920	745600	21000	2.23	1.98

Note : Calculated based on 1kg= 2.2046 lb and 1m=3.2808 feet  
 \*Please contact us for further clarification.

6a(iii) Cold Formed Circular Hollow Sections

(Dimensions and Properties in accordance to EN 10219:2006)



Circular Hollow Sections

Designation		Weight			Cross Sectional Area	Second Moment of Area	Radius of Gyration	Elastic Section Modulus	Plastic Section Modulus	Torsional Inertia Constant	Torsional Modulus Constant	Super Ficial Area per Metre Length	Nominal Length per Tonne
Outside Diameter	Thickness												
D	T	M			A	I	i	W <sub>el</sub>	W <sub>pl</sub>	L <sub>t</sub>	C <sub>t</sub>	A <sub>s</sub>	L
mm	mm	kg / m	kg / ft	lb/ft	cm <sup>2</sup>	cm <sup>4</sup>	cm	cm <sup>3</sup>	cm <sup>3</sup>	cm <sup>4</sup>	cm <sup>3</sup>	m <sup>2</sup> / m	m
<b>762.0</b>	6.0	112	34.138	75.257	143	101800	26.7	2672	3429	20360	5345	2.39	8.94
	6.3	117	35.662	78.616	150	106800	26.7	2803	3598	213600	5605	2.39	8.52
	8.0	149	45.415	100.118	190	134700	26.7	3535	4548	269400	7070	2.39	6.72
	10.0	185	56.388	124.308	236	167000	26.6	4384	5655	334100	8768	2.39	5.39
	12.0	222	67.666	149.170	283	198900	26.5	5219	6751	397700	10440	2.39	4.51
	12.5	231	70.409	155.217	294	206700	26.5	5426	7023	413500	10900	2.39	4.33
	16.0	294	89.611	197.549	375	261000	26.4	6850	8906	522000	13700	2.39	3.40
	20.0	366	111.557	245.928	466	321100	26.2	8427	11000	642200	16860	2.39	2.73
	25.0	454	138.379	305.058	579	393500	26.1	10327	13580	786900	20650	2.39	2.20
	30.0	542	165.202	364.189	690	462900	25.9	12148	16080	925700	24300	2.39	1.85
<b>813.0</b>	8.0	159	48.463	106.838	202	163900	28.5	4032	5184	327800	8064	2.55	6.30
	10.0	198	60.350	133.043	252	203400	28.4	5003	6448	406700	10010	2.55	5.05
	12.0	237	72.238	159.249	302	242200	28.3	5959	7700	484500	11930	2.55	4.22
	12.5	247	75.286	165.968	314	251900	28.3	6196	8011	503700	12400	2.55	4.05
	16.0	314	95.707	210.988	401	318200	28.2	7828	10170	636400	15660	2.55	3.18
	20.0	391	119.177	262.727	498	392000	28.0	9641	12600	783800	19280	2.55	2.56
	25.0	486	148.133	326.560	619	480900	27.9	11829	15530	961700	23660	2.55	2.06
	30.0	579	176.479	389.050	738	566400	27.7	13933	18400	1133000	27870	2.55	1.73
<b>914.0</b>	8.0	179	54.559	120.276	228	233700	32.0	5113	6567	467300	10230	2.87	5.59
	10.0	223	67.970	149.842	284	290200	32.0	6349	8172	580300	12700	2.87	4.49
	12.0	267	81.382	179.407	340	345890	31.9	7569	9764	691800	15140	2.87	3.75
	12.5	278	84.734	186.798	354	359700	31.9	7871	10160	719400	15740	2.87	3.60
	16.0	354	107.899	237.865	451	455100	31.8	9959	12900	910300	19920	2.87	2.82
	20.0	441	134.417	296.323	562	561500	31.6	12286	15990	1123000	24570	2.87	2.27
	25.0	548	167.030	368.220	698	690300	31.4	15105	19760	1381000	30210	2.87	1.82
	30.0	654	199.339	439.445	833	814800	31.3	17829	23450	1630000	35660	2.87	1.53
<b>1016.0</b>	8.0	199	60.655	133.715	253	321800	35.6	6334	8129	6436000	12670	3.19	5.03
	10.0	248	75.590	166.640	316	399900	35.6	7871	10120	799700	15740	3.19	4.03
	12.0	297	90.526	199.565	378	477000	35.5	9389	12100	954000	18780	3.19	3.37
	12.5	309	94.183	207.628	394	496100	35.5	9766	12590	992300	19530	3.19	3.23
	16.0	395	120.396	265.414	503	628500	35.4	12372	16000	1257000	24740	3.19	2.53
	20.0	491	149.657	329.920	626	776300	35.2	15282	19840	1553000	30560	3.19	2.04
	25.0	611	186.233	410.552	778	956000	35.0	18821	24560	1912000	37640	3.19	1.64
	30.0	729	222.199	489.841	929	1130000	34.9	22251	29180	2261000	44500	3.19	1.37
<b>1067.0</b>	10.0	261	79.553	175.375	332	463900	37.4	8693	11170	927600	17390	3.35	3.84
	12.0	312	95.098	209.644	398	553420	37.3	10373	13360	1107000	20750	3.35	3.20
	12.5	325	99.060	218.379	414	575700	37.3	10790	13900	1151000	21580	3.35	3.08
	16.0	415	126.492	278.853	528	729600	37.2	13676	17680	1459000	27350	3.35	2.41
	20.0	516	157.277	346.718	658	901800	37.0	16903	21930	1804000	33810	3.35	1.94
	25.0	642	195.682	431.382	818	1111000	36.9	20831	27150	2223000	41660	3.35	1.56
	30.0	767	233.782	515.374	977	1315000	36.7	24646	32270	2630000	49290	3.35	1.30
<b>1168.0</b>	10.0	286	87.173	192.173	364	609800	40.9	10443	13410	1220000	20890	3.67	3.50
	12.0	342	104.242	229.802	436	728100	40.9	12467	16040	1456000	24930	3.67	2.92
	12.5	356	108.509	239.209	454	757400	40.9	12969	16690	1515000	25940	3.67	2.81
	16.0	455	138.684	305.730	579	960800	40.7	16452	21240	1922000	32900	3.67	2.20
	20.0	566	172.517	380.315	721	1189000	40.6	20353	26360	2377000	40710	3.67	1.77
	25.0	705	214.884	473.714	898	1467000	40.4	25115	32670	2933000	50230	3.67	1.42
<b>1219.0</b>	10.0	298	90.830	200.237	380	694000	42.7	11387	14620	1388000	22770	3.83	3.35
	12.0	357	108.814	239.881	455	828700	42.7	13597	17480	1657000	27190	3.83	2.80
	12.5	372	113.386	249.960	474	862200	42.7	14146	18200	1724000	28290	3.83	2.69
	16.0	475	144.780	319.169	605	1094000	42.5	17951	23260	2188000	35900	3.83	2.11
	20.0	591	180.137	397.114	753	1354000	42.4	22217	28760	2708400	44440	3.83	1.69
	25.0	736	224.333	494.544	938	1672000	42.2	27430	35650	3344000	54660	3.83	1.36

Note : Calculated based on 1kg= 2.2046 lb and 1m=3.2808 feet  
 \*Please contact us for further clarification.

6b) Cold-formed Structural Steel Hollow Sections - Australian / New Zealand Standard

( Extracts from AS/NZS 1163 Standard : 2009 )

<b>General Information</b>	AS/NZS 1163 Standard specifies the requirements for cold-formed, electric resistance-welded, carbon steel hollow sections used for structural purposes. It considers three strength grades, with or without impact properties that are suitable for welding.																																																																							
<b>Chemical Composition</b>	<p>The Chemical analysis shall conform to the limits given in Table 1 for the appropriate grade.</p> <p>Table 1. Chemical Composition</p> <table border="1"> <thead> <tr> <th rowspan="2">Grade</th> <th colspan="11">Chemical Composition (Cast Or Product Analysis) (See Note 2)</th> </tr> <tr> <th colspan="11">% Max.</th> </tr> <tr> <th>(See Note1)</th> <th>C</th> <th>Si</th> <th>Mn</th> <th>P</th> <th>S</th> <th>Cr</th> <th>Mo</th> <th>AL (seeNote3)</th> <th>Ti</th> <th>Micro-Alloying Elements</th> <th>CE (seeNote4)</th> </tr> </thead> <tbody> <tr> <td>C250, C250L0</td> <td>0.12</td> <td>0.05</td> <td>0.50</td> <td>0.03</td> <td>0.03</td> <td>0.15</td> <td>0.10</td> <td>0.10</td> <td>0.04</td> <td>0.03 (see Note 5)</td> <td>0.25</td> </tr> <tr> <td>C350, C350L0</td> <td>0.20</td> <td>0.45</td> <td>1.60</td> <td>0.03</td> <td>0.03</td> <td>0.30</td> <td>0.10</td> <td>0.10</td> <td>0.04</td> <td>0.15 (see Note 6)</td> <td>0.43</td> </tr> <tr> <td>C450, C450L0</td> <td>0.20</td> <td>0.45</td> <td>1.70</td> <td>0.03</td> <td>0.03</td> <td>0.50</td> <td>0.35</td> <td>0.10</td> <td>0.04</td> <td>0.15 (see Note 6)</td> <td>0.43</td> </tr> </tbody> </table> <p>Notes:</p> <ol style="list-style-type: none"> <li>The use of sulphide modification manufacturing techniques for these grades is permitted.</li> <li>The following elements may be present to the limits stated:             <ol style="list-style-type: none"> <li>Copper 0.25%</li> <li>Nickel 0.25%</li> </ol> </li> <li>Limits specified are for soluble or total aluminium.</li> <li>Applies to niobium and vanadium only. However, niobium greater than 0.010% is not permitted.</li> <li>Applies to niobium, vanadium and titanium only. However, vanadium greater than 0.10% is not permitted.</li> </ol>	Grade	Chemical Composition (Cast Or Product Analysis) (See Note 2)											% Max.											(See Note1)	C	Si	Mn	P	S	Cr	Mo	AL (seeNote3)	Ti	Micro-Alloying Elements	CE (seeNote4)	C250, C250L0	0.12	0.05	0.50	0.03	0.03	0.15	0.10	0.10	0.04	0.03 (see Note 5)	0.25	C350, C350L0	0.20	0.45	1.60	0.03	0.03	0.30	0.10	0.10	0.04	0.15 (see Note 6)	0.43	C450, C450L0	0.20	0.45	1.70	0.03	0.03	0.50	0.35	0.10	0.04	0.15 (see Note 6)	0.43
Grade	Chemical Composition (Cast Or Product Analysis) (See Note 2)																																																																							
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C450, C450L0	0.20	0.45	1.70	0.03	0.03	0.50	0.35	0.10	0.04	0.15 (see Note 6)	0.43																																																													
<b>Mechanical Strength (Tensile Test)</b>	<p>For Tensile test. The yield strength, tensile strength and elongation of the test piece shall conform to the limits given in Table 2 for the appropriate grade.</p> <p>Table 2. Tensile Test Requirements</p> <table border="1"> <thead> <tr> <th rowspan="3">Grade</th> <th rowspan="3">Minimum Yield Strength MPa</th> <th rowspan="3">Minimum Tensile Strength MPa</th> <th colspan="6">Minimum Elongation As A Proportion Of The Gauge Length Of 5.65 √ So %</th> </tr> <tr> <th colspan="3">Circular Hollow Sections do/t</th> <th colspan="3">Rectangular Hollow Sections b/t, d/t</th> </tr> <tr> <th>≤ 15</th> <th>&gt; 15 ≤ 30</th> <th>&gt; 30</th> <th>≤ 15</th> <th>&gt; 15 ≤ 30</th> <th>&gt; 30</th> </tr> </thead> <tbody> <tr> <td>C250, C250L0</td> <td>250</td> <td>320</td> <td>18</td> <td>20</td> <td>22</td> <td>14</td> <td>16</td> <td>18</td> </tr> <tr> <td>C350, C350L0</td> <td>350</td> <td>430</td> <td>16</td> <td>18</td> <td>20</td> <td>12</td> <td>14</td> <td>16</td> </tr> <tr> <td>C450, C450L0</td> <td>450</td> <td>500</td> <td>12</td> <td>14</td> <td>16</td> <td>10</td> <td>12</td> <td>14</td> </tr> </tbody> </table>	Grade	Minimum Yield Strength MPa	Minimum Tensile Strength MPa	Minimum Elongation As A Proportion Of The Gauge Length Of 5.65 √ So %						Circular Hollow Sections do/t			Rectangular Hollow Sections b/t, d/t			≤ 15	> 15 ≤ 30	> 30	≤ 15	> 15 ≤ 30	> 30	C250, C250L0	250	320	18	20	22	14	16	18	C350, C350L0	350	430	16	18	20	12	14	16	C450, C450L0	450	500	12	14	16	10	12	14																							
Grade	Minimum Yield Strength MPa				Minimum Tensile Strength MPa	Minimum Elongation As A Proportion Of The Gauge Length Of 5.65 √ So %																																																																		
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C250, C250L0	250	320	18	20	22	14	16	18																																																																
C350, C350L0	350	430	16	18	20	12	14	16																																																																
C450, C450L0	450	500	12	14	16	10	12	14																																																																
<b>Impact Test</b>	<p>The absorbed energy value (J) resulting from—</p> <ol style="list-style-type: none"> <li>each individual test; and</li> <li>the average of three tests,</li> </ol> <p>Shall conform to the specified values given in Table 3 for the appropriate grade.</p> <p>Table 3: Charpy V-Notch Impact Test Requirements</p> <table border="1"> <thead> <tr> <th rowspan="3">Grade</th> <th rowspan="3">Test Temperature °C</th> <th colspan="6">Minimum Absorbed Energy, Joule</th> </tr> <tr> <th colspan="6">Size Of Test Piece</th> </tr> <tr> <th colspan="2">10 mm X 10 mm</th> <th colspan="2">10 mm X 7.5 mm</th> <th colspan="2">10 mm X 5 mm</th> </tr> <tr> <th></th> <th></th> <th>Average Of 3 Tests</th> <th>Individual Test</th> <th>Average Of 3 Tests</th> <th>Individual Test</th> <th>Average Of 3 Tests</th> <th>Individual Test</th> </tr> </thead> <tbody> <tr> <td>C 250 L 0</td> <td rowspan="3">0</td> <td rowspan="3">27</td> <td rowspan="3">20</td> <td rowspan="3">22</td> <td rowspan="3">16</td> <td rowspan="3">18</td> <td rowspan="3">13</td> </tr> <tr> <td>C 350 L 0</td> </tr> <tr> <td>C 450 L 0</td> </tr> </tbody> </table>	Grade	Test Temperature °C	Minimum Absorbed Energy, Joule						Size Of Test Piece						10 mm X 10 mm		10 mm X 7.5 mm		10 mm X 5 mm				Average Of 3 Tests	Individual Test	Average Of 3 Tests	Individual Test	Average Of 3 Tests	Individual Test	C 250 L 0	0	27	20	22	16	18	13	C 350 L 0	C 450 L 0																																	
Grade	Test Temperature °C			Minimum Absorbed Energy, Joule																																																																				
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C 350 L 0																																																																								
C 450 L 0																																																																								
<b>Cold Flattening Test</b>	<p>The test piece shall be cut in the transverse direction and the length of the test piece shall be not less than 40mm. The flattening test piece shall be flattened at room temperature between two parallel plane surfaces with the weld seam located as follows in relation to the direction of flattening :</p> <ol style="list-style-type: none"> <li>For do ≤ 60 mm: 45 degrees</li> <li>For do &gt; 60mm : 90 degrees</li> </ol> <p>The test piece shall be flattened until the distance between the surfaces is 0.75 do or less. The test piece taken from a circular section with a longitudinal weld show no signs of cracks or flaws.</p>																																																																							

