



Standard Structural Profiles

[Machine Design course supplements]

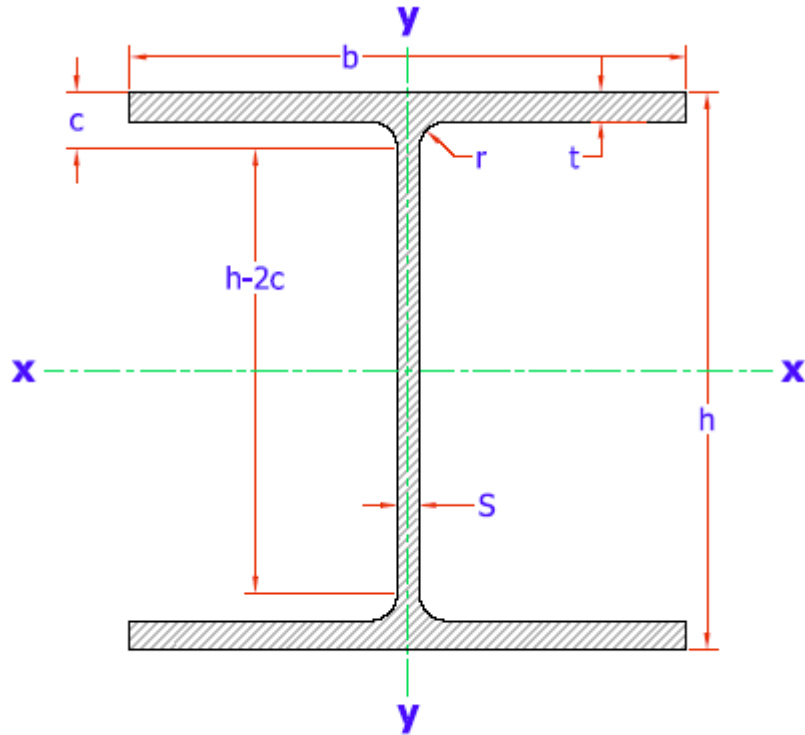
The Hashemite University
Mechanical Engineering Department
Dr. Ala Hijazi

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I-Beam (IPB)

