



Cold Formed Welded Structural Hollow Section

ท่อเหล็กกลม สำหรับงานโครงสร้าง

BS EN 10219

Grade	% Chemical Composition (Max)					Mechanical Properties (Min)					Minimum Average Absorbed Energy for Standard Test Pieces Joule
	C	Si	Mn	P	S	Yield Strength MPa	Tensile Strength		Elongation %	Impact Test	
							t < 3 mm	3 mm ≤ t ≤ 40 mm		Test Temperature °C	
S235JRH	0.17	-	1.40	0.040	0.040	235	360 - 510	360 - 510	24	20	27
S275J0H	0.20	-	1.50	0.035	0.035	275	430 - 580	410 - 560	20	0	27
S275J2H	0.20	-	1.50	0.030	0.030	275	430 - 580	410 - 560	20	-20	27
S355J0H	0.22	0.55	1.60	0.035	0.035	355	510 - 680	470 - 630	20	0	27
S355J2H	0.22	0.55	1.60	0.030	0.030	355	510 - 680	470 - 630	20	-20	27

Dimension Tolerances	Outside Diameter	Thickness	Weight
	±1% with a minimum of ± 0.5 mm and a maximum of ±10 mm	for D ≤ 406.4 mm t ≤ 5 mm : ±10% t > 5 mm : ±0.5 mm for D > 406.4 mm ±10% with a maximum of 2 mm	±6%