Tolerances and limits on the dimensions and mass of cold-formed hollow sections shall conform to the values given in Table 4.

Table 4. Tolerance on dimensions

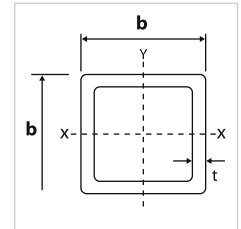
Characteristic	Circular Hollow Sections	Square And Rectangular Hollow Sections															
Outside Dimension (OD)	± 1%, with a minimum of ± 0.5 mm and a maximum of ± 10 mm	± 1%, with minimum of ± 0.50 mm															
Thickness (t)	For do ≤ 406.4 mm : ± 10 % For do > 406.4 mm : ± 10 % with a max of ± 2 mm	± 10%															
Length	<table border="1"> <thead> <tr> <th>Type Of Length</th> <th>Range mm</th> <th>Tolerance</th> </tr> </thead> <tbody> <tr> <td>Random length</td> <td>4000 to 16000 with a range of 2000 per order item</td> <td>10 % of sections supplied may be below the minimum for the ordered range but not less than 75 % of the minimum</td> </tr> <tr> <td>Mill (or' unspecified' ) length</td> <td>All</td> <td>+ 100 mm 0</td> </tr> <tr> <td rowspan="2">Precision length</td> <td>&lt; 6000</td> <td>+ 5 mm 0</td> </tr> <tr> <td>≥ 6000 ≤ 10000 &gt; 10000</td> <td>+ 15 mm 0 + 5 mm + 1mm/m 0</td> </tr> </tbody> </table>			Type Of Length	Range mm	Tolerance	Random length	4000 to 16000 with a range of 2000 per order item	10 % of sections supplied may be below the minimum for the ordered range but not less than 75 % of the minimum	Mill (or' unspecified' ) length	All	+ 100 mm 0	Precision length	< 6000	+ 5 mm 0	≥ 6000 ≤ 10000 > 10000	+ 15 mm 0 + 5 mm + 1mm/m 0
	Type Of Length	Range mm	Tolerance														
	Random length	4000 to 16000 with a range of 2000 per order item	10 % of sections supplied may be below the minimum for the ordered range but not less than 75 % of the minimum														
	Mill (or' unspecified' ) length	All	+ 100 mm 0														
Precision length	< 6000	+ 5 mm 0															
	≥ 6000 ≤ 10000 > 10000	+ 15 mm 0 + 5 mm + 1mm/m 0															
Straightness	0.20 % of total length	0.15 % of total length															
Out-of-roundness (o)	2 % for hollow sections having a diameter to thickness ratio not exceeding 100	-															
Concavity / convexity	-	Max. 0.8 % or 0.50 mm, whichever is greater															
Radius of Corners	-	Perimeter mm	External Corner Profile mm														
		Equivalent to 50 x 50 or less Equivalent to greater than 50 x 50	1.5 t to 3.0 t 1.8 t to 3.0 t														
Squareness of sides		90° ± 1°															
Twist (v)		2 mm plus 0.5 mm /m length															
Inner Flash		-															
End tolerance on diameter		-															
End Facing		-															
Mass (m) per unit length	Not less than 0.96 times the specified mass on individual lengths																

Tolerances On Dimensions and Mass

## 6b(i) Cold Formed Square Hollow Sections

(Australian / New Zealand Standard)

(Dimensions and Properties in accordance to AS / NZS 1163 : 2009)



### Square Hollow Sections

Designation	Mass Per Unit Length	External Surface Area		Ratio $\frac{b - 2t}{t}$	Gross Area Of Cross-Section $A_g$	About $x, y$ and $n$ - axis					Torsion Constant $J$	Torsion Modulus $C$
		Per Unit Length	Per Unit Mass			Second Moment Of Area	Elastic Section Modulus	Elastic Section Modulus	Plastic Section Modulus	Radius Of Gyration		
		$m$	$m^2/t$			$I_x, I_y$	$Z_x, Z_y$	$Z_n$	$S_x, S_y$	$r_x, r_y$		
Depth x Width x Thickness $b \times b \times t$												
mm x mm x mm	kg / m	m <sup>2</sup> / m	m <sup>2</sup> / t		mm <sup>2</sup>	10 <sup>6</sup> mm <sup>4</sup>	10 <sup>3</sup> mm <sup>3</sup>	10 <sup>3</sup> mm <sup>3</sup>	10 <sup>3</sup> mm <sup>3</sup>	mm	10 <sup>6</sup> mm <sup>4</sup>	10 <sup>3</sup> mm <sup>3</sup>
20 x 20 x 1.6	0.873	0.0745	85.4	10.5	111	0.00608	0.608	0.474	0.751	7.39	0.0103	0.924
25 x 25 x 1.6	1.12	0.0945	84.1	13.6	143	0.0128	1.02	0.780	1.24	9.44	0.0212	1.54
25 x 25 x 2.0	1.36	0.0931	68.3	10.5	174	0.0148	1.19	0.926	1.47	9.24	0.0253	1.80
25 x 25 x 2.5	1.64	0.0914	55.7	8.00	209	0.0169	1.35	1.08	1.71	8.99	0.0297	2.07
25 x 25 x 3.0	1.89	0.0897	47.4	6.33	241	0.0184	1.47	1.21	1.91	8.74	0.0333	2.27
30 x 30 x 1.6	1.38	0.115	83.3	16.8	175	0.0231	1.54	1.16	1.84	11.5	0.0377	2.32
30 x 30 x 2.0	1.68	0.113	67.4	13.0	214	0.0272	1.81	1.39	2.21	11.3	0.0454	2.75
35 x 35 x 1.6	1.63	0.135	82.7	19.9	207	0.0379	2.16	1.62	2.57	13.5	0.0611	3.26
35 x 35 x 2.0	1.99	0.133	66.8	15.5	254	0.0451	2.58	1.95	3.09	13.3	0.0741	3.89
35 x 35 x 2.5	2.42	0.131	54.2	12.0	309	0.0529	3.02	2.33	3.69	13.1	0.0889	4.58
35 x 35 x 3.0	2.83	0.130	45.8	9.67	361	0.0595	3.40	2.67	4.23	12.8	0.102	5.18
40 x 40 x 1.6	1.88	0.155	82.3	23.0	239	0.0579	2.90	2.15	3.41	15.6	0.0927	4.36
40 x 40 x 2.0	2.31	0.153	66.4	18.0	294	0.0694	3.47	2.61	4.13	15.4	0.113	5.23
40 x 40 x 2.5	2.82	0.151	53.7	14.0	359	0.0822	4.11	3.13	4.97	15.1	0.136	6.21
40 x 40 x 4.0	4.09	0.143	34.9	8.00	521	0.105	5.26	4.36	6.74	14.2	0.192	8.33
50 x 50 x 1.6	2.38	0.195	81.7	29.3	303	0.117	4.68	3.44	5.48	19.6	0.185	7.03
50 x 50 x 2.0	2.93	0.193	65.8	23.0	374	0.141	5.66	4.20	6.66	19.5	0.226	8.51
50 x 50 x 2.5	3.60	0.191	53.1	18.0	459	0.169	6.78	5.09	8.07	19.2	0.275	10.2
50 x 50 x 3.0	4.25	0.190	44.7	14.7	541	0.195	7.79	5.92	9.39	19.0	0.321	11.8
50 x 50 x 4.0	5.35	0.183	34.2	10.5	681	0.229	9.15	7.33	11.4	18.3	0.403	14.3
65 x 65 x 2.0	3.88	0.253	65.3	30.5	494	0.323	9.94	7.29	11.6	25.6	0.509	14.9
65 x 65 x 2.5	4.78	0.251	52.6	24.0	609	0.391	12.0	8.91	14.1	25.3	0.624	18.1
65 x 65 x 3.0	5.68	0.250	44.1	19.7	721	0.454	14.0	10.4	16.6	25.1	0.733	21.0
75 x 75 x 2.5	5.56	0.291	52.4	28.0	709	0.614	16.4	12.0	19.1	29.4	0.971	24.6
75 x 75 x 3.0	6.60	0.290	43.9	23.0	841	0.716	19.1	14.2	22.5	29.2	1.15	28.7
75 x 75 x 3.5	7.53	0.285	37.9	19.4	959	0.797	21.3	16.1	25.3	28.8	1.32	32.5
75 x 75 x 4.0	8.49	0.283	33.3	16.8	1080	0.882	23.5	18.0	28.2	28.6	1.48	36.1
75 x 75 x 5.0	10.3	0.279	27.0	13.0	1310	1.03	27.5	21.6	33.6	28.0	1.77	42.6
75 x 75 x 6.0	12.0	0.274	22.8	10.5	1530	1.16	30.9	24.7	38.4	27.5	2.04	48.2
89 x 89 x 3.5	9.06	0.341	37.6	23.4	1150	1.37	30.9	23.2	36.5	34.5	2.24	47.1
89 x 89 x 5.0	12.5	0.334	26.7	15.8	1590	1.81	40.7	31.4	49.1	33.7	3.05	62.7
89 x 89 x 6.0	14.6	0.330	22.5	12.8	1870	2.06	46.2	36.3	56.6	33.2	3.54	71.6
100 x 100 x 3.0	8.96	0.390	43.5	31.3	1140	1.77	35.4	26.0	41.2	39.4	2.79	53.2
100 x 100 x 4.0	11.6	0.383	32.9	23.0	1480	2.23	44.6	33.5	52.6	38.8	3.63	68.0
100 x 100 x 5.0	14.2	0.379	26.6	18.0	1810	2.66	53.1	40.5	63.5	38.3	4.42	81.4
100 x 100 x 6.0	16.7	0.374	22.4	14.7	2130	3.04	60.7	47.1	73.5	37.7	5.15	93.6
100 x 100 x 9.0	23.5	0.361	15.4	9.11	3000	3.91	78.1	63.6	98.6	36.1	7.00	123
125 x 125 x 4.0	14.8	0.483	32.7	29.3	1880	4.52	72.3	53.6	84.5	49.0	7.25	110
125 x 125 x 5.0	18.2	0.479	26.3	23.0	2310	5.44	87.1	65.4	103	48.5	8.87	133
125 x 125 x 6.0	21.4	0.474	22.1	18.8	2730	6.29	101	76.5	120	48.0	10.4	154
125 x 125 x 9.0	30.6	0.461	15.1	11.9	3900	8.38	134	106	165	46.4	14.5	208
150 x 150 x 5.0	22.1	0.579	26.2	28.0	2810	9.70	129	96.1	151	58.7	15.6	197
150 x 150 x 6.0	26.2	0.574	22.0	23.0	3330	11.3	150	113	178	58.2	18.4	229
150 x 150 x 9.0	37.7	0.561	14.9	14.7	4800	15.4	205	159	248	56.6	26.1	316
200 x 200 x 5.0	29.9	0.779	26.0	38.0	3810	23.9	239	175	277	79.1	37.8	362
200 x 200 x 6.0	35.6	0.774	21.8	31.3	4530	28.0	280	207	327	78.6	44.8	425
200 x 200 x 9.0	51.8	0.761	14.7	20.2	6600	39.2	392	297	465	77.1	64.5	599
250 x 250 x 6.0	45.0	0.974	21.7	39.7	5730	56.2	450	330	521	99.0	88.7	681
250 x 250 x 9.0	65.9	0.961	14.6	25.8	8400	79.8	639	477	750	97.5	129	972