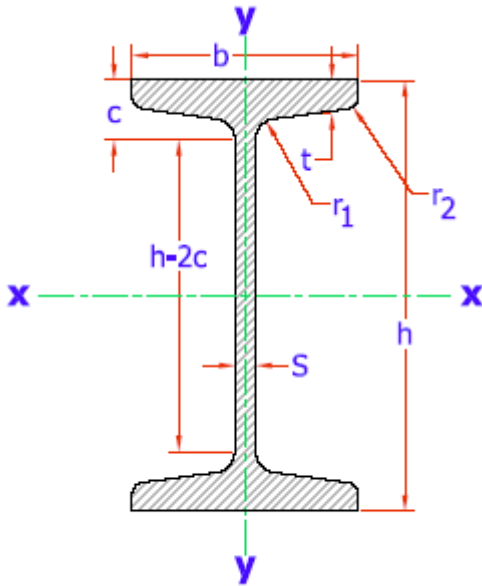


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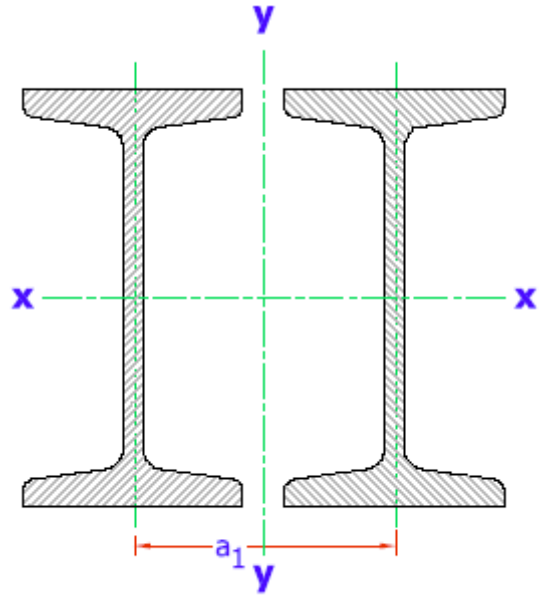
IPB	h mm	b mm	s=r ₁ mm	t mm	r ₂ mm	c mm	h-2c mm	A cm ²	G kg/m	I _x cm ⁴	Z _x cm ³	k _x cm	I _y cm ⁴	Z _y cm ³	k _y cm	r _T mm
100	100	100	6	10	12	22	56	26	20.4	450	89.9	4.16	167	33.5	2.53	27.8
120	120	120	6.5	11	12	23	74	34	26.7	864	144	5.04	318	52.9	3.06	33.4
140	140	140	7	12	12	24	92	43	33.7	1510	216	5.93	550	78.5	3.58	38.9
160	160	160	8	13	15	28	104	54.3	42.6	2490	311	6.78	889	111	4.05	44.4
180	180	180	8.5	14	15	29	122	65.3	51.2	3830	426	7.66	1360	151	4.57	49.9
200	200	200	9	15	18	33	134	78.1	61.3	5700	570	8.54	2000	200	5.07	55.5
220	220	220	9.5	16	18	34	152	91	71.5	8090	736	9.43	2840	258	5.59	61
240	240	240	10	17	21	38	164	106	83.2	11260	938	10.3	3920	327	6.08	66.6
260	260	260	10	17.5	24	41.5	177	118	93	14920	1150	11.2	5130	395	6.58	72.2
280	280	280	10.5	18	24	42	196	131	103	19270	1380	12.1	6590	471	7.09	77.6
300	300	300	11	19	27	46	208	149	117	25170	1680	13	8560	571	7.58	83.2
320	320	300	11.5	20.5	27	47.5	225	161	127	30820	1930	13.8	9240	616	7.57	83.1
340	340	300	12	21.5	27	48.5	243	171	134	36660	2160	14.6	9690	646	7.53	82.9
360	360	300	12.5	22.5	27	49.5	261	181	142	43190	2400	15.5	10140	676	7.49	82.7
400	400	300	13.5	24	27	51	298	198	155	57680	2880	17.1	10820	721	7.4	82.3
450	450	300	14	26	27	53	344	218	171	79890	3550	19.1	11720	781	7.33	81.9
500	500	300	14.5	28	27	55	390	239	187	107200	4290	21.2	12620	842	7.27	81.6
550	550	300	15	29	27	56	438	254	199	136700	4970	23.2	13080	872	7.17	81.1
600	600	300	15.5	30	27	57	486	270	212	171000	5700	25.2	13530	902	7.08	80.7
650	650	300	16	31	27	58	534	286	225	210600	6480	27.1	13980	932	6.99	80.2
700	700	300	17	32	27	59	582	306	241	256900	7340	29	14440	963	6.87	79.6
800	800	300	17.5	33	30	63	674	334	262	359100	8980	32.8	14900	994	6.68	78.7
900	900	300	18.5	35	30	65	770	371	291	494100	10980	36.5	15820	1050	6.53	77.9
1000	1000	300	19	36	30	66	868	400	314	644700	12890	40.1	16280	1090	6.38	77



I-Beam (INP)



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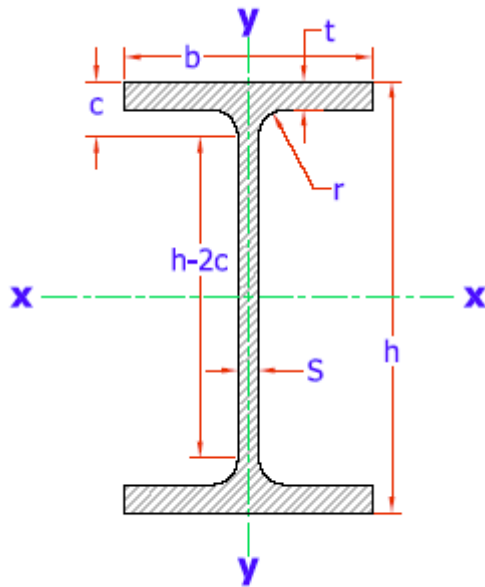