Nominal Size	Outside Diameter	Thickness (t)	Mass Per Unit Length	Cross Sectional Area	Second Moment of Area	Elastic Section Modulus	Radius of Gyration	Nominal Size	Outside Diameter	Thickness (t)	Mass Per Unit Length	Cross Sectional Area	Second Moment of Area	Elastic Section Modulus	Radius of Gyration		
inch	mm	mm	kg/m	cm ²	cm ⁴	cm ³	cm	inch	mm	mm	kg/m	cm ²	cm ⁴	cm ³	cm		
1/2"	21.3	2.00	0.95	1.21	0.571	0.536	0.686	5"	139.7	6.00	19.8	25.2	564	80.8	4.73		
		2.50	1.16	1.48	0.664	0.623	0.671			6.30	20.7	26.4	589	84.3	4.72		
		3.00	1.35	1.72	0.741	0.696	0.656			8.00	26.0	33.1	720	103	4.66		
3/4"	26.9	2.00	1.23	1.56	1.22	0.907	0.883			10.00	32.0	40.7	862	123	4.60		
		2.50	1.50	1.92	1.44	1.07	0.867			6"	168.3	3.00	12.2	15.6	532	63.3	5.85
		3.00	1.77	2.25	1.63	1.21	0.852					4.00	16.2	20.6	697	82.8	5.81
1"	33.7	2.00	1.56	1.99	2.51	1.49	1.12		5.00			20.1	25.7	856	102	5.78	
		2.50	1.92	2.45	3.00	1.78	1.11		6.00			24.0	30.6	1009	120	5.74	
		3.00	2.27	2.89	3.44	2.04	1.09		6.30			25.2	32.1	1053	125	5.73	
1 1/4"	42.4	2.00	1.99	2.54	5.19	2.45	1.43		8.00			31.6	40.3	1297	154	5.67	
		2.50	2.46	3.13	6.26	2.95	1.41		10.00	39.0	49.7	1564	186	5.61			
		3.00	2.91	3.71	7.25	3.42	1.40		7"	193.7	4.00	18.7	23.8	1073	111	6.71	
		4.00	3.79	4.83	8.99	4.24	1.36	5.00			23.3	29.6	1320	136	6.67		
1 1/2"	48.3	2.00	2.28	2.91	7.81	3.23	1.64	6.00			27.8	35.4	1560	161	6.64		
		2.50	2.82	3.60	9.46	3.92	1.62	6.30			29.1	37.1	1830	168	6.63		
		3.00	3.35	4.27	11.0	4.55	1.61	8.00			36.6	46.7	2016	208	6.57		
		4.00	4.37	5.57	13.8	5.70	1.57	10.00			45.3	57.7	2442	252	6.50		
		5.00	5.34	6.8	16.2	6.69	1.54	12.00	53.8	68.5	2839	293	6.44				
2"	60.3	2.00	2.88	3.66	15.6	5.17	2.06	12.50	55.9	71.2	2934	303	6.42				
		2.50	3.56	4.54	19.0	6.30	2.05	8"	219.1	4.00	21.2	27.0	1564	143	7.61		
		3.00	4.24	5.40	22.2	7.37	2.03			5.00	26.4	33.6	1928	176	7.57		
		4.00	5.55	7.07	28.2	9.34	2.00			6.00	31.5	40.2	2282	208	7.54		
		5.00	6.82	8.69	33.5	11.1	1.96			6.30	33.1	42.1	2386	218	7.53		
2 1/2"	76.1	2.00	3.65	4.66	32.0	8.40	2.62			8.00	41.6	53.1	2960	270	7.47		
		2.50	4.54	5.78	39.2	10.3	2.60			10.00	51.6	65.7	3598	328	7.40		
		3.00	5.41	6.89	46.1	12.1	2.59	12.00	61.3	78.1	4200	383	7.33				
		4.00	7.11	9.06	59.1	15.5	2.55	12.50	63.7	81.1	4345	397	7.32				
		5.00	8.77	11.2	70.9	18.6	2.52	10"	273.0	5.00	33.0	42.1	3781	277	9.48		
		6.00	10.4	13.2	81.8	21.5	2.49			6.00	39.5	50.3	4487	329	9.44		
6.30	10.8	13.8	84.8	22.3	2.48	6.30	41.4			52.8	4696	344	9.43				
3"	88.9	2.00	4.29	5.46	51.6	11.6	3.07			8.00	52.3	66.6	5852	429	9.37		
		2.50	5.33	6.79	63.4	14.3	3.06			10.00	64.9	82.6	7154	524	9.31		
		3.00	6.36	8.10	74.8	16.8	3.04			12.00	77.2	98.4	8396	615	9.24		
		4.00	8.38	10.7	96.3	21.7	3.00	12.50	80.3	102	8697	637	9.22				
		5.00	10.3	13.2	116	26.2	2.97	12"	323.9	5.00	39.3	50.1	6369	393	11.3		
6.00	12.3	15.6	135	30.4	2.94	6.00	47.0			59.9	7572	468	11.2				
6.30	12.8	16.3	140	31.5	2.93	6.30	49.3			62.9	7929	490	11.2				
3 1/2"	101.6	2.00	4.91	6.26	77.6	15.3	3.52			8.00	62.3	79.4	9910	612	11.2		
		2.50	6.11	7.78	95.6	18.8	3.50			10.00	77.4	98.6	12160	751	11.1		
		3.00	7.29	9.29	113	22.3	3.49			12.00	92.3	118	14320	884	11.0		
		4.00	9.63	12.3	146	28.8	3.45	12.50	96.0	122	14850	917	11.0				
		5.00	11.9	15.2	177	34.9	3.42	14"	355.6	5.00	43.2	55.1	8464	476	12.4		
		6.00	14.1	18.0	207	40.7	3.39			6.00	51.7	65.9	10070	566	12.4		
6.30	14.8	18.9	215	42.3	3.38	6.30	54.3			69.1	10550	593	12.4				
4"	114.3	2.50	6.89	8.78	137	24.0	3.95			8.00	68.6	87.4	13200	742	12.3		
		3.00	8.23	10.5	163	28.4	3.94			10.00	85.2	109	16220	912	12.2		
		4.00	10.9	13.9	211	36.9	3.90			12.00	102	130	19140	1076	12.2		
		5.00	13.5	17.2	257	45.0	3.87	12.50	106	135	19850	1117	12.1				
		6.00	16.0	20.4	300	52.5	3.83	16"	406.4	6.00	59.2	75.5	15130	745	14.2		
6.30	16.8	21.4	313	54.7	3.82	6.30	62.2			79.2	15850	780	14.1				
8.00	21.0	26.7	379	66.4	3.77	8.00	78.6			100	19870	978	14.1				
5"	139.7	3.00	10.1	12.9	301	43.1	4.83			10.00	97.8	125	24480	1205	14.0		
		4.00	13.4	17.1	393	56.2	4.80			12.00	117	149	28940	1424	14.0		
		5.00	16.6	21.2	481	68.8	4.77			12.50	121	155	30030	1478	13.9		