Note : The calculation of sectional properties is based on the following corner geometry :

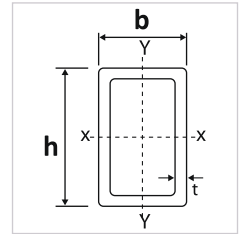
Size Range	Inside Corner Radius mm	Outside Corner Radius mm
Thickness 3.0 mm and less	$t \leq 3$ mm	1.0 t
Thickness greater than 3 mm	$t > 3$ mm	1.5 t



## 6b(ii) Cold Formed Rectangular Hollow Sections

(Australian / New Zealand Standard)

(Dimensions and Properties in accordance to AS / NZS 1163 : 2009)



### Rectangular Hollow Sections

Designation	Depth x Width x Thickness h x b x t	Mass Per Unit Length m	External Surface Area		Ratio		Gross Area Of Cross-section A <sub>g</sub>	About x - axis				About y - axis				Torsion Constant J	Torsion Modulus C
			Per Unit Length	Per Unit Mass	$\frac{b - 2t}{t}$	$\frac{h - 2t}{t}$		Second Moment Of Area I <sub>x</sub>	Elastic Section Modulus Z <sub>x</sub>	Plastic Section Modulus S <sub>x</sub>	Radius Of Gyration r <sub>x</sub>	Second Moment Of Area I <sub>y</sub>	Elastic Section Modulus Z <sub>y</sub>	Plastic Section Modulus S <sub>y</sub>	Radius Of Gyration r <sub>y</sub>		
50 x 20	x 1.6	1.63	0.135	82.7	10.5	29.3	207	0.0608	2.43	3.14	17.1	0.0142	1.42	1.63	8.29	0.0389	2.55
	x 2.0	1.99	0.133	66.8	8.00	23.0	254	0.0723	2.89	3.78	16.9	0.0167	1.67	1.96	8.11	0.0466	3.00
	x 2.5	2.42	0.131	54.2	6.00	18.0	309	0.0848	3.39	4.51	16.6	0.0192	1.92	2.32	7.89	0.0550	3.49
	x 3.0	2.83	0.130	45.8	4.67	14.7	361	0.0951	3.81	5.16	16.2	0.0212	2.12	2.63	7.67	0.0620	3.88
50 x 25	x 1.6	1.75	0.145	82.5	13.6	29.3	223	0.0702	2.81	3.53	17.7	0.0237	1.90	2.17	10.3	0.0585	3.29
	x 2.0	2.15	0.143	66.6	10.5	23.0	274	0.0838	3.35	4.26	17.5	0.0281	2.25	2.62	10.1	0.0706	3.92
	x 2.5	2.62	0.141	54.0	8.00	18.0	334	0.0989	3.95	5.11	17.2	0.0328	2.62	3.12	9.91	0.0843	4.60
	x 3.0	3.07	0.140	45.5	6.33	14.7	391	0.112	4.47	5.86	16.9	0.0367	2.93	3.56	9.69	0.0964	5.18
65 x 35	x 2.0	2.93	0.193	65.8	15.5	30.5	374	0.204	6.28	7.80	23.4	0.0778	4.44	5.07	14.4	0.184	7.62
	x 2.5	3.60	0.191	53.1	12.0	24.0	459	0.244	7.52	9.45	23.1	0.0926	5.29	6.13	14.2	0.223	9.10
	x 3.0	4.25	0.190	44.7	9.67	19.7	541	0.281	8.65	11.0	22.8	0.106	6.04	7.11	14.0	0.259	10.4
75 x 25	x 1.6	2.38	0.195	81.7	13.6	44.9	303	0.197	5.26	6.81	25.5	0.0347	2.78	3.11	10.7	0.0993	5.05
	x 2.0	2.93	0.193	65.8	10.5	35.5	374	0.238	6.36	8.31	25.3	0.0414	3.31	3.77	10.5	0.120	6.04
	x 2.5	3.60	0.191	53.1	8.00	28.0	459	0.285	7.60	10.1	24.9	0.0487	3.89	4.53	10.3	0.144	7.14
75 x 50	x 2.0	3.72	0.243	65.4	23.0	35.5	474	0.372	9.91	12.0	28.0	0.199	7.96	9.06	20.5	0.414	13.1
	x 2.5	4.58	0.241	52.7	18.0	28.0	584	0.450	12.0	14.6	27.7	0.240	9.60	11.0	20.3	0.505	15.9
	x 3.0	5.42	0.240	44.2	14.7	23.0	691	0.522	13.9	17.1	27.5	0.278	11.1	12.9	20.0	0.593	18.4
	x 4.0	6.92	0.233	33.7	10.5	16.8	881	0.630	16.8	21.1	26.7	0.335	13.4	16.0	19.5	0.754	22.7
100 x 50	x 2.0	4.50	0.293	65.1	23.0	48.0	574	0.750	15.0	18.5	36.2	0.257	10.3	11.5	21.2	0.616	17.7
	x 2.5	5.56	0.291	52.4	18.0	38.0	709	0.912	18.2	22.7	35.9	0.311	12.4	14.0	20.9	0.754	21.5
	x 3.0	6.60	0.290	43.9	14.7	31.3	841	1.06	21.3	26.7	35.6	0.361	14.4	16.4	20.7	0.886	25.0
	x 3.5	7.53	0.285	37.9	12.3	26.6	959	1.18	23.6	29.9	35.1	0.400	16.0	18.5	20.4	1.01	28.2
	x 4.0	8.49	0.283	33.3	10.5	23.0	1080	1.31	26.1	33.4	34.8	0.441	17.6	20.6	20.2	1.13	31.2
	x 5.0	10.3	0.279	27.0	8.00	18.0	1310	1.53	30.6	39.8	34.1	0.511	20.4	24.4	19.7	1.35	36.5
125 x 75	x 3.0	8.96	0.390	43.5	23.0	39.7	1140	2.43	38.9	47.3	46.1	1.11	29.5	33.3	31.1	2.43	49.5
	x 4.0	11.6	0.383	32.9	16.8	29.3	1480	3.05	48.9	60.3	45.4	1.39	37.0	42.4	30.6	3.16	63.0
	x 5.0	14.2	0.379	26.6	13.0	23.0	1810	3.64	58.3	72.7	44.8	1.65	43.9	51.1	30.1	3.83	75.3
150 x 50	x 3.0	8.96	0.390	43.5	14.7	48.0	1140	2.99	39.8	51.4	51.2	0.526	21.1	23.5	21.5	1.50	38.3
	x 4.0	11.6	0.383	32.9	10.5	35.5	1480	3.74	49.8	65.4	50.2	0.653	26.1	29.8	21.0	1.93	48.2
	x 5.0	14.2	0.379	26.6	8.00	28.0	1810	4.44	59.2	78.9	49.5	0.765	30.6	35.7	20.5	2.30	56.8
150 x 100	x 4.0	14.8	0.483	32.7	23.0	35.5	1880	5.87	78.2	94.6	55.9	3.15	63.0	71.8	40.9	6.64	105
	x 5.0	18.2	0.479	26.3	18.0	28.0	2310	7.07	94.3	115	55.3	3.79	75.7	87.3	40.4	8.12	127
	x 6.0	21.4	0.474	22.1	14.7	23.0	2730	8.17	109	134	54.7	4.36	87.3	102	40.0	9.51	147
200 x 100	x 4.0	17.9	0.583	32.5	23.0	48.0	2280	11.9	119	147	72.1	4.07	81.5	91.0	42.3	9.89	142
	x 5.0	22.1	0.579	26.2	18.0	38.0	2810	14.4	144	179	71.5	4.92	98.3	111	41.8	12.1	172
	x 6.0	26.2	0.574	22.0	14.7	31.3	3330	16.7	167	210	70.8	5.69	114	130	41.3	14.2	200
	x 9.0	37.7	0.561	14.9	9.11	20.2	4800	22.8	228	293	68.9	7.64	153	180	39.9	19.9	272
250 x 150	x 5.0	29.9	0.779	26.0	28.0	48.0	3810	32.7	262	317	92.6	15.0	199	224	62.6	33.0	337
	x 6.0	35.6	0.774	21.8	23.0	39.7	4530	38.4	307	374	92.0	17.5	233	264	62.2	39.0	395
	x 9.0	51.8	0.761	14.7	14.7	25.8	6600	53.7	430	533	90.2	24.3	324	375	60.7	56.0	554

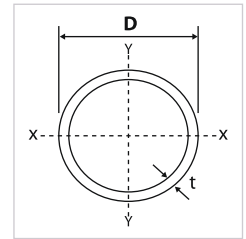
Note : The calculation of sectional properties is based on the following corner geometry :

Size Range	Inside Corner Radius mm	Outside Corner Radius mm
Thicknesses 3.0 mm and less	1.0 t	2.0 t
Thicknesses greater than 3 mm	1.5 t	2.5 t

## 6b(iii) Cold Formed Circular Hollow Sections

(Australian / New Zealand Standard)

(Dimensions and Properties in accordance to AS / NZS 1163 : 2009)



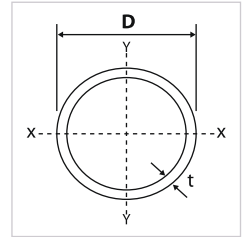
### Circular Hollow Sections

Designation			Unit Weight	External Surface Area		Ratio	Gross Area Of Cross-section	About Any Axis				Torsion Constant	Torsion Modulus
Outside Diameter x Thickness				Per Unit Length	Per Unit Mass			Second Moment Of Area	Elastic Section Modulus	Plastic Section Modulus	Radius Of Gyration		
D	x	t	m	m <sup>2</sup> / m	m <sup>2</sup> / t	D / t	A <sub>g</sub>	I	Z	S	r	J	C
mm	x	mm	kg / m	m <sup>2</sup> / m	m <sup>2</sup> / t		mm <sup>2</sup>	10 <sup>6</sup> mm <sup>4</sup>	10 <sup>3</sup> mm <sup>3</sup>	10 <sup>3</sup> mm <sup>3</sup>	mm	10 <sup>8</sup> mm <sup>4</sup>	10 <sup>3</sup> mm <sup>3</sup>
13.5	x	2.3	0.635	0.0424	66.8	5.9	80.9	0.00132	0.196	0.293	4.04	0.002 64	0.392
13.5	x	2.9	0.758	0.0424	55.9	4.7	96.6	0.00146	0.216	0.334	3.89	0.002 92	0.432
17.2	x	2.3	0.845	0.0540	63.9	7.5	108	0.00306	0.356	0.515	5.33	0.00612	0.711
	x	2.9	1.02	0.0540	52.8	5.9	130	0.00347	0.403	0.601	5.16	0.00693	0.806
21.3	x	2.6	1.20	0.0669	55.8	8.2	153	0.00681	0.639	0.915	6.68	0.0136	1.28
	x	3.2	1.43	0.0669	46.8	6.7	182	0.00768	0.722	1.06	6.50	0.0154	1.44
	x	3.6	1.57	0.0669	42.6	5.9	200	0.00816	0.767	1.14	6.39	0.0163	1.53
26.9	x	2.6	1.56	0.0845	54.2	10.3	198	0.0148	1.10	1.54	8.64	0.0296	2.20
	x	3.2	1.87	0.0845	45.2	8.4	238	0.0170	1.27	1.81	8.46	0.0341	2.53
	x	4.0	2.26	0.0845	37.4	6.7	288	0.0194	1.45	2.12	8.22	0.0389	2.89
33.7	x	3.2	2.41	0.106	44.0	10.5	307	0.0360	2.14	2.99	10.8	0.0721	4.28
	x	4.0	2.93	0.106	36.1	8.4	373	0.0419	2.49	3.55	10.6	0.0838	4.97
	x	4.5	3.24	0.106	32.7	7.5	413	0.0450	2.67	3.87	10.4	0.0901	5.35
42.4	x	3.2	3.09	0.133	43.1	13.3	394	0.0762	3.59	4.93	13.9	0.152	7.19
	x	4.0	3.79	0.133	35.2	10.6	483	0.0899	4.24	5.92	13.6	0.180	8.48
	x	4.9	4.53	0.133	29.4	8.7	577	0.103	4.87	6.93	13.4	0.206	9.74
48.3	x	3.2	3.56	0.152	42.6	15.1	453	0.116	4.80	6.52	16.0	0.232	9.59
	x	4.0	4.37	0.152	34.7	12.1	557	0.138	5.70	7.87	15.7	0.275	11.4
	x	5.4	5.71	0.152	26.6	8.9	728	0.170	7.04	9.99	15.3	0.340	14.1
60.3	x	3.6	5.03	0.189	37.6	16.8	641	0.259	8.58	11.6	20.1	0.517	17.2
	x	4.5	6.19	0.189	30.6	13.4	789	0.309	10.2	14.0	19.8	0.618	20.5
	x	5.4	7.31	0.189	25.9	11.2	931	0.354	11.8	16.3	19.5	0.709	23.5
76.1	x	2.3	4.19	0.239	57.1	33.1	533	0.363	9.55	12.5	26.1	0.727	19.1
	x	3.2	5.75	0.239	41.6	23.8	733	0.488	12.8	17.0	25.8	0.976	25.6
	x	3.6	6.44	0.239	37.1	21.1	820	0.540	14.21	8.9	25.7	1.08	28.4
	x	4.5	7.95	0.239	30.1	16.9	1010	0.651	17.1	23.1	25.4	1.30	34.2
	x	5.9	10.2	0.239	23.4	12.9	1300	0.807	21.2	29.1	24.9	1.61	42.4
88.9	x	2.6	5.53	0.279	50.5	34.2	705	0.657	14.8	19.4	30.5	1.31	29.6
	x	3.2	6.76	0.279	41.3	27.8	862	0.792	17.8	23.5	30.3	1.58	35.6
	x	4.0	8.38	0.279	33.3	22.2	1070	0.963	21.7	28.9	30.0	1.93	43.3
	x	4.8	9.96	0.279	28.1	18.5	1270	1.12	25.3	34.0	29.8	2.25	50.6
	x	5.0	10.3	0.279	27.0	17.8	1320	1.16	26.2	35.2	29.7	2.33	52.4
	x	5.5	11.3	0.279	24.7	16.2	1440	1.26	28.3	38.3	29.6	2.52	56.6
	x	5.9	12.1	0.279	23.1	15.1	1540	1.33	30.0	40.7	29.4	2.66	59.9
101.6	x	2.6	6.35	0.319	50.3	39.1	809	0.991	19.5	25.5	35.0	1.98	39.0
	x	3.2	7.77	0.319	41.1	31.8	989	1.20	23.6	31.0	34.8	2.40	47.2
	x	4.0	9.63	0.319	33.2	25.4	1230	1.46	28.8	38.1	34.5	2.93	57.6
	x	5.0	11.9	0.319	26.8	20.3	1520	1.77	34.9	46.7	34.2	3.55	69.9