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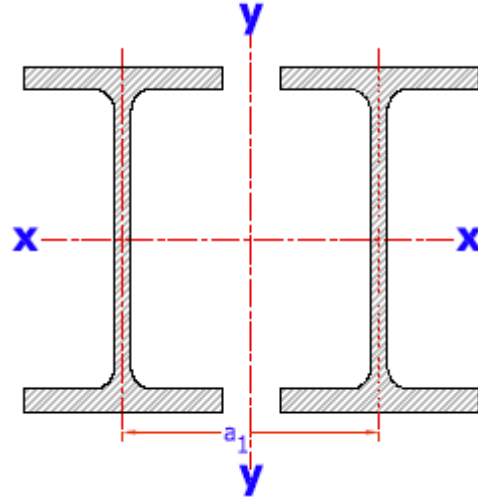
INP	h	b	s=r ₁	t	r ₂	c	h-2c	A	G	I _x	Z _x	k _x	I _y	Z _y	k _y	a ₁	r _T
	mm	mm	mm	mm	mm	mm	mm	cm ²	kg/m	cm ⁴	cm ³	cm	cm ⁴	cm ³	cm	mm	mm
80	80	42	3.9	5.9	2.3	10.5	59	7.57	5.94	77.8	19.5	3.2	6.29	3	0.91	62	11.2
100	100	50	4.5	6.8	2.7	12.5	75	10.6	8.34	171	34.2	4.01	12.2	4.88	1.07	78	13.3
120	120	58	5.1	7.7	3.1	14	92	14.2	11.1	328	54.7	4.81	21.5	7.41	1.23	94	15.4
140	140	66	5.7	8.6	3.4	15.5	109	18.2	14.3	573	81.9	5.61	35.2	10.7	1.4	108	17.4
160	160	74	6.3	9.5	3.8	17.5	125	22.8	17.9	935	117	6.4	54.7	14.8	1.55	124	19.5
180	180	82	6.9	10.4	4.1	19	142	27.9	21.9	1450	161	7.2	81.3	19.8	1.71	140	21.6
200	200	90	7.5	11.3	4.5	20.5	159	33.4	26.2	2140	214	8	117	26	1.87	156	23.6
220	220	98	8.1	12.2	4.9	22	176	39.5	31.1	3060	278	8.8	162	33.1	2.02	172	25.7
240	240	106	8.7	13.1	5.2	24	192	46.1	36.2	4250	354	9.59	221	41.7	2.2	188	27.8
260	260	113	9.4	14.1	5.6	26	208	53.3	41.9	5740	442	10.4	288	51	2.32	202	29.6
280	280	119	10.1	15.2	6.1	27.5	225	61	47.9	7590	542	11.1	364	61.2	2.45	218	31.1
300	300	125	10.8	16.2	6.5	29.5	241	69	54.2	9800	653	11.9	451	72.2	2.56	234	32.6
320	320	131	11.5	17.3	6.9	31	258	77.7	61	12510	782	12.7	555	84.7	2.67	248	34.1
340	340	137	12.2	18.3	7.3	33	274	86.7	68	15700	923	13.5	674	98.4	2.8	264	35.6
360	360	143	13	19.5	7.8	35	290	97	76.1	19610	1090	14.2	818	114	2.9	278	37.2
380	380	149	13.7	20.5	8.2	37	306	107	84	24010	1260	15	975	131	3.02	294	38.7
400	400	155	14.4	21.6	8.6	38.5	323	118	92.4	29210	1460	15.7	1160	149	3.13	308	40.2
425	425	163	15.3	23	9.2	41	343	132	104	36970	1740	16.7	1440	176	3.3	328	42.2
450	450	170	16.2	24.3	9.7	43.5	363	147	115	45850	2040	17.7	1730	203	3.43	348	44
475	475	178	17.1	25.6	10.3	45.5	384	163	128	56480	2380	18.6	2090	235	3.6	366	46
500	500	185	18	27	10.8	48	404	179	141	68740	2750	19.6	2480	268	3.72	384	47.8
550	550	200	19	30	11.9	52.5	445	212	166	99180	3610	21.6	3490	349	4.02	424	51.8
600	600	215	21.6	32.4	13	57.5	485	254	199	139000	4630	23.6	4670	434	4.3	460	55.4



I-Beam (IPE)



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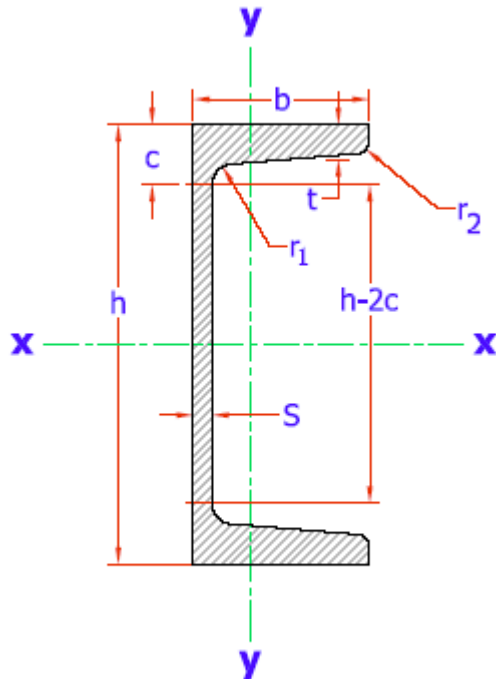