Cold Formed Welded Structural Hollow Section

ท่อเหล็กรูปสี่เหลี่ยมจัตุรัส สำหรับงานโครงสร้าง

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Grade	% Chemical Composition (Max)					Mechanical Properties (Min)					Minimum Average Absorbed Energy for Standard Test Pieces Joule
	C	Si	Mn	P	S	Yield Strength	Tensile Strength		Elongation	Impact Test	
							t < 3 mm	3 mm ≤ t ≤ 40 mm			
						MPa	MPa	MPa	%	°C	
S235JRH	0.17	-	1.40	0.040	0.040	235	360 - 510	360 - 510	24	20	27
S275J0H	0.20	-	1.50	0.035	0.035	275	430 - 580	410 - 560	20	0	27
S275J2H	0.20	-	1.50	0.030	0.030	275	430 - 580	410 - 560	20	-20	27
S355J0H	0.22	0.55	1.60	0.035	0.035	355	510 - 680	470 - 630	20	0	27
S355J2H	0.22	0.55	1.60	0.030	0.030	355	510 - 680	470 - 630	20	-20	27

Nominal Size	Thickness	Mass Per Unit Length	Cross Sectional Area	Geometrical Moment of Inertia	Modulus of Section	Radius of Gyration	Nominal Size	Thickness	Mass Per Unit Length	Cross Sectional Area	Geometrical Moment of Inertia	Modulus of Section	Radius of Gyration	
H x B	(t)	kg/m	cm ²	lx , ly	Zx , Zy	ix , iy	H x B	(t)	kg/m	cm ²	lx , ly	Zx , Zy	ix , iy	
mm	mm	kg/m	cm ²	cm ⁴	cm ³	cm	mm	mm	kg/m	cm ²	cm ⁴	cm ³	cm	
20 x 20	2.0	1.05	1.34	0.692	0.692	0.720	100 x 100	6.0	17.0	21.6	311	62.3	3.79	
25 x 25	2.0	1.36	1.74	1.48	1.19	0.924		6.3	17.5	22.2	314	62.8	3.76	
	2.5	1.64	2.09	1.69	1.35	0.899		8.0	21.4	27.2	366	73.2	3.67	
	3.0	1.89	2.41	1.84	1.47	0.874		10.0	25.6	32.6	411	82.2	3.55	
30 x 30	2.0	1.68	2.14	2.72	1.81	1.13	120 x 120	3.0	10.8	13.8	312	52.1	4.76	
	2.5	2.03	2.59	3.16	2.10	1.10		4.0	14.2	18.1	402	67.0	4.71	
	3.0	2.36	3.01	3.50	2.34	1.08		5.0	17.5	22.4	485	80.9	4.66	
40 x 40	2.0	2.31	2.94	6.94	3.47	1.54		6.0	20.7	26.4	562	93.7	4.61	
	2.5	2.82	3.59	8.22	4.11	1.51	6.3	21.4	27.3	572	95.3	4.58		
	3.0	3.30	4.21	9.32	4.66	1.49	8.0	26.4	33.6	677	113	4.49		
	4.0	4.20	5.35	11.1	5.54	1.44	10.0	31.8	40.6	777	129	4.38		
50 x 50	2.0	2.93	3.74	14.1	5.66	1.95	150 x 150	4.0	18.0	22.9	808	108	5.93	
	2.5	3.60	4.59	16.9	6.78	1.92		5.0	22.3	28.4	982	131	5.89	
	3.0	4.25	5.41	19.5	7.79	1.90		6.0	26.4	33.6	1146	153	5.84	
	4.0	5.45	6.95	23.7	9.49	1.85		6.3	27.4	34.8	1174	156	5.80	
	5.0	6.56	8.36	27.0	10.8	1.80		8.0	33.9	43.2	1412	188	5.71	
60 x 60	2.0	3.56	4.54	25.1	8.38	2.35		200 x 200	10.0	41.3	52.6	1653	220	5.61
	2.5	4.39	5.59	30.3	10.1	2.33	4.0		24.3	30.9	1968	197	7.97	
	3.0	5.19	6.61	35.1	11.7	2.31	5.0		30.1	38.4	2410	241	7.93	
	4.0	6.71	8.55	43.6	14.5	2.26	6.0		35.8	45.6	2833	283	7.88	
	5.0	8.13	10.4	50.5	16.8	2.21	6.3		37.2	47.4	2922	292	7.85	
	6.0	9.45	12.0	56.1	18.7	2.16	8.0		46.5	59.2	3566	357	7.76	
	6.3	9.55	12.2	54.4	18.1	2.11	10.0		57.0	72.6	4251	425	7.65	
80 x 80	3.0	7.07	9.01	87.8	22.0	3.12	250 x 250		12.0	66.0	84.1	4730	473	7.50
	4.0	9.22	11.7	111	27.8	3.07			12.5	68.3	87.0	4859	486	7.47
	5.0	11.3	14.4	131	32.9	3.03			5.0	38.0	48.4	4805	384	9.97
	6.0	13.2	16.8	149	37.3	2.98		6.0	45.2	57.6	5672	454	9.92	
	6.3	13.5	17.2	149	37.1	2.94		6.3	47.1	60.0	5873	470	9.89	
90 x 90	8.0	16.4	20.8	168	42.1	2.84		300 x 300	8.0	59.1	75.2	7229	578	9.80
	3.0	8.01	10.2	127	28.3	3.53			10.0	72.7	92.6	8707	697	9.70
	4.0	10.5	13.3	162	36.0	3.48			12.0	84.8	108	9859	789	9.55
	5.0	12.8	16.4	193	42.9	3.43			12.5	88.0	112	10160	813	9.52
	6.0	15.1	19.2	220	49.0	3.39			6.0	54.7	69.6	9964	664	12.0
100 x 100	6.3	15.5	19.7	221	49.1	3.35	300 x 300		6.3	57.0	72.6	10340	689	11.9
	8.0	18.9	24.0	255	56.6	3.25			8.0	71.6	91.2	12800	853	11.8
	3.0	8.96	11.4	177	35.4	3.94			10.0	88.4	113	15520	1035	11.7
	4.0	11.7	14.9	226	45.3	3.89			12.0	104	132	17770	1184	11.6
	5.0	14.4	18.4	271	54.2	3.84			12.5	108	137	18350	1223	11.6