## 6b(iii) Cold Formed Circular Hollow Sections

(Australian / New Zealand Standard)

(Dimensions and Properties in accordance to AS / NZS 1163 : 2009)



### Circular Hollow Sections

Designation			Unit Weight	External Surface Area		Ratio	Gross Area Of Cross-section	About Any Axis				Torsion Constant	Torsion Modulus
Outside Diameter x Thickness		Per Unit Length		Per Unit Mass	Second Moment Of Area			Elastic Section Modulus	Plastic Section Modulus	Radius Of Gyration			
D	x		t			m	m <sup>2</sup> / m				m <sup>2</sup> / t	D / t	A <sub>g</sub>
mm	x	mm	kg / m	m <sup>2</sup> / m	m <sup>2</sup> / t		mm <sup>2</sup>	10 <sup>6</sup> mm <sup>4</sup>	10 <sup>3</sup> mm <sup>3</sup>	10 <sup>3</sup> mm <sup>3</sup>	mm	10 <sup>8</sup> mm <sup>4</sup>	10 <sup>3</sup> mm <sup>3</sup>
<b>114.3</b>	x	<b>3.2</b>	8.77	0.359	41.0	35.7	1120	1.72	30.2	39.5	39.3	3.45	60.4
	x	<b>3.6</b>	9.83	0.359	36.5	31.8	1250	1.92	33.6	44.1	39.2	3.84	67.2
	x	<b>4.5</b>	12.2	0.359	29.5	25.4	1550	2.34	41.0	54.3	38.9	4.69	82.0
	x	<b>4.8</b>	13.0	0.359	27.7	23.8	1650	2.48	43.4	57.6	38.8	4.96	86.6
	x	<b>5.4</b>	14.5	0.359	24.8	21.2	1850	2.75	48.0	64.1	38.5	5.49	96.1
	x	<b>6.0</b>	16.0	0.359	22.4	19.1	2040	3.00	52.5	70.4	38.3	6.00	105
<b>139.7</b>	x	<b>3.0</b>	10.1	0.439	43.4	46.6	1290	3.01	43.1	56.1	48.3	6.02	86.2
	x	<b>3.5</b>	11.8	0.439	37.3	39.9	1500	3.47	49.7	64.9	48.2	6.95	99.5
	x	<b>5.0</b>	16.6	0.439	26.4	27.9	2120	4.81	68.8	90.8	47.7	9.61	138
	x	<b>5.4</b>	17.9	0.439	24.5	25.9	2280	5.14	73.7	97.4	47.5	10.3	147
<b>165.1</b>	x	<b>3.0</b>	12.0	0.519	43.2	55.0	1530	5.02	60.8	78.8	57.3	10.0	122
	x	<b>3.5</b>	13.9	0.519	37.2	47.2	1780	5.80	70.3	91.4	57.1	11.6	141
	x	<b>5.0</b>	19.7	0.519	26.3	33.0	2510	8.07	97.7	128	56.6	16.1	195
	x	<b>5.4</b>	21.3	0.519	24.4	30.6	2710	8.65	105	138	56.5	17.3	209
<b>168.3</b>	x	<b>4.8</b>	19.4	0.529	27.3	35.1	2470	8.25	98.0	128	57.8	16.5	196
	x	<b>6.4</b>	25.6	0.529	20.7	26.3	3260	10.7	127	168	57.3	21.4	254
	x	<b>7.1</b>	28.2	0.529	18.7	23.7	3600	11.7	139	185	57.0	23.4	278
<b>219.1</b>	x	<b>4.8</b>	25.4	0.688	27.1	45.6	3230	18.6	169	220	75.8	37.1	339
	x	<b>6.4</b>	33.6	0.688	20.5	34.2	4280	24.2	221	290	75.2	48.4	442
	x	<b>8.2</b>	42.6	0.688	16.1	26.7	5430	30.3	276	365	74.6	60.5	552
<b>273.1</b>	x	<b>4.8</b>	31.8	0.858	27.0	56.9	4050	36.4	267	346	94.9	72.8	533
	x	<b>6.4</b>	42.1	0.858	20.4	42.7	5360	47.7	349	455	94.3	95.4	699
	x	<b>9.3</b>	60.5	0.858	14.2	29.4	7710	67.1	492	647	93.3	134	983
<b>323.9</b>	x	<b>2.7</b>	97.5	1.02	10.4	25.5	12400	151	930	1230	110	301	1860
	x	<b>6.4</b>	50.1	1.02	20.3	50.6	6380	80.5	497	645	112	161	994
	x	<b>9.5</b>	73.7	1.02	13.8	34.1	9380	116	717	939	111	232	1430
<b>355.6</b>	x	<b>6.4</b>	55.1	1.12	20.3	55.6	7020	107	602	781	123	214	1200
	x	<b>9.5</b>	81.1	1.12	13.8	37.4	10300	155	871	1140	122	310	1740
	x	<b>12.7</b>	107	1.12	10.4	28.0	13700	201	1130	1490	121	403	2260
<b>406.4</b>	x	<b>6.4</b>	63.1	1.28	20.2	63.5	8040	161	792	1020	141	322	1580
	x	<b>9.5</b>	93.0	1.28	13.7	42.8	11800	233	1150	1500	140	467	2300
	x	<b>12.7</b>	123	1.28	10.4	32.0	15700	305	1500	1970	139	609	3000
<b>457.0</b>	x	<b>6.4</b>	71.1	1.44	20.2	71.4	9060	230	1010	1300	159	460	2010
	x	<b>9.5</b>	105	1.44	13.7	48.1	13400	334	1460	1900	158	669	2930
	x	<b>12.7</b>	139	1.44	10.3	36.0	17700	438	1920	2510	157	876	3830
<b>508.0</b>	x	<b>6.4</b>	79.2	1.60	20.2	79.4	10100	317	1250	1610	177	634	2500
	x	<b>9.5</b>	117	1.60	13.7	53.5	14900	462	1820	2360	176	925	3640
	x	<b>12.7</b>	155	1.60	10.3	40.0	19800	606	2390	3120	175	1210	4770
<b>610.0</b>	x	<b>6.4</b>	95.3	1.92	20.1	95.3	12100	553	1810	2330	213	1110	3620
	x	<b>9.5</b>	141	1.92	13.6	64.2	17900	808	2850	3430	212	1620	5300
	x	<b>12.7</b>	187	1.92	10.2	48.0	23800	1060	3490	4530	211	2130	6970

6c) Standard Specification for Cold-Formed Welded and Seamless Carbon Steel

Structural Tubing in Round and Shapes - America Standard ( Extracts from ASTM A-500:2007 )

<p><b>General Information</b></p>	<p>ASTM A-500 covers cold-formed welded carbon steel round, square, rectangular, or special shape structural tubing for welded, riveted, or bolted construction of bridges and buildings, and for general structural purposes.</p>																																																
<p><b>Chemical Composition</b></p>	<p>The Chemical analysis shall conform to the limits given in Table 1 for the appropriate grade.</p> <p>Table 1. Chemical Requirements</p> <table border="1"> <thead> <tr> <th colspan="2" rowspan="2">Grades</th> <th colspan="5">Chemical Composition %</th> </tr> <tr> <th>C max.</th> <th>Mn max.</th> <th>P max.</th> <th>S max.</th> <th>Cu min.</th> </tr> </thead> <tbody> <tr> <td rowspan="2">Grade A, B and D</td> <td>Heat Analysis</td> <td>0.26</td> <td>1.35</td> <td>0.035</td> <td>0.035</td> <td>0.20</td> </tr> <tr> <td>Product Analysis</td> <td>0.30</td> <td>1.40</td> <td>0.045</td> <td>0.045</td> <td>0.18</td> </tr> <tr> <td rowspan="2">Grade C</td> <td>Heat Analysis</td> <td>0.23</td> <td>1.35</td> <td>0.035</td> <td>0.035</td> <td>0.20</td> </tr> <tr> <td>Product Analysis</td> <td>0.27</td> <td>1.40</td> <td>0.045</td> <td>0.045</td> <td>0.18</td> </tr> </tbody> </table>	Grades		Chemical Composition %					C max.	Mn max.	P max.	S max.	Cu min.	Grade A, B and D	Heat Analysis	0.26	1.35	0.035	0.035	0.20	Product Analysis	0.30	1.40	0.045	0.045	0.18	Grade C	Heat Analysis	0.23	1.35	0.035	0.035	0.20	Product Analysis	0.27	1.40	0.045	0.045	0.18										
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<p><b>Mechanical Strength (Tensile Test)</b></p>	<p>For Tensile test. The yield strength, tensile strength and elongation of the test piece shall conform to the limits given in Table 2 for the appropriate grade.</p> <p>Table 2. Mechanical Properties</p> <table border="1"> <thead> <tr> <th colspan="4">Shaped Structural Tubing</th> </tr> <tr> <th>Grade</th> <th>Tensile Strength, min, psi (MPa)</th> <th>Yield Strength, min, psi (MPa)</th> <th>Elongation in 2 in. (50 mm) min %</th> </tr> </thead> <tbody> <tr> <td>Grade A</td> <td>45000 (310)</td> <td>39000 (270)</td> <td>25</td> </tr> <tr> <td>Grade B</td> <td>58000 (400)</td> <td>46000 (315)</td> <td>23</td> </tr> <tr> <td>Grade C</td> <td>62000 (425)</td> <td>50000 (345)</td> <td>21</td> </tr> <tr> <td>Grade D</td> <td>58000 (400)</td> <td>36000 (250)</td> <td>23</td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="4">Round Structural Tubing</th> </tr> <tr> <th>Grade</th> <th>Tensile Strength, min, psi (MPa)</th> <th>Yield Strength, min, psi (MPa)</th> <th>Elongation in 2 in. (50 mm) min %</th> </tr> </thead> <tbody> <tr> <td>Grade A</td> <td>45000 (310)</td> <td>33000 (230)</td> <td>25</td> </tr> <tr> <td>Grade B</td> <td>58000 (400)</td> <td>42000 (290)</td> <td>23</td> </tr> <tr> <td>Grade C</td> <td>62000 (425)</td> <td>46000 (315)</td> <td>21</td> </tr> <tr> <td>Grade D</td> <td>58000 (400)</td> <td>36000 (250)</td> <td>23</td> </tr> </tbody> </table>	Shaped Structural Tubing				Grade	Tensile Strength, min, psi (MPa)	Yield Strength, min, psi (MPa)	Elongation in 2 in. (50 mm) min %	Grade A	45000 (310)	39000 (270)	25	Grade B	58000 (400)	46000 (315)	23	Grade C	62000 (425)	50000 (345)	21	Grade D	58000 (400)	36000 (250)	23	Round Structural Tubing				Grade	Tensile Strength, min, psi (MPa)	Yield Strength, min, psi (MPa)	Elongation in 2 in. (50 mm) min %	Grade A	45000 (310)	33000 (230)	25	Grade B	58000 (400)	42000 (290)	23	Grade C	62000 (425)	46000 (315)	21	Grade D	58000 (400)	36000 (250)	23
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<p><b>Cold Flattening Test</b></p>	<p>The flattening test shall be made on round structural tubing. A flattening test is not required for shaped structural tubing. For welded round structural tubing, a test specimen at least 4 in. [100mm] in length shall be flattened cold between parallel plates in three steps with the weld located either 0° or 90° from the line of direction of the force.</p> <ol style="list-style-type: none"> <li>1) During the first step, which is a test for ductility of the weld, no cracks or breaks on the inside or outside surfaces of the test specimen shall be present until the distance between the plates is less than two-thirds of the specified outside diameter of the tubing.</li> <li>2) For the second step, no cracks or breaks on the inside or outside parent metal surfaces of the test specimen, shall be present until the distance between the plates is less than one-half of the specified outside diameter of the tubing.</li> <li>3) During the third step, which is a test for soundness, the flattening shall be continued until the test specimen breaks or the opposite walls of the test specimen meet. Evidence of laminated or unsound material or of incomplete weld that is revealed by the flattening test shall be cause for rejection.</li> </ol>																																																