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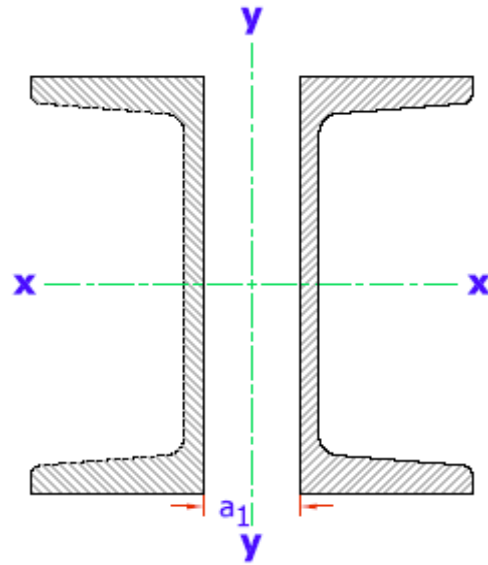
IPE	h mm	b mm	s mm	t mm	r mm	c mm	h-2c mm	A cm ²	G kg/m	I _x cm ⁴	Z _x cm ³	k _x cm	I _y cm ⁴	Z _y cm ³	k _y cm	a ₁ mm	r _T mm
80	80	46	3.8	5.2	5	10.2	59	7.64	6	80.1	20	3.24	8.49	3.69	1.05	63	12.2
100	100	55	4.1	5.7	7	12.7	74	10.3	8.1	171	34.2	4.07	15.9	5.79	1.24	79	14.6
120	120	64	4.4	6.3	7	13.3	93	13.2	10.4	318	53	4.9	27.7	8.65	1.45	96	16.9
140	140	73	4.7	6.9	7	13.9	112	16.4	12.9	541	77.3	5.74	44.9	12.3	1.65	112	19.3
160	160	82	5	7.4	9	16.4	127	20.1	15.8	869	109	6.58	68.3	16.7	1.84	129	21.7
180	180	91	5.3	8	9	17	146	23.9	18.8	1320	146	7.42	101	22.2	2.06	145	24
200	200	100	5.6	8.5	12	20.5	159	28.5	22.4	1940	194	8.26	142	28.5	2.24	162	26.4
220	220	110	5.9	9.2	12	21.2	177	33.4	26.2	2770	252	9.11	205	37.3	2.48	179	29.1
240	240	120	6.2	9.8	15	24.8	190	39.1	30.7	3890	324	9.97	284	47.3	2.6	196	31.8
270	270	135	6.6	10.2	15	25.2	219	45.9	36.1	5790	429	11.2	420	62.2	3.02	220	35.6
300	300	150	7.1	10.7	15	25.7	248	53.8	42.2	8360	557	12.5	604	80.5	3.35	245	39.5
330	330	160	7.5	11.5	18	29.5	271	62.6	49.1	11770	713	13.7	788	98.5	3.55	270	42.1
360	360	170	8	12.7	18	30.7	298	72.7	57.1	16270	904	15	1040	123	3.79	294	44.7
400	400	180	8.6	13.5	21	34.5	331	84.5	66.3	23130	1160	16.5	1320	146	3.95	326	47.1
450	450	190	9.4	14.6	21	35.6	378	98.8	77.6	33740	1500	18.5	1680	176	4.12	365	49.4
500	500	200	10.2	16	21	37	426	116	90.7	48200	1930	20.4	2140	214	4.31	404	51.8
550	550	210	11.1	17.2	24	41.2	467	134	106	67120	2440	22.3	2670	254	4.45	442	54
600	600	220	12	19	24	43	514	156	122	92080	3070	24.3	3390	308	4.66	481	56.5



Channel (UNP)