Dimension Tolerances	Length of Side	Thickness	Weight
	H,B < 100 mm 100 mm ≤ H, B ≤ 200 mm H,B > 200 mm	: ±1% with a minimum of ±0.5 mm : ±0.8% : ±0.6%	t ≤ 5 mm ±10% t > 5 mm ±0.5 mm

Grade	% Chemical Composition (Max)					Mechanical Properties (Min)					Minimum Average Absorbed Energy for Standard Test Pieces Joule	
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S355J2H	0.22	0.55	1.60	0.030	0.030	355	510 - 680		470 - 630	20	-20	27

Nominal Size H x B	Thick-ness (t)	Mass Per Unit Length kg/m	Cross Sectional Area cm ²	Geometrical Moment of Inertia		Modulus of Section		Radius of Gyration		Nominal Size H x B	Thick-ness (t)	Mass Per Unit Length kg/m	Cross Sectional Area cm ²	Geometrical Moment of Inertia		Modulus of Section		Radius of Gyration		
				I _x	I _y	Z _x	Z _y	i _x	i _y					I _x	I _y	Z _x	Z _y	i _x	i _y	
mm	mm	kg/m	cm ²	cm ⁴	cm ⁴	cm ³	cm ³	cm	cm	mm	mm	kg/m	cm ²	cm ⁴	cm ⁴	cm ³	cm ³	cm	cm	
40 x 20	2.0	1.68	2.14	4.05	1.34	2.02	1.34	1.38	0.793	200 x 100	5.0	22.3	28.4	1459	497	146	99.4	7.17	4.19	
60 x 40	2.0	2.93	3.74	18.4	9.83	6.14	4.92	2.22	1.62	200 x 100	6.0	26.4	33.6	1703	577	170	115	7.12	4.14	
	2.5	3.60	4.59	22.1	11.7	7.36	5.87	2.19	1.60		6.3	27.4	34.8	1739	591	174	118	7.06	4.12	
	3.0	4.25	5.41	25.4	13.4	8.46	6.72	2.17	1.58		8.0	33.9	43.2	2091	705	209	141	6.95	4.04	
100 x 50	2.5	5.56	7.09	91.2	31.1	18.2	12.4	3.59	2.09	200 x 100	10.0	41.3	52.6	2444	818	244	164	6.82	3.94	
	3.0	6.60	8.41	106	36.1	21.3	14.4	3.56	2.07		250 x 150	5.0	30.1	38.4	3304	1508	264	201	9.28	6.27
	4.0	8.59	10.9	134	44.9	26.8	18.0	3.50	2.03			6.0	35.8	45.6	3886	1768	311	236	9.23	6.23
5.0	10.5	13.4	158	52.5	31.6	21.0	3.44	1.98	6.3	37.2		47.4	4001	1825	320	243	9.18	6.20		
120 x 80	6.0	12.3	15.6	179	58.7	35.8	23.5	3.38	1.94	250 x 150	8.0	46.5	59.2	4886	2219	391	296	9.08	6.12	
	6.3	12.5	15.9	176	58.2	35.1	23.3	3.32	1.91		10.0	57.0	72.6	5825	2634	466	351	8.96	6.02	
	3.0	8.96	11.4	230	123	38.4	30.9	4.49	3.29		300 x 150	12.0	66.0	84.1	6458	2925	517	390	8.77	5.90
4.0	11.7	14.9	295	157	49.1	39.3	4.44	3.24	12.5	68.3		87.0	6633	3002	531	400	8.73	5.87		