<b>Tolerances On Dimensions and Mass</b>	The tolerances on dimensions shall respectively conform to Table 3.					
	Table 3. Tolerance on dimensions					
	<b>Characteristic</b>	<b>Circular Hollow Sections</b>		<b>Square And Rectangular Hollow Sections</b>		
		Specified OD (mm)	Tolerance (mm)	Specified Outside Large Flat Dimension in. (mm)	Tolerances, plus & minus in. (mm)	
	Outside Dimension (OD)	OD ≤ 48	± 0.50 %	2 1/2 (65) or under	0.020 (0.50)	
		OD ≥ 50	± 0.75 %	Over 2 1/2 to 3 1/2 (65 to 90), incl	0.025 (0.60)	
				Over 3 1/2 to 5 1/2 (90 to 140), incl Over 5 1/2 (140)	0.030 (0.80) 0.01 times large flat dimension	
	Thickness (t)	± 10 % of nominal thickness, exclusive of weld area				
	Length	Length tolerance for specific lengths, in. (mm)	22 ft (6.5 m) And Under		Over 22 ft (6.5 m)	
			Over	Under	Over	Under
			1/2 (13)	1/4 (6)	3/4 (19)	1/4 (6)
	Straightness	$1/8 \text{ in} \times \frac{\text{Total Length in ft}}{5}$				
	Out-of-roundness	-				
	Concavity / convexity	Shall be not exceed the outside dimension tolerance				
	Radius of Corners	-	Shall not exceed three times the specified wall thickness			
Squareness of Sides	-	adjacent sides shall be square (90°), with permissible variation of ± 2° max.				
Twist	-	Specified Dia. of longest side, in (mm)	Maximum Permissible Variations in Twist per 3ft of length (Twist per meter of length)			
			in.	mm		
		1 1/2 (40) and under Over 1 1/2 to 2 1/2 (40 to 65), incl Over 2 1/2 to 4 (65 to 100), incl Over 4 to 6 (100 to 150). Incl Over 6 to 8 (150 to 200), incl Over 8 (200)	0.050 0.062 0.075 0.087 0.100 0.112	1.3 1.6 1.9 2.2 2.5 2.8		
Inner Flash	-					
End tolerance on diameter	-					
End Facing	-					
Mass (m) per unit length	-					

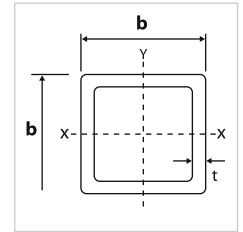
# Hollow Sections ASTM A - 500

ASTM A- 500

## 6c(i) Cold Formed Square Hollow Sections

(America Standard)

(Dimensions and Properties in accordance to ASTM A - 500 Grade A and B / Manufacturer Standard)



## Square Hollow Sections

Nominal Size b x b		Wall Thickness t		Calculated Weight			Area A	Moment Of Inertia		Section Modulus		Radius Of Gyration		Plastic Modulus	
mm	in	mm	in	Kg/m	Kg/6m	Kg/ft	cm <sup>2</sup>	I <sub>x</sub> cm <sup>4</sup>	I <sub>y</sub> cm <sup>4</sup>	Z <sub>x</sub> cm <sup>3</sup>	Z <sub>y</sub> cm <sup>3</sup>	i <sub>x</sub> cm	i <sub>y</sub> cm	S <sub>x</sub> cm <sup>3</sup>	S <sub>y</sub> cm <sup>3</sup>
20 x 20	-	1.5	0.059	0.83	4.96	0.25	1.05	0.58	0.58	0.58	0.58	0.74	0.74	0.72	0.72
25 x 25	1 x 1	1.5	0.059	1.06	6.37	0.32	1.35	1.22	1.22	0.97	0.97	0.95	0.95	1.17	1.17
		1.9	0.075	1.31	7.83	0.40	1.66	1.44	1.44	1.15	1.15	0.93	0.93	1.41	1.41
		2.3	0.091	1.53	9.19	0.47	1.95	1.61	1.61	1.29	1.29	0.91	0.91	1.62	1.62
		3.0	0.120	1.89	11.34	0.58	2.41	1.84	1.84	1.47	1.47	0.87	0.87	1.91	1.91
30 x 30		1.5	0.059	1.30	7.78	0.40	1.65	2.20	2.20	1.46	1.46	1.15	1.15	1.74	1.74
		1.9	0.075	1.60	9.62	0.49	2.04	2.62	2.62	1.75	1.75	1.13	1.13	2.12	2.12
		2.3	0.091	1.89	11.36	0.58	2.41	2.99	2.99	2.00	2.00	1.11	1.11	2.45	2.45
		3.0	0.120	2.36	14.17	0.72	3.01	3.50	3.50	2.34	2.34	1.08	1.08	2.96	2.96
32 x 32	1 1/4 x 1 1/4	1.5	0.059	1.39	8.35	0.42	1.77	2.70	2.70	1.69	1.69	1.23	1.23	2.00	2.00
		1.9	0.075	1.72	10.34	0.53	2.19	3.24	3.24	2.03	2.03	1.22	1.22	2.44	2.44
		2.3	0.091	2.04	12.23	0.62	2.60	3.71	3.71	2.32	2.32	1.20	1.20	2.84	2.84
		3.0	0.120	2.55	15.30	0.78	3.25	4.38	4.38	2.74	2.74	1.16	1.16	3.44	3.44
35 x 35		1.5	0.059	1.53	9.19	0.47	1.95	3.60	3.60	2.05	2.05	1.36	1.36	2.43	2.43
		1.9	0.075	1.90	11.41	0.58	2.42	4.34	4.34	2.48	2.48	1.34	1.34	2.97	2.97
		2.3	0.091	2.25	13.53	0.69	2.87	4.99	4.99	2.85	2.85	1.32	1.32	3.46	3.46
		3.0	0.120	2.83	16.99	0.86	3.61	5.95	5.95	3.40	3.40	1.28	1.28	4.23	4.23
38 x 38	1 1/2 x 1 1/2	1.5	0.059	1.67	10.04	0.51	2.13	4.67	4.67	2.46	2.46	1.48	1.48	2.89	2.89
		1.9	0.075	2.08	12.48	0.63	2.65	5.65	5.65	2.98	2.98	1.46	1.46	3.54	3.54
		2.3	0.091	2.47	14.83	0.75	3.15	6.54	6.54	3.44	3.44	1.44	1.44	4.15	4.15
		3.0	0.120	3.12	18.69	0.95	3.97	7.85	7.85	4.13	4.13	1.41	1.41	5.10	5.10
40 x 40		1.5	0.059	1.77	10.61	0.54	2.25	5.49	5.49	2.75	2.75	1.56	1.56	3.22	3.22
		1.9	0.075	2.20	13.20	0.67	2.80	6.66	6.66	3.33	3.33	1.54	1.54	3.96	3.96
		2.3	0.091	2.62	15.69	0.80	3.33	7.73	7.73	3.86	3.86	1.52	1.52	4.64	4.64
		3.0	0.120	3.30	19.82	1.01	4.21	9.32	9.32	4.66	4.66	1.49	1.49	5.72	5.72
50 x 50	2 x 2	1.5	0.059	2.24	13.43	0.68	2.85	11.07	11.07	4.43	4.43	1.97	1.97	5.15	5.15
		1.9	0.075	2.80	16.78	0.85	3.56	13.55	13.55	5.42	5.42	1.95	1.95	6.37	6.37
		2.3	0.091	3.34	20.03	1.02	4.25	15.86	15.86	6.34	6.34	1.93	1.93	7.52	7.52
		3.0	0.120	4.25	25.47	1.29	5.41	19.47	19.47	7.79	7.79	1.90	1.90	9.39	9.39
		4.0	0.156	5.45	32.72	1.66	6.95	23.74	23.74	9.49	9.49	1.85	1.85	11.73	11.73
65 x 65	2 1/2 x 2 1/2	4.5	0.177	6.02	36.12	1.83	7.67	25.50	25.50	10.20	10.20	1.82	1.82	12.76	12.76
		1.5	0.059	2.95	17.67	0.90	3.75	25.02	25.02	7.70	7.70	2.58	2.58	8.89	8.89
		1.9	0.075	3.69	22.15	1.13	4.70	30.89	30.89	9.51	9.51	2.56	2.56	11.05	11.05
		2.3	0.091	4.42	26.53	1.35	5.63	36.45	36.45	11.21	11.21	2.54	2.54	13.13	13.13
		3.0	0.120	5.66	33.95	1.72	7.21	45.42	45.42	13.97	13.97	2.51	2.51	16.57	16.57
		4.0	0.156	7.34	44.03	2.24	9.35	56.64	56.64	17.43	17.43	2.46	2.46	21.05	21.05
		4.5	0.177	8.14	48.84	2.48	10.37	61.59	61.59	18.95	18.95	2.44	2.44	23.10	23.10
5.0	0.197	8.91	53.49	2.72	11.36	66.10	66.10	20.34	20.34	2.41	2.41	25.03	25.03		
6.0	0.236	10.39	62.33	3.17	13.23	73.91	73.91	22.74	22.74	2.36	2.36	28.53	28.53		

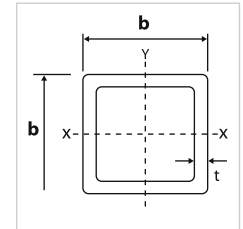
# Hollow Sections ASTM A - 500

ASTM A - 500

## 6c(i) Cold Formed Square Hollow Sections

(America Standard)

(Dimensions and Properties in accordance to ASTM A - 500 Grade A and B / Manufacturer Standard)