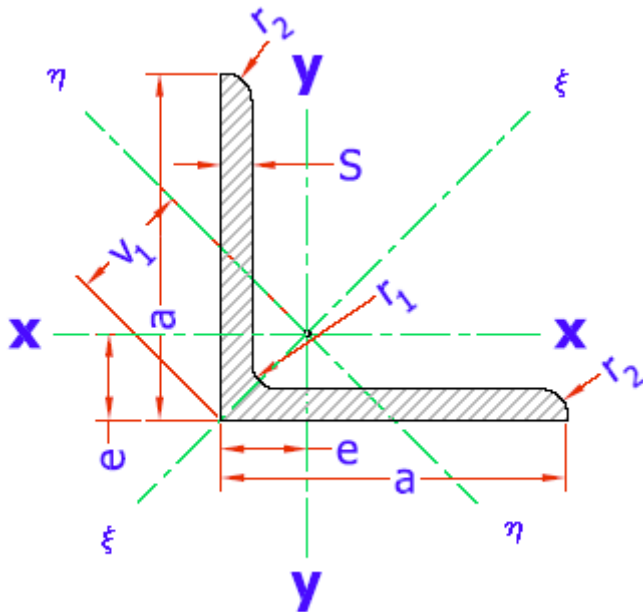
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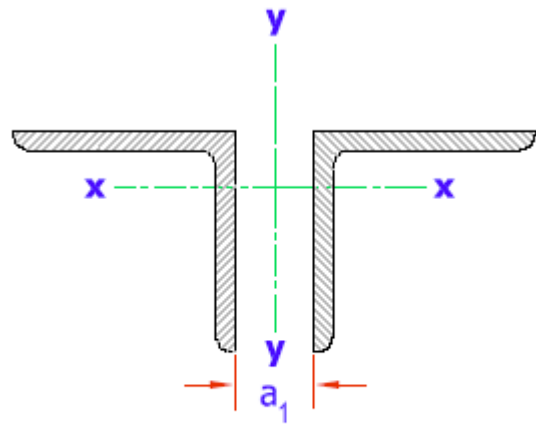
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UNP	h mm	b mm	s mm	t=r ₁ mm	r ₂ mm	c mm	h-2c mm	A cm ²	G kg/m	I _x cm ⁴	Z _x cm ³	k _x cm	I _y cm ⁴	Z _y cm ³	k _y cm	e _y cm	x _M cm	a ₁ mm
30x15	30	15	4	4.5	2	9	12	2.21	1.74	2.53	1.69	1.07	0.38	0.39	0.42	0.52	0.74	--
30	30	33	5	7	3.5	14.5	1	5.44	4.27	6.39	4.26	1.08	5.33	2.68	0.99	1.31	2.22	--
40x20	40	20	5	5.5	2.5	11	18	3.66	2.87	7.58	3.79	1.44	1.14	0.86	0.56	0.67	1.01	--
40	40	35	5	7	3.5	14.5	11	6.21	4.87	14.1	7.05	1.5	6.68	3.08	1.04	1.33	2.32	--
50x25	50	25	5	6	3	12.5	25	4.92	3.86	16.8	6.73	1.85	2.49	1.48	0.71	0.81	1.34	--
50	50	38	5	7	3.5	15	20	7.12	5.59	26.4	10.6	1.92	9.12	3.75	1.13	1.37	2.47	4
60	60	30	6	6	3	12.5	35	6.46	5.07	31.6	10.5	2.21	4.51	2.16	0.84	0.91	1.5	--
65	65	42	5.5	7.5	4	16	33	9.03	7.09	57.5	17.7	2.52	14.1	5.07	1.25	1.42	2.6	16
80	80	45	6	8	4	17	47	11	8.64	106	26.5	3.1	19.4	6.36	1.33	1.45	2.67	28
100	100	50	6	8.5	4.5	18	64	13.5	10.6	206	41.2	3.91	29.3	8.49	1.47	1.55	2.93	42
120	120	55	7	9	4.5	19	82	17	13.4	364	60.7	4.62	43.2	11.1	1.59	1.6	3.03	56
140	140	60	7	10	5	21	97	20.4	16	605	86.4	5.45	62.7	14.8	1.75	1.75	3.37	70
160	160	65	7.5	10.5	5.5	22.5	116	24	18.8	925	116	6.21	85.3	18.3	1.89	1.84	3.56	82
180	180	70	8	11	5.5	23.5	133	28	22	1350	150	6.95	114	22.4	2.02	1.92	3.75	96
200	200	75	8.5	11.5	6	24.5	151	32.2	25.3	1910	191	7.7	148	27	2.14	2.01	3.94	108
220	220	80	9	12.5	6.5	26.5	166	37.4	29.4	2690	245	8.48	197	33.6	2.3	2.14	4.2	122
240	240	85	9.5	13	6.5	28	185	42.3	33.2	3600	300	9.22	248	39.6	2.42	2.23	4.39	134
260	260	90	10	14	7	30	201	48.3	37.9	4820	371	9.99	317	47.7	2.56	2.36	4.66	146
280	280	95	10	15	7.5	32	216	53.3	41.8	6280	448	10.9	399	57.2	2.74	2.53	5.02	160
300	300	100	10	16	8	34	232	58.8	46.2	8030	535	11.7	495	67.8	2.9	2.7	5.41	174
320	320	100	14	17.5	8.75	37	247	75.8	59.5	10870	679	12.1	597	80.6	2.81	2.6	4.82	182
350	350	100	14	16	8	34	283	77.3	60.6	12840	734	12.9	570	75	2.72	2.4	4.45	204
380	380	102	13.5	16	8	33.5	313	80.4	63.1	15760	829	14	615	78.7	2.77	2.38	4.58	227
400	400	110	14	18	9	38	325	91.5	71.8	20350	1020	14.9	846	102	3.04	2.65	5.11	240

L Angle [Equal Leg]



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For any value of a_1 : $J_y > J_x$