5.0	14.4	18.4	353	188	58.9	46.9	4.39	3.20	6.0	40.5		51.6	6074	2080	405	277	10.8	6.35		
140 x 80	6.0	17.0	21.6	406	215	67.7	53.8	4.33	3.15	300 x 150	6.3	42.2	53.7	6266	2150	418	287	10.8	6.32	
	6.3	17.5	22.2	408	217	68.1	54.3	4.28	3.12		8.0	52.8	67.2	7684	2623	512	350	10.7	6.25	
	8.0	21.4	27.2	476	252	79.3	62.9	4.18	3.04		10.0	64.8	82.6	9209	3125	614	417	10.6	6.15	
140 x 80	4.0	13.0	16.5	430	180	61.4	45.1	5.10	3.30	300 x 200	12.0	75.4	96.1	13000	3498	687	466	10.4	6.03	
	5.0	16.0	20.4	517	216	73.9	54.0	5.04	3.26		12.5	78.1	99.5	10590	3595	706	479	10.3	6.01	
	6.0	18.9	24.0	597	248	85.3	62.0	4.98	3.21		6.0	45.2	57.6	7370	3962	491	396	11.3	8.29	
150 x 100	6.3	19.4	24.8	603	251	86.1	62.9	4.93	3.19	300 x 200	6.3	47.1	60.0	7624	4104	508	410	11.3	8.27	
	8.0	23.9	30.4	708	293	101	73.3	4.82	3.10		8.0	59.1	75.2	9389	5042	626	504	11.2	8.19	
	4.0	14.9	18.9	595	319	79.3	63.7	5.60	4.10		350 x 250	10.0	72.7	92.6	11310	6058	754	606	11.1	8.09
5.0	18.3	23.4	719	384	95.9	76.8	5.55	4.05	12.0	84.8		108	12790	6854	853	685	10.9	7.96		
6.0	21.7	27.6	835	444	111	88.8	5.50	4.01	12.5	88.0		112	13180	7060	879	706	10.8	7.94		
160 x 80	6.3	22.4	28.5	848	453	113	90.5	5.45	3.98	350 x 250	6.0	54.7	69.6	12460	7458	712	597	13.4	10.3	
	8.0	27.7	35.2	1008	536	134	107	5.35	3.90		6.3	57.0	72.6	12920	7744	738	620	13.3	10.3	
	10.0	33.4	42.6	1162	614	155	123	5.22	3.80		8.0	71.6	91.2	16000	9573	914	766	13.2	10.2	
160 x 80	4.0	14.2	18.1	598	204	74.7	50.9	5.74	3.36	400 x 200	10.0	88.4	113	19410	11590	1109	927	13.1	10.1	
	5.0	17.5	22.4	722	244	90.2	61.0	5.68	3.30		12.0	104	132	22200	13260	1268	1061	13.0	10.0	
	6.0	20.7	26.4	836	281	105	70.2	5.62	3.26		12.5	108	137	22920	13690	1310	1095	12.9	9.99	
200 x 100	6.3	21.4	27.3	846	286	106	71.4	5.57	3.24	400 x 200	8.0	71.6	91.2	18970	6517	949	652	14.4	8.45	
	4.0	18.0	22.9	1200	411	120	82.2	7.23	4.23		12.5	108	137	27100	9260	1355	926	14.1	8.22	

Dimension Tolerances	Length of Side		Thickness		Weight ±6%
	H, B < 100 mm	: ±1% with a minimum of ±0.5 mm	t ≤ 5 mm	±10%	
100 mm ≤ H, B ≤ 200 mm	: ±0.8%	t > 5 mm	±0.5 mm		
H, B > 200 mm	: ±0.6%				