## Square Hollow Sections

Nominal Size b x b		Wall Thickness t		Calculated Weight			Area A	Moment Of Inertia		Section Modulus		Radius Of Gyration		Plastic Modulus	
mm	in	mm	in	Kg/m	Kg/6m	Kg/ft	cm <sup>2</sup>	Ix cm <sup>4</sup>	Iy cm <sup>4</sup>	Zx cm <sup>3</sup>	Zy cm <sup>3</sup>	ix cm	iy cm	Sx cm <sup>3</sup>	Sy cm <sup>3</sup>
75 x 75 3 x 3		1.5	0.059	3.42	20.50	1.04	4.35	38.92	38.92	10.38	10.38	2.99	2.99	11.94	11.94
		1.9	0.075	4.29	25.73	1.31	5.46	48.23	48.23	12.86	12.86	2.97	2.97	14.89	14.89
		2.3	0.091	5.14	30.86	1.57	6.55	57.10	57.10	15.23	15.23	2.95	2.95	17.74	17.74
		3.0	0.120	6.60	39.60	2.01	8.41	71.62	71.62	19.10	19.10	2.92	2.92	22.49	22.49
		4.0	0.156	8.59	51.56	2.62	10.95	90.19	90.19	24.05	24.05	2.87	2.87	28.76	28.76
		4.5	0.177	9.55	57.31	2.91	12.17	98.55	98.55	26.28	26.28	2.85	2.85	31.68	31.68
		5.0	0.197	10.48	62.91	3.20	13.36	106.33	106.33	28.35	28.35	2.82	2.82	34.46	34.46
6.0	0.236	12.27	73.63	3.74	15.63	120.16	120.16	32.04	32.04	2.77	2.77	39.58	39.58		
90 x 90 3 1/2 x 3 1/2		2.3	0.091	6.23	37.36	1.90	7.93	100.79	100.79	22.40	22.40	3.56	3.56	25.93	25.93
		3.0	0.120	8.01	48.08	2.44	10.21	127.28	127.28	28.29	28.29	3.53	3.53	33.04	33.04
		4.0	0.156	10.48	62.87	3.19	13.35	161.92	161.92	35.98	35.98	3.48	3.48	42.58	42.58
		4.5	0.177	11.67	70.03	3.56	14.87	177.87	177.87	39.53	39.53	3.46	3.46	47.09	47.09
		5.0	0.197	12.84	77.04	3.91	16.36	192.93	192.93	42.87	42.87	3.43	3.43	51.41	51.41
6.0	0.236	15.10	90.59	4.60	19.23	220.48	220.48	48.99	48.99	3.39	3.39	59.54	59.54		
100 x 100 4 x 4		2.3	0.091	6.95	41.69	2.12	8.85	139.73	139.73	27.95	27.95	3.97	3.97	32.26	32.26
		3.0	0.120	8.96	53.73	2.73	11.41	177.05	177.05	35.41	35.41	3.94	3.94	41.21	41.21
		4.0	0.156	11.73	70.40	3.58	14.95	226.35	226.35	45.27	45.27	3.89	3.89	53.30	53.30
		4.5	0.177	13.08	78.51	3.99	16.67	249.29	249.29	49.86	49.86	3.87	3.87	59.04	59.04
		5.0	0.197	14.41	86.46	4.39	18.36	271.10	271.10	54.22	54.22	3.84	3.84	64.59	64.59
6.0	0.236	16.98	101.89	5.18	21.63	311.47	311.47	62.29	62.29	3.79	3.79	75.10	75.10		
125 x 125 5 x 5		3.0	0.120	11.31	67.86	3.45	14.41	354.50	354.50	56.72	56.72	4.96	4.96	65.56	65.56
		4.0	0.156	14.87	89.24	4.53	18.95	457.23	457.23	73.16	73.16	4.91	4.91	85.33	85.33
		4.5	0.177	16.62	99.70	5.06	21.17	505.83	505.83	80.93	80.93	4.89	4.89	94.84	94.84
		5.0	0.197	18.33	110.01	5.59	23.36	552.62	552.62	88.42	88.42	4.86	4.86	104.10	104.10
		6.0	0.236	21.69	130.15	6.61	27.63	640.89	640.89	102.54	102.54	4.82	4.82	121.87	121.87
150 x 150 6 x 6		4.0	0.156	18.01	108.08	5.49	22.95	807.82	807.82	107.71	107.71	5.93	5.93	124.87	124.87
		4.5	0.177	20.15	120.90	6.14	25.67	896.30	896.30	119.51	119.51	5.91	5.91	139.08	139.08
		5.0	0.197	22.26	133.56	6.78	28.36	982.12	982.12	130.95	130.95	5.89	5.89	152.98	152.98
		6.0	0.236	26.40	158.41	8.05	33.63	1145.91	1145.91	152.79	152.79	5.84	5.84	179.88	179.88
		8.0	0.315	33.95	203.67	10.35	43.24	1411.83	1411.83	188.24	188.24	5.71	5.71	225.96	225.96
		9.0	0.354	37.66	225.98	11.48	47.98	1537.39	1537.39	204.99	204.99	5.66	5.66	248.20	248.20
		10.0	0.394	41.26	247.59	12.58	52.57	1652.53	1652.53	220.34	220.34	5.61	5.61	269.17	269.17
12.0	0.472	47.15	282.88	14.37	60.06	1779.77	1779.77	237.30	237.30	5.44	5.44	297.66	297.66		
200 x 200 8 x 8		4.5	0.177	27.21	163.29	8.30	34.67	2191.55	2191.55	219.15	219.15	7.95	7.95	252.86	252.86
		5.0	0.197	30.11	180.66	9.18	38.36	2410.09	2410.09	241.01	241.01	7.93	7.93	278.87	278.87
		6.0	0.236	35.82	214.93	10.92	45.63	2832.75	2832.75	283.27	283.27	7.88	7.88	329.67	329.67
		8.0	0.315	46.51	279.03	14.17	59.24	3566.26	3566.26	356.63	356.63	7.76	7.76	420.86	420.86
		9.0	0.354	51.79	310.76	15.79	65.98	3918.46	3918.46	391.85	391.85	7.71	7.71	465.35	465.35
		10.0	0.394	56.96	341.79	17.36	72.57	4251.06	4251.06	425.11	425.11	7.65	7.65	508.08	508.08
		12.0	0.472	65.99	395.92	20.11	84.06	4730.23	4730.23	473.02	473.02	7.50	7.50	575.61	575.61
250 x 250 10 x 10		5.0	0.197	37.96	227.76	11.57	48.36	4805.01	4805.01	384.40	384.40	9.97	9.97	442.26	442.26
		6.0	0.236	45.24	271.45	13.79	57.63	5672.00	5672.00	453.76	453.76	9.92	9.92	524.45	524.45
		8.0	0.315	59.07	354.39	18.00	75.24	7229.21	7229.21	578.34	578.34	9.80	9.80	675.77	675.77
		9.0	0.354	65.92	395.54	20.09	83.98	7983.76	7983.76	638.70	638.70	9.75	9.75	750.00	750.00
		10.0	0.394	72.66	435.99	22.15	92.57	8706.68	8706.68	696.53	696.53	9.70	9.70	822.00	822.00
12.0	0.472	84.83	508.96	25.86	108.06	9859.42	9859.42	788.75	788.75	9.55	9.55	943.56	943.56		
300 x 300 12 x 12		6.0	0.236	54.66	327.97	16.66	69.63	9963.67	9963.67	664.24	664.24	11.96	11.96	764.23	764.23
		8.0	0.315	71.63	429.75	21.83	91.24	12800.69	12800.69	853.38	853.38	11.84	11.84	990.68	990.68
		9.0	0.354	80.05	480.32	24.40	101.98	14183.29	14183.29	945.55	945.55	11.79	11.79	1102.14	1102.14
		10.0	0.394	88.36	530.19	26.93	112.57	15519.37	15519.37	1034.62	1034.62	11.74	11.74	1210.91	1210.91
		12.0	0.472	103.67	622.00	31.60	132.06	17767.37	17767.37	1184.49	1184.49	11.60	11.60	1401.51	1401.51

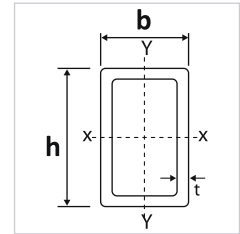
# Hollow Sections ASTM A - 500

ASTM A - 500

## 6c(ii) Cold Formed Rectangular Hollow Sections

(America Standard)

(Dimensions and Properties in accordance to ASTM A - 500 Grade A and B / Manufacturer Standard)



### Rectangular Hollow Sections

Nominal Size		Wall Thickness		Calculated Weight			Area	Moment Of Inertia		Section Modulus		Radius Of Gyration		Plastic Modulus	
h x b		t		Kg/m	Kg/6m	Kg/ft	A cm <sup>2</sup>	I <sub>x</sub> cm <sup>4</sup>	I <sub>y</sub> cm <sup>4</sup>	Z <sub>x</sub> cm <sup>3</sup>	Z <sub>y</sub> cm <sup>3</sup>	i <sub>x</sub> cm	i <sub>y</sub> cm	S <sub>x</sub> cm <sup>3</sup>	S <sub>y</sub> cm <sup>3</sup>
mm	in	mm	in												
38 x 19	1 1/2 x 1 3/4	1.5	0.059	1.23	7.36	0.37	1.56	2.77	0.93	1.46	0.98	1.33	0.77	1.85	1.14
		3.0	0.118	2.46	14.72	0.74	3.12	5.54	1.86	2.92	1.96	2.66	1.46	3.70	2.28
50 x 25	2 x 1	1.5	0.059	1.65	9.90	0.50	2.10	6.65	2.25	2.66	1.80	1.78	1.04	3.33	2.05
		1.9	0.075	2.05	12.31	0.63	2.61	8.06	2.71	3.22	2.16	1.76	1.02	4.08	2.51
		2.3	0.091	2.44	14.61	0.74	3.10	9.31	3.10	3.72	2.48	1.73	1.00	4.78	2.92
		3.0	0.120	3.07	18.41	0.94	3.91	11.17	3.67	4.47	2.93	1.69	0.97	5.86	3.56
65 x 35		1.5	0.059	2.24	13.43	0.68	2.85	15.94	6.12	4.91	3.50	2.36	1.47	6.03	3.93
		1.9	0.075	2.80	16.78	0.85	3.56	19.54	7.46	6.01	4.26	2.34	1.45	7.46	4.85
		2.3	0.091	3.34	20.03	1.02	4.25	22.88	8.69	7.04	4.96	2.32	1.43	8.81	5.72
		3.0	0.120	4.25	25.47	1.29	5.41	28.10	10.57	8.65	6.04	2.28	1.40	10.99	7.11
		4.0	0.156	5.45	32.72	1.66	6.95	34.28	12.72	10.55	7.27	2.22	1.35	13.73	8.83
65 x 38	2 1/2 x 1 1/2	1.5	0.059	2.31	13.86	0.70	2.94	16.85	7.37	5.18	3.88	2.39	1.58	6.32	4.37
		1.9	0.075	2.89	17.32	0.88	3.68	20.68	9.00	6.36	4.74	2.37	1.56	7.82	5.40
		2.3	0.091	3.45	20.68	1.05	4.39	24.23	10.50	7.46	5.53	2.35	1.55	9.24	6.37
		3.0	0.120	4.39	26.32	1.34	5.59	29.83	12.83	9.18	6.75	2.31	1.51	11.55	7.93
		4.0	0.156	5.64	33.86	1.72	7.19	36.52	15.53	11.24	8.17	2.25	1.47	14.46	9.89
75 x 25	3 x 1	1.5	0.059	2.24	13.43	0.68	2.85	18.66	3.29	4.98	2.63	2.56	1.07	6.43	2.94
		1.9	0.075	2.80	16.78	0.85	3.56	22.84	3.98	6.09	3.18	2.53	1.06	7.94	3.61
		2.3	0.091	3.34	20.03	1.02	4.25	26.70	4.59	7.12	3.67	2.51	1.04	9.37	4.23
		3.0	0.120	4.25	25.47	1.29	5.41	32.72	5.49	8.72	4.39	2.46	1.01	11.69	5.21
75 x 38	3 x 1 1/2	1.5	0.059	2.55	15.27	0.78	3.24	23.93	8.37	6.38	4.40	2.72	1.61	7.86	4.92
		1.9	0.075	3.18	19.11	0.97	4.06	29.44	10.24	7.85	5.39	2.69	1.59	9.75	6.08
		2.3	0.091	3.81	22.84	1.16	4.85	34.61	11.97	9.23	6.30	2.67	1.57	11.55	7.19
		3.0	0.120	4.86	29.15	1.48	6.19	42.83	14.67	11.42	7.72	2.63	1.54	14.49	8.98
		4.0	0.156	6.27	37.62	1.91	7.99	52.84	17.85	14.09	9.40	2.57	1.50	18.26	11.25
75 x 50	3 x 2	1.5	0.059	2.83	16.97	0.86	3.60	28.79	15.48	7.68	6.19	2.83	2.07	9.18	6.97
		1.9	0.075	3.54	21.25	1.08	4.51	35.54	19.05	9.48	7.62	2.81	2.05	11.42	8.65
		2.3	0.091	4.24	25.44	1.29	5.40	41.90	22.41	11.17	8.96	2.79	2.04	13.56	10.26
		3.0	0.120	5.42	32.54	1.65	6.91	52.17	27.76	13.91	11.10	2.75	2.00	17.09	12.91
		4.0	0.156	7.02	42.14	2.14	8.95	64.96	34.34	17.32	13.74	2.69	1.96	21.66	16.33
		4.5	0.177	7.79	46.72	2.37	9.92	70.56	37.19	18.82	14.87	2.67	1.94	23.75	17.88
100 x 50	4 x 2	1.5	0.059	3.42	20.50	1.04	4.35	57.77	19.89	11.55	7.96	3.64	2.14	14.16	8.79
		1.9	0.075	4.29	25.73	1.31	5.46	71.62	24.55	14.32	9.82	3.62	2.12	17.65	10.94
		2.3	0.091	5.14	30.86	1.57	6.55	84.83	28.95	16.97	11.58	3.60	2.10	21.03	13.01
		3.0	0.120	6.60	39.60	2.01	8.41	106.46	36.06	21.29	14.42	3.56	2.07	26.66	16.44
		4.0	0.156	8.59	51.56	2.62	10.95	134.14	44.95	26.83	17.98	3.50	2.03	34.10	20.93
		4.5	0.177	9.55	57.31	2.91	12.17	146.61	48.87	29.32	19.55	3.47	2.00	37.56	23.00
		5.0	0.197	10.48	62.91	3.20	13.36	158.19	52.45	31.64	20.98	3.44	1.98	40.84	24.95
125 x 50	5 x 2	2.3	0.091	6.05	36.28	1.84	7.70	148.24	35.50	23.72	14.20	4.39	2.15	29.94	15.75
		3.0	0.120	7.78	46.67	2.37	9.91	187.02	44.35	29.92	17.74	4.34	2.12	38.11	19.96
		4.0	0.156	10.16	60.98	3.10	12.95	237.53	55.56	38.01	22.22	4.28	2.07	49.03	25.53
		4.5	0.177	11.32	67.91	3.45	14.42	260.68	60.55	41.71	24.22	4.25	2.05	54.17	28.12
		5.0	0.197	12.45	74.68	3.79	15.86	282.46	65.16	45.19	26.07	4.22	2.03	59.10	30.58
		6.0	0.236	14.63	87.76	4.46	18.63	322.00	73.28	51.52	29.31	4.16	1.98	68.32	35.12
150 x 50	6 x 2	2.3	0.091	6.95	41.69	2.12	8.85	235.71	42.04	31.43	16.82	5.16	2.18	40.28	18.49
		3.0	0.120	8.96	53.73	2.73	11.41	298.55	52.65	39.81	21.06	5.12	2.15	51.43	23.49
		4.0	0.156	11.73	70.40	3.58	14.95	381.39	66.16	50.85	26.47	5.05	2.10	66.47	30.13
		4.5	0.177	13.08	78.51	3.99	16.67	419.82	72.24	55.98	28.89	5.02	2.08	73.60	33.24
		5.0	0.197	14.41	86.46	4.39	18.36	456.29	77.87	60.84	31.15	4.99	2.06	80.48	36.20
		6.0	0.236	16.98	101.89	5.18	21.63	523.47	87.89	69.80	35.16	4.92	2.02	93.48	41.72



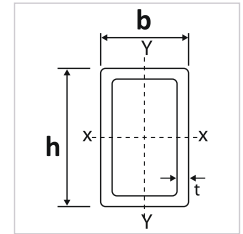
# Hollow Sections ASTM A - 500

ASTM A - 500

## 6c(ii) Cold Formed Rectangular Hollow Sections

(America Standard)

(Dimensions and Properties in accordance to ASTM A - 500 Grade A and B / Manufacturer Standard)