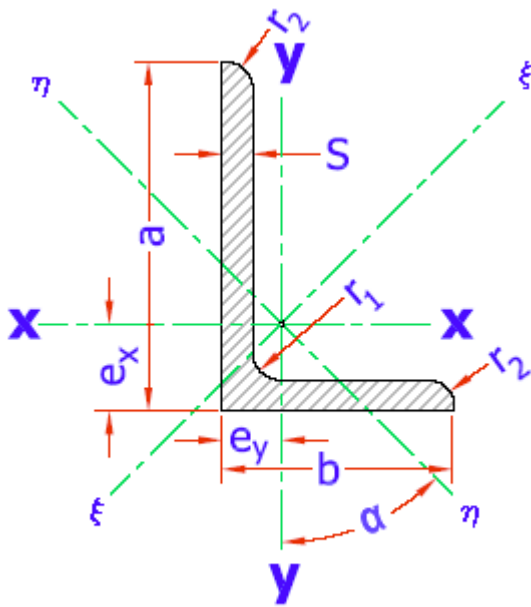
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a x s mm	r ₁ mm	r ₂ mm	A cm ²	G kg/m	e cm	w cm	v ₁ cm	I _x =I _y cm ⁴	Z _x =Z _y cm ³	k _x =k _y cm	I _{xi} cm ⁴	k _{xi} cm	I _n cm ⁴	Z _{ni} cm ³	k _{ni} cm
20 X 3	3.5	2.0	1.12	0.88	0.60	1.41	0.85	0.39	0.28	0.59	0.62	0.74	0.15	0.18	0.37
20 X 4	3.5	2.0	1.45	1.14	0.64	1.41	0.90	0.48	0.35	0.58	0.77	0.73	0.19	0.21	0.36
25 X 3	3.5	2.0	1.42	1.12	0.73	1.77	1.03	0.79	0.45	0.75	1.27	0.95	0.31	0.30	0.47
25 X 4	3.5	2.0	1.85	1.45	0.76	1.77	1.08	1.01	0.58	0.74	1.61	0.93	0.40	0.37	0.47
25 X 5	3.5	2.0	2.26	1.77	0.80	1.77	1.13	1.18	0.69	0.72	1.87	0.91	0.50	0.44	0.47
30 X 3	5.0	2.5	1.74	1.36	0.84	2.12	1.18	1.41	0.65	0.90	2.24	1.14	0.57	0.48	0.57
30 X 4	5.0	2.5	2.27	1.78	0.89	2.12	1.24	1.81	0.86	0.89	2.85	1.12	0.76	0.61	0.58
30 X 5	5.0	2.5	2.78	2.18	0.92	2.12	1.30	2.16	1.04	0.88	3.41	1.11	0.91	0.70	0.57
35 X 3	5.0	2.5	2.04	1.60	0.96	2.47	1.36	2.29	0.90	1.06	3.63	1.34	0.95	0.70	0.68
35 X 4	5.0	2.5	2.67	2.10	1.00	2.47	1.41	2.96	1.18	1.05	4.68	1.33	1.24	0.88	0.68
35 X 5	5.0	2.5	3.28	2.57	1.04	2.47	1.47	3.56	1.45	1.04	5.63	1.31	1.49	1.01	0.67
35 X 6	5.0	2.5	3.87	3.04	1.08	2.47	1.53	4.14	1.71	1.04	6.50	1.30	1.77	1.16	0.68
40 X 3	6.0	3.0	2.35	1.84	1.07	2.83	1.52	3.45	1.18	1.21	5.45	1.52	1.44	0.95	0.78
40 X 4	6.0	3.0	3.08	2.42	1.12	2.83	1.58	4.48	1.56	1.21	7.09	1.52	1.86	1.18	0.78
40 X 5	6.0	3.0	3.79	2.97	1.16	2.83	1.64	5.43	1.91	1.20	8.64	1.51	2.22	1.35	0.77
40 X 6	6.0	3.0	4.48	3.52	1.20	2.83	1.70	6.33	2.26	1.19	9.98	1.49	2.67	1.57	0.77
45 X 4	7.0	3.5	3.49	2.74	1.23	3.18	1.75	6.43	1.97	1.36	10.20	1.71	2.68	1.53	0.88
45 X 5	7.0	3.5	4.30	3.38	1.28	3.18	1.81	7.83	2.43	1.35	12.40	1.70	3.25	1.80	0.87
45 X 6	7.0	3.5	5.09	4.00	1.32	3.18	1.87	9.16	2.88	1.34	14.50	1.69	3.83	2.05	0.87
45 X 7	7.0	3.5	5.86	4.60	1.36	3.18	1.92	10.40	3.31	1.33	16.40	1.67	4.39	2.29	0.87
50 X 4	7.0	3.5	3.89	3.06	1.36	3.54	1.92	8.97	2.46	1.52	14.20	1.91	3.73	1.94	0.98
50 X 5	7.0	3.5	4.80	3.77	1.40	3.54	1.98	11.00	3.05	1.51	17.40	1.90	4.59	2.32	0.98
50 X 6	7.0	3.5	5.69	4.47	1.45	3.54	2.04	12.80	3.61	1.50	20.40	1.89	5.24	2.57	0.96
50 X 7	7.0	3.5	6.56	5.15	1.49	3.54	2.11	14.60	4.15	1.49	23.10	1.88	6.02	2.85	0.96
50 X 8	7.0	3.5	7.41	5.82	1.52	3.54	2.16	16.30	4.68	1.48	25.70	1.86	6.87	3.19	0.96
50 X 9	7.0	3.5	8.24	6.47	1.56	3.54	2.21	17.90	5.20	1.47	28.10	1.85	7.67	3.47	0.97
55 X 5	8.0	4.0	5.32	4.18	1.52	3.89	2.15	14.70	3.70	1.66	23.30	2.09	6.11	2.84	1.07
55 X 6	8.0	4.0	6.31	4.95	1.56	3.89	2.21	17.30	4.40	1.66	27.40	2.08	7.24	3.28	1.07
55 X 8	8.0	4.0	8.23	6.46	1.64	3.89	2.32	22.10	5.72	1.64	34.80	2.06	9.35	4.03	1.07

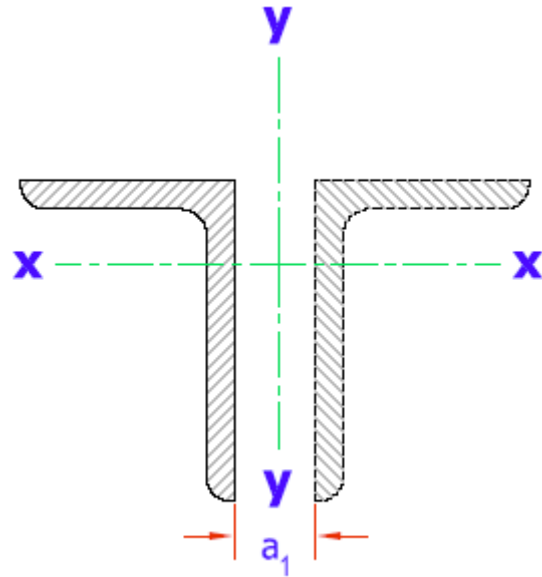
55 X 10	8.0	4.0	10.10	7.90	1.72	3.89	2.43	26.30	6.97	1.62	41.40	2.02	11.30	4.65	1.06
60 X 5	8.0	4.0	5.82	4.57	1.64	4.24	2.32	19.40	4.45	1.82	30.70	2.30	8.03	3.46	1.17
60 X 6	8.0	4.0	6.91	5.42	1.69	4.24	2.39	22.80	5.29	1.82	36.10	2.29	9.43	3.95	1.17
60 X 8	8.0	4.0	9.03	7.09	1.77	4.24	2.50	29.10	6.88	1.80	46.10	2.26	12.10	4.84	1.16
60 X 10	8.0	4.0	11.10	8.69	1.85	4.24	2.62	34.90	8.41	1.78	55.10	2.23	14.60	5.57	1.15
65 X 6	9.0	4.5	7.53	5.91	1.80	4.60	2.55	29.20	6.21	1.97	46.30	2.48	12.10	4.74	1.27
65 X 7	9.0	4.5	8.70	6.83	1.85	4.60	2.62	33.40	7.18	1.96	53.00	2.47	13.80	5.27	1.26
65 X 8	9.0	4.5	9.85	7.73	1.89	4.60	2.67	37.50	8.13	1.95	59.40	2.46	15.60	5.84	1.26
65 X 9	9.0	4.5	11.00	8.62	1.93	4.60	2.73	41.30	9.04	1.94	65.40	2.44	17.20	6.30	1.25
65 X 11	9.0	4.5	13.20	10.30	2.00	4.60	2.83	48.80	10.80	1.91	76.80	2.42	20.70	7.31	1.25
70 X 6	9.0	4.5	8.13	6.38	1.93	4.95	2.73	36.90	7.27	2.13	58.50	2.68	15.30	5.60	1.37
70 X 7	9.0	4.5	9.40	7.38	1.97	4.95	2.79	42.40	8.43	2.12	67.10	2.67	17.60	6.31	1.37
70 X 9	9.0	4.5	11.90	9.34	2.05	4.95	2.90	52.60	10.60	2.10	83.10	2.64	22.00	7.59	1.36
70 X 11	9.0	4.5	14.30	11.20	2.13	4.95	3.01	61.80	12.70	2.08	97.60	2.61	26.00	8.64	1.35
75 X 6	10.0	5.0	8.75	6.87	2.04	5.30	2.89	45.60	8.35	2.28	72.20	2.87	18.90	6.54	1.47
75 X 7	10.0	5.0	10.10	7.94	2.09	5.30	2.95	52.40	9.67	2.28	83.60	2.88	21.10	7.15	1.45
75 X 8	10.0	5.0	11.50	9.03	2.13	5.30	3.01	58.90	11.00	2.26	93.30	2.85	24.40	8.11	1.46
75 X 10	10.0	5.0	14.10	11.10	2.21	5.30	3.12	71.40	13.50	2.25	113.00	2.83	29.80	9.55	1.45
75 X 12	10.0	5.0	16.70	13.10	2.29	5.30	3.24	82.40	15.80	2.22	130.00	2.79	34.70	10.70	1.44
80 X 7	10.0	5.0	10.80	8.49	2.21	5.66	3.13	64.20	11.10	2.44	102.00	3.07	26.50	8.48	1.57
80 X 8	10.0	5.0	12.30	9.66	2.26	5.66	3.20	72.30	12.60	2.42	115.00	3.06	29.60	9.25	1.55