## Rectangular Hollow Sections

Nominal Size		Wall Thickness		Calculated Weight			Area	Moment Of Inertia		Section Modulus		Radius Of Gyration		Plastic Modulus			
h x b		t		Kg/m	Kg/6m	Kg/ft	A cm <sup>2</sup>	I <sub>x</sub> cm <sup>4</sup>	I <sub>y</sub> cm <sup>4</sup>	Z <sub>x</sub> cm <sup>3</sup>	Z <sub>y</sub> cm <sup>3</sup>	i <sub>x</sub> cm	i <sub>y</sub> cm	S <sub>x</sub> cm <sup>3</sup>	S <sub>y</sub> cm <sup>3</sup>		
mm	in	mm	in														
100 x 75	4 x 3	2.3	0.091	6.05	36.28	1.84	7.70	112.28	72.30	22.46	19.28	3.82	3.06	26.64	21.92		
		3.0	0.120	7.78	46.67	2.37	9.91	141.75	91.07	28.35	24.29	3.78	3.03	33.93	27.89		
		4.0	0.156	10.16	60.98	3.10	12.95	180.25	115.42	36.05	30.78	3.73	2.99	43.70	35.86		
		4.5	0.177	11.32	67.91	3.45	14.42	197.95	126.55	39.59	33.75	3.71	2.96	48.30	39.61		
		5.0	0.197	12.45	74.68	3.79	15.86	214.64	137.00	42.93	36.53	3.68	2.94	52.72	43.21		
		6.0	0.236	14.63	87.76	4.46	18.63	245.11	155.96	49.02	41.59	3.63	2.89	61.00	49.93		
125 x 75	5 x 3	2.3	0.091	6.95	41.69	2.12	8.85	191.52	87.51	30.64	23.33	4.65	3.14	36.99	26.10		
		3.0	0.120	8.96	53.73	2.73	11.41	242.85	110.52	38.86	29.47	4.61	3.11	47.26	33.29		
		4.0	0.156	11.73	70.40	3.58	14.95	310.76	140.65	49.72	37.51	4.56	3.07	61.13	42.96		
		4.5	0.177	13.08	78.51	3.99	16.67	342.40	154.54	54.78	41.21	4.53	3.04	67.73	47.55		
		5.0	0.197	14.41	86.46	4.39	18.36	372.51	167.68	59.60	44.71	4.50	3.02	74.10	51.96		
		6.0	0.236	16.98	101.89	5.18	21.63	428.29	191.76	68.53	51.14	4.45	2.98	86.17	60.28		
150 x 75	6 x 3	2.3	0.091	7.85	47.11	2.39	10.00	298.43	102.71	39.79	27.39	5.46	3.20	48.77	30.28		
		3.0	0.120	10.13	60.80	3.09	12.91	379.59	129.97	50.61	34.66	5.42	3.17	62.45	38.69		
		4.0	0.156	13.30	79.82	4.06	16.95	488.00	165.88	65.07	44.24	5.37	3.13	81.07	50.06		
		4.5	0.177	14.85	89.11	4.53	18.92	538.94	182.54	71.86	48.68	5.34	3.11	89.97	55.48		
		5.0	0.197	16.37	98.23	4.99	20.86	587.74	198.36	78.37	52.90	5.31	3.08	98.61	60.71		
		6.0	0.236	19.34	116.02	5.89	24.63	679.08	227.56	90.54	60.68	5.25	3.04	115.08	70.63		
150 x 100	6 x 4	3.0	0.120	11.31	67.86	3.45	14.41	460.64	247.64	61.42	49.53	5.65	4.15	73.48	55.76		
		4.0	0.156	14.87	89.24	4.53	18.95	594.60	318.57	79.28	63.71	5.60	4.10	95.67	72.50		
		4.5	0.177	16.62	99.70	5.06	21.17	658.06	351.96	87.74	70.39	5.58	4.08	106.34	80.53		
		5.0	0.197	18.33	110.01	5.59	23.36	719.20	384.02	95.89	76.80	5.55	4.05	116.73	88.34		
		6.0	0.236	21.69	130.15	6.61	27.63	834.69	444.19	111.29	88.84	5.50	4.01	136.68	103.30		
		200 x 100	8 x 4	4.0	0.156	18.01	108.08	5.49	22.95	1199.71	410.78	119.97	82.16	7.23	4.23	148.04	91.70
4.5	0.177			20.15	120.90	6.14	25.67	1331.44	454.64	133.14	90.93	7.20	4.21	164.89	102.02		
5.0	0.197			22.26	133.56	6.78	28.36	1459.26	496.94	145.93	99.39	7.17	4.19	181.37	112.09		
6.0	0.236			26.40	158.41	8.05	33.63	1703.31	576.91	170.33	115.38	7.12	4.14	213.27	131.50		
8.0	0.315			33.95	203.67	10.35	43.24	2090.84	705.36	209.08	141.07	6.95	4.04	267.26	164.65		
9.0	0.354			37.66	225.98	11.48	47.98	2275.60	764.43	227.56	152.89	6.89	3.99	293.45	180.46		
10.0	0.394			41.26	247.59	12.58	52.57	2444.40	817.74	244.44	163.55	6.82	3.94	318.08	195.25		
12.0	0.472			47.15	282.88	14.37	60.06	2606.71	875.58	260.67	175.12	6.59	3.82	350.01	215.32		
200 x 150	8 x 6			4.0	0.156	21.15	126.92	6.45	26.95	1583.92	1021.03	158.39	136.14	7.67	6.16	187.24	154.07
				4.5	0.177	23.68	142.09	7.22	30.17	1761.49	1134.54	176.15	151.27	7.64	6.13	208.87	171.82
		5.0	0.197	26.18	157.11	7.98	33.36	1934.67	1245.04	193.47	166.00	7.62	6.11	230.12	189.23		
		6.0	0.236	31.11	186.67	9.48	39.63	2268.03	1457.13	226.80	194.28	7.56	6.06	271.47	223.08		
		8.0	0.315	40.23	241.35	12.26	51.24	2828.55	1815.54	282.85	242.07	7.43	5.95	344.06	282.76		
		9.0	0.354	44.73	268.37	13.63	56.98	3097.03	1985.32	309.70	264.71	7.37	5.90	379.40	311.65		
		10.0	0.394	49.11	294.69	14.97	62.57	3347.73	2143.36	334.77	285.78	7.31	5.85	413.08	339.17		
		12.0	0.472	56.57	339.40	17.24	72.06	3668.47	2352.53	366.85	313.67	7.14	5.71	462.81	380.46		
250 x 150	10 x 6	4.5	0.177	27.21	163.29	8.30	34.67	3003.79	1372.78	240.30	183.04	9.31	6.29	289.92	204.55		
		5.0	0.197	30.11	180.66	9.18	38.36	3304.18	1507.95	264.33	201.06	9.28	6.27	319.76	225.48		
		6.0	0.236	35.82	214.93	10.92	45.63	3885.56	1768.35	310.85	235.78	9.23	6.23	378.05	266.28		
		8.0	0.315	46.51	279.03	14.17	59.24	4885.79	2219.25	390.86	295.90	9.08	6.12	482.17	339.56		
		9.0	0.354	51.79	310.76	15.79	65.98	5368.90	2433.25	429.51	324.43	9.02	6.07	533.10	375.10		
		10.0	0.394	56.96	341.79	17.36	72.57	5825.01	2634.20	466.00	351.23	8.96	6.02	582.00	409.17		
		12.0	0.472	65.99	395.92	20.11	84.06	6457.90	2925.29	516.63	390.04	8.77	5.90	657.96	463.26		
300 x 200	12 x 8	5.0	0.197	37.96	227.76	11.57	48.36	6241.05	3360.92	416.07	336.09	11.36	8.34	495.65	376.37		
		6.0	0.236	45.24	271.45	13.79	57.63	7370.23	3962.19	491.35	396.22	11.31	8.29	587.83	446.07		
		8.0	0.315	59.07	354.39	18.00	75.24	9389.28	5041.67	625.95	504.17	11.17	8.19	757.08	574.46		
		9.0	0.354	65.92	395.54	20.09	83.98	10371.43	5561.32	691.43	556.13	11.11	8.14	840.24	637.25		
		10.0	0.394	72.66	435.99	22.15	92.57	11312.71	6057.73	754.18	605.77	11.05	8.09	920.91	698.08		
		12.0	0.472	84.83	508.96	25.86	108.06	12787.85	6853.75	852.52	685.37	10.88	7.96	1055.91	801.21		

6d) Carbon Steel Square And Rectangular Tubes For General Structure

Japanese Industrial Standard ( Extracts from JIS G 3466:2006 )

<p><b>General Information</b></p>	<p>This Japanese Industrial Standard specifies the carbon steel square and rectangular tubes (hereafter referred to as “square and rectangular tubes”) used for civil engineering, architecture and other structures. Square and rectangular tubes are classified into two classes and the symbols of the classes shall be as shown in Table 1.</p> <p>Table 1. Class symbols</p> <table border="1"> <thead> <tr> <th>Class Symbol</th> </tr> </thead> <tbody> <tr> <td>STKR 400</td> </tr> <tr> <td>STKR 490</td> </tr> </tbody> </table>	Class Symbol	STKR 400	STKR 490																																							
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STKR 490																																											
<p><b>Chemical Composition</b></p>	<p>The Heat analysis values and Product analysis values shall satisfy the requirements given in Table 2.</p> <p>Table 2. Chemical Composition <span style="float: right;">Unit: %</span></p> <table border="1"> <thead> <tr> <th>Class Symbol</th> <th>C</th> <th>Si</th> <th>Mn</th> <th>P</th> <th>S</th> </tr> </thead> <tbody> <tr> <td>STKR 400</td> <td>0.25 max.</td> <td>-</td> <td>-</td> <td>0.040 max.</td> <td>0.040 max.</td> </tr> <tr> <td>STKR 490</td> <td>0.18 max.</td> <td>0.55 max.</td> <td>1.50 max.</td> <td>0.040 max.</td> <td>0.040 max.</td> </tr> </tbody> </table>	Class Symbol	C	Si	Mn	P	S	STKR 400	0.25 max.	-	-	0.040 max.	0.040 max.	STKR 490	0.18 max.	0.55 max.	1.50 max.	0.040 max.	0.040 max.																								
Class Symbol	C	Si	Mn	P	S																																						
STKR 400	0.25 max.	-	-	0.040 max.	0.040 max.																																						
STKR 490	0.18 max.	0.55 max.	1.50 max.	0.040 max.	0.040 max.																																						
<p><b>Mechanical Strength (Tensile Test)</b></p>	<p>The resulting values of tensile strength, yield point or proof stress and elongation shall satisfy the requirements in Table 3. However, for square and rectangular tubes under 8 mm in wall thickness, the minimum elongation as a result of the tensile test using *No.5 test piece shall be in according with Table 4.</p> <p>Table 3. Mechanical properties <span style="float: right;">Unit: %</span></p> <table border="1"> <thead> <tr> <th rowspan="2">Class Symbol</th> <th rowspan="2">Tensile Strength N/mm<sup>2</sup></th> <th rowspan="2">Yield Point Or Proof Stress N/mm<sup>2</sup></th> <th>Elongation %</th> </tr> <tr> <th>*No. 5 Test Piece</th> </tr> </thead> <tbody> <tr> <td>STKR 400</td> <td>400 min.</td> <td>245 min.</td> <td>23 min.</td> </tr> <tr> <td>STKR 490</td> <td>490 min.</td> <td>325 min.</td> <td>23 min.</td> </tr> </tbody> </table> <p>NOTE: 1 N/mm<sup>2</sup> = 1 MPa</p> <p>Table 4. Minimum elongation for square and rectangular tubes of thickness under 8 mm as a result of test using No.5 test piece <span style="float: right;">Unit: %</span></p> <table border="1"> <thead> <tr> <th rowspan="2">Class Symbol</th> <th rowspan="2">Test Piece</th> <th colspan="8">Division Of Wall Thickness</th> </tr> <tr> <th>1 mm max.</th> <th>Over 1mm up to and incl. 2 mm</th> <th>Over 2mm up to and incl. 3 mm</th> <th>Over 3mm up to and incl. 4 mm</th> <th>Over 4mm up to and incl. 5 mm</th> <th>Over 5mm up to and incl. 6 mm</th> <th>Over 6mm up to and incl. 7 mm</th> <th>Over 7mm to and excl. 8 mm</th> </tr> </thead> <tbody> <tr> <td>STKR 400</td> <td rowspan="2">*No. 5 Test Piece</td> <td rowspan="2">12</td> <td rowspan="2">14</td> <td rowspan="2">16</td> <td rowspan="2">17</td> <td rowspan="2">18</td> <td rowspan="2">20</td> <td rowspan="2">22</td> <td rowspan="2">23</td> </tr> <tr> <td>STKR 490</td> </tr> </tbody> </table> <p>NOTE: The above value have been obtained by subtracting 1.5 from the values in table 3 per 1 mm decreament from the 8 mm tube wall thickness, and then rounding the results off to an integer in accordance with rule A of JIS Z 8401</p> <p>* Please refer to Appendix ‘A’ Tension Test Pieces for Metallic Materials - JIS Z 2201 ( pg153-155)</p>	Class Symbol	Tensile Strength N/mm <sup>2</sup>	Yield Point Or Proof Stress N/mm <sup>2</sup>	Elongation %	*No. 5 Test Piece	STKR 400	400 min.	245 min.	23 min.	STKR 490	490 min.	325 min.	23 min.	Class Symbol	Test Piece	Division Of Wall Thickness								1 mm max.	Over 1mm up to and incl. 2 mm	Over 2mm up to and incl. 3 mm	Over 3mm up to and incl. 4 mm	Over 4mm up to and incl. 5 mm	Over 5mm up to and incl. 6 mm	Over 6mm up to and incl. 7 mm	Over 7mm to and excl. 8 mm	STKR 400	*No. 5 Test Piece	12	14	16	17	18	20	22	23	STKR 490
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STKR 400	*No. 5 Test Piece	12	14	16	17	18	20	22	23																																		
STKR 490																																											

The tolerances on dimensions shall be as specified in Table 5.

Table 5. Tolerance on dimensions

Specified Item And Dimension		Dimensional Tolerances	
Side length	100 mm or under	± 1.5 mm	
	Over 100 mm	± 1.5 %	
Unevenness of the flat portion of each side	Side length 100 mm or under	0.5 mm or under	
	Side length over 100 mm	0.5 % or less of the side length	
Thickness	Square and rectangular tubes manufactured by welding	Under 3 mm	± 0.3 mm
		3 mm or over	± 10 %
	Seamless square and rectangular tubes	Under 4 mm	± 0.6 mm
		4 mm or over	± 15 %
Length		+ not specified 0	
Straightness		0.3 % or less of the whole length	
Out-of-roundness		-	
Concavity / convexity		-	
Radius of Corners		3 t or under	
Squareness of side		-	
Twist		-	
Angularity between the adjacent flat portions		± 1.5°	
Inner Flash		-	
End tolerance on diameter		-	
End Facing		-	
Pipe End		-	
Mass ( <i>m</i> ) per unit length		-	

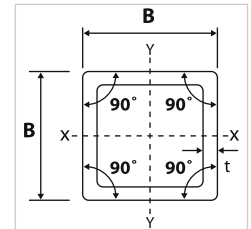
**Tolerances On Dimensions and Mass**

# Hollow Sections JIS G 3466

JIS G 3466

## 6d(i) Carbon Steel Square Pipe For General Structural Purpose

(Dimensions and Properties in accordance to JIS G 3466 : 2066)



### Sqaure Pipe

Size	Wall Thickness	Weight	Cross Section	Geometric Moment Of Inertia	Section Modulus	Radius Of Gyration Of Cross-Section
$B \times B$	$t$	$W$	$A$	$I_{X'}, I_{Y'}$	$Z_{X'}, Z_{Y'}$	$i_{X'}, i_{Y'}$
mm	mm	kg / m	cm <sup>2</sup>	cm <sup>4</sup>	cm <sup>3</sup>	cm
40 x 40	1.6	1.88	2.392	5.79	2.90	1.56
	2.3	2.62	3.332	7.73	3.86	1.52
50 x 50	1.6	2.38	3.032	11.7	4.68	1.96
	2.3	3.34	4.252	15.9	6.34	1.93
	3.2	4.50	5.727	20.4	8.16	1.89
60 x 60	1.6	2.88	3.672	20.7	6.89	2.37
	2.3	4.06	5.172	28.3	9.44	2.34
	3.2	5.50	7.007	36.9	12.3	2.30
75 x 75	1.6	3.64	4.632	41.3	11.0	2.99
	2.3	5.14	6.552	57.1	15.2	2.95
	3.2	7.01	8.927	75.5	20.1	2.91
	4.5	9.55	12.17	98.6	26.3	2.85
80 x 80	2.3	5.50	7.012	69.9	17.5	3.16
	3.2	7.51	9.567	92.7	23.2	3.11
	4.5	10.3	13.07	122	30.4	3.05
90 x 90	2.3	6.23	7.932	101	22.4	3.56
	3.2	8.51	10.85	135	29.9	3.52
100 x 100	2.3	6.95	8.852	140	27.9	3.97
	3.2	9.52	12.13	187	37.5	3.93
	4.0	11.7	14.95	226	45.3	3.89
	4.5	13.1	16.67	249	49.9	3.87
	6.0	17.0	21.63	311	62.3	3.79
	9.0	24.1	30.67	408	81.6	3.65
125 x 125	12.0	30.2	38.53	471	94.3	3.50
	3.2	12.0	15.33	376	60.1	4.95
	4.5	16.6	21.17	506	80.9	4.89
	5.0	18.3	23.36	553	88.4	4.86
	6.0	21.7	27.63	641	103	4.82
150 x 150	9.0	31.1	39.67	865	138	4.67
	12.0	39.7	50.53	103 x 10	165	4.52
	4.5	20.1	25.67	896	120	5.91
	5.0	22.3	28.36	982	131	5.89
	6.0	26.4	33.63	115 x 10	153	5.84
175 x 175	9.0	38.2	48.67	158 x 10	210	5.69
	4.5	23.7	30.17	145 x 10	166	6.93
	5.0	26.2	33.36	159 x 10	182	6.91
200 x 200	6.0	31.1	39.63	186 x 10	213	6.86
	4.5	27.2	34.67	219 x 10	219	7.95
	6.0	35.8	45.63	283 x 10	283	7.88
250 x 250	8.0	46.9	59.79	362 x 10	362	7.78
	9.0	52.3	66.67	399 x 10	399	7.73
	12.0	67.9	86.53	498 x 10	498	7.59
	5.0	38.0	48.36	481 x 10	384	9.97
	6.0	45.2	57.63	567 x 10	454	9.92
300 x 300	8.0	59.5	75.79	732 x 10	585	9.82
	9.0	66.5	84.67	809 x 10	647	9.78
	12.0	86.8	110.5	103 x 10 <sup>2</sup>	820	9.63
	4.5	41.3	52.67	763 x 10	508	12.0
	6.0	54.7	69.63	996 x 10	664	12.0
350 x 350	9.0	80.6	102.7	143 x 10 <sup>2</sup>	956	11.8
	12.0	106	134.5	183 x 10 <sup>2</sup>	122 x 10	11.7
	9.0	94.7	120.7	232 x 10 <sup>2</sup>	132 x 10	13.9
	12.0	124	158.5	298 x 10 <sup>2</sup>	170 x 10	13.7

The weight values in the table have been obtained by calculating according to the following formula as assuming 1 cm<sup>3</sup> of steel to be 7.85 g

and rounding off the result to three significant figures according to rule A of JIS Z 8401.

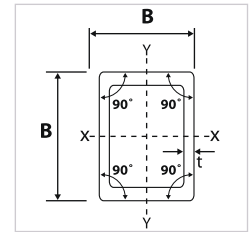
$W = 0.0157t(B + B - 3.287t)$  where,  $W$ : Weight of square tubes (kg / m)

$t$ : Thickness of square tubes (mm)  $B, B$ : Size of square tubes (mm)

Other dimensions than given in above table shall be in accordance with the purchaser and the supplier.

## 6d(ii) Carbon Steel Rectangular Pipe For General Structural Purpose

(Dimensions and Properties in accordance to JIS G 3466 : 2066)



### Rectangular Pipe

Size	Wall Thickness	Weight	Cross Sectional Area	Geometric Moment Of Moment Of Inertia		Section Modulus		Radius Of Gyration Of Cross-Section	
				$I_x$	$I_y$	$Z_x$	$Z_y$	$i_x$	$i_y$
$H \times B$	$t$	$W$	$A$	$I_x$	$I_y$	$Z_x$	$Z_y$	$i_x$	$i_y$
mm	mm	kg / m	cm <sup>2</sup>	cm <sup>4</sup>	cm <sup>4</sup>	cm <sup>3</sup>	cm <sup>3</sup>	cm	cm
50 x 20	1.6	1.63	2.072	6.08	1.42	2.43	1.42	1.71	0.829
	2.3	2.25	2.872	8.00	1.83	3.20	1.83	1.67	0.798
50 x 30	1.6	1.88	2.392	7.96	3.60	3.18	2.40	1.82	1.23
	2.3	2.62	3.332	10.6	4.76	4.25	3.17	1.79	1.20
60 x 30	1.6	2.13	2.712	12.5	4.25	4.16	2.83	2.15	1.25
	2.3	2.98	3.792	16.8	5.65	5.61	3.76	2.11	1.22
	3.2	3.99	5.087	21.4	7.08	7.15	4.72	2.05	1.18
75 x 20	1.6	2.25	2.872	17.6	2.10	4.69	2.10	2.47	0.855
	2.3	3.16	4.022	23.7	2.73	6.31	2.73	2.43	0.824
75 x 45	1.6	2.88	3.672	28.4	12.9	7.56	5.75	2.78	1.88
	2.3	4.06	5.172	38.9	17.6	10.4	7.82	2.74	1.84
	3.2	5.50	7.007	50.8	22.8	13.5	10.1	2.69	1.80
80 x 40	1.6	2.88	3.672	30.7	10.5	7.68	5.26	2.89	1.69
	2.3	4.06	5.172	42.1	14.3	10.5	7.14	2.85	1.66
	3.2	5.50	7.007	54.9	18.4	13.7	9.21	2.80	1.62
90 x 45	2.3	4.60	5.862	61.0	20.8	13.6	9.22	3.23	1.88
	3.2	6.25	7.967	80.2	27.0	17.8	12.0	3.17	1.84
100 x 20	1.6	2.88	3.672	38.1	2.78	7.61	2.78	3.22	0.870
	2.3	4.06	5.172	51.9	3.64	10.4	3.64	3.17	0.839
100 x 40	1.6	3.38	4.312	53.5	12.9	10.7	6.44	3.52	1.73
	2.3	4.78	6.092	73.9	17.5	14.8	8.77	3.48	1.70
	4.2	8.32	10.60	120	27.6	24.0	10.6	3.36	1.61
100 x 50	1.6	3.64	4.632	61.3	21.1	12.3	8.43	3.64	2.13
	2.3	5.14	6.552	84.8	29.0	17.0	11.6	3.60	2.10
	3.2	7.01	8.927	112	38.0	22.5	15.2	3.55	2.06
125 x 40	4.5	9.55	12.17	147	48.9	29.3	19.5	3.47	2.00
	1.6	4.01	5.112	94.4	15.8	15.1	7.91	4.30	1.76
125 x 75	2.3	5.69	7.242	131	21.6	20.9	10.8	4.25	1.73
	3.2	6.95	8.852	192	27.5	30.6	23.3	4.65	3.14
150 x 75	3.2	9.52	12.13	257	117	41.1	31.1	4.60	3.10
	4.0	11.7	14.95	311	141	49.7	37.5	4.56	3.07
	4.5	13.1	16.67	342	155	54.8	41.2	4.53	3.04
	6.0	17.0	21.63	428	192	68.5	51.1	4.45	2.98
150 x 80	3.2	10.8	13.73	402	137	53.6	36.6	5.41	3.16
	4.5	15.2	19.37	563	211	75.0	52.9	5.39	3.30
150 x 100	5.0	16.8	21.36	614	230	81.9	57.5	5.36	3.28
	6.0	19.8	25.23	710	264	94.7	66.1	5.31	3.24
	3.2	12.0	15.33	488	262	65.1	52.5	5.64	4.14
200 x 100	4.5	16.6	21.17	658	352	87.7	70.4	5.58	4.08
	6.0	21.7	27.63	835	444	111	88.8	5.50	4.01
	9.0	31.1	39.67	113 x 10	595	151	119	5.33	3.87
200 x 150	4.5	20.1	25.67	133 x 10	455	133	90.9	7.20	4.21
	6.0	26.4	33.63	170 x 10	577	170	115	7.12	4.14
	9.0	38.2	48.67	235 x 10	782	235	156	6.94	4.01
200 x 200	4.5	23.7	30.17	176 x 10	113 x 10	176	151	7.64	6.13
	6.0	31.1	39.63	227 x 10	146 x 10	227	194	7.56	6.06
	9.0	45.3	57.67	317 x 10	202 x 10	317	270	7.41	5.93
250 x 150	6.0	35.8	45.63	389 x 10	177 x 10	311	236	9.23	6.23
	9.0	52.3	66.67	548 x 10	247 x 10	438	330	9.06	6.09
	12.0	67.9	86.53	685 x 10	307 x 10	548	409	8.90	5.95
300 x 200	6.0	45.2	57.63	737 x 10	396 x 10	491	396	11.3	8.29
	9.0	66.5	84.67	105 x 10 <sup>2</sup>	563 x 10	702	563	11.2	8.16
	12.0	86.8	110.5	134 x 10 <sup>2</sup>	711 x 10	890	711	11.0	8.02
350 x 150	6.0	45.2	57.63	891 x 10	239 x 10	509	319	12.4	6.44
	9.0	66.5	84.67	127 x 10 <sup>2</sup>	337 x 10	726	449	12.3	6.31
	12.0	86.8	110.5	161 x 10 <sup>2</sup>	421 x 10	921	562	12.1	6.17
400 x 200	6.0	54.7	69.63	148 x 10 <sup>2</sup>	509 x 10	739	509	14.6	8.55
	9.0	80.6	102.7	213 x 10 <sup>2</sup>	727 x 10	107 x 10	727	14.4	8.42
	12.0	106	134.5	273 x 10 <sup>2</sup>	923 x 10	136 x 10	923	14.2	8.23

The weight values in the table have been obtained by calculating according to the following formula as assuming 1 cm<sup>3</sup> of steel to be 7.85 g and rounding off the result to three significant figures according to rule A of JIS Z 8401.

$W = 0.0157t(H + B - 3.287t)$  where,  $W$ : Weight of rectangular tubes ( kg / m )  $t$ : Thickness of rectangular tubes ( mm )  $H, B$ : Size of rectangular tubes ( mm )  
Other dimensions than given in above table shall be in accordance with the purchaser and the supplier.



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