80 X 10	10.0	5.0	15.10	11.90	2.34	5.66	3.31	87.50	15.50	2.41	139.00	3.03	35.90	10.90	1.54
80 X 12	10.0	5.0	17.90	14.10	2.41	5.66	3.41	102.00	18.20	2.39	161.00	3.00	43.00	12.60	1.53
80 X 14	10.0	5.0	20.60	16.10	2.48	5.66	3.51	115.00	20.80	2.36	181.00	2.96	48.60	13.90	1.54
90 X 8	11.0	5.5	13.90	10.90	2.50	6.36	3.53	104.00	16.10	2.74	165.00	3.45	43.50	12.30	1.77
90 X 9	11.0	5.5	15.50	12.20	2.54	6.36	3.59	116.00	18.00	2.74	184.00	3.45	47.80	13.30	1.76
90 X 11	11.0	5.5	18.70	14.70	2.62	6.36	3.70	138.00	21.60	2.72	218.00	3.41	57.10	15.40	1.75
90 X 13	11.0	5.5	21.80	17.10	2.70	6.36	3.81	158.00	25.10	2.69	250.00	3.39	65.90	17.30	1.74
90 X 16	11.0	5.5	26.40	20.70	2.81	6.36	3.97	186.00	30.10	2.66	294.00	3.34	79.10	19.90	1.73
100 X 8	12.0	6.0	15.50	12.20	2.74	7.07	3.87	145.00	19.90	3.06	230.00	3.85	59.90	15.50	1.96
100 X 10	12.0	6.0	19.20	15.10	2.82	7.07	3.99	177.00	24.70	3.04	280.00	3.82	73.30	18.40	1.95
100 X 12	12.0	6.0	22.70	17.80	2.90	7.07	4.10	207.00	29.20	3.02	328.00	3.80	86.20	21.00	1.95
100 X 14	12.0	6.0	26.20	20.60	2.98	7.07	4.21	235.00	33.50	3.00	372.00	3.77	98.30	23.40	1.94
100 X 16	12.0	6.0	29.60	23.20	3.06	7.07	4.32	262.00	37.70	2.97	413.00	3.74	111.00	25.60	1.93
100 X 20	12.0	6.0	36.20	28.40	3.20	7.07	4.53	311.00	45.70	2.93	487.00	3.67	135.00	29.80	1.93
110 X 10	12.0	6.0	21.20	16.60	3.07	7.78	4.34	239.00	30.10	3.36	379.00	4.23	98.60	22.70	2.16
110 X 12	12.0	6.0	25.10	19.70	3.15	7.78	4.45	280.00	35.70	3.34	444.00	4.21	116.00	26.10	2.15
110 X 14	12.0	6.0	29.00	22.80	3.21	7.78	4.54	319.00	41.00	3.32	505.00	4.18	133.00	29.30	2.14
120 X 11	13.0	6.5	25.40	19.90	3.36	8.49	4.75	341.00	39.50	3.66	541.00	4.62	140.00	29.50	2.35
120 X 12	13.0	6.5	27.50	21.60	3.40	8.49	4.80	368.00	42.70	3.65	584.00	4.60	152.00	31.60	2.35
120 X 13	13.0	6.5	29.70	23.30	3.44	8.49	4.86	394.00	46.00	3.64	625.00	4.59	162.00	33.30	2.34
120 X 15	13.0	6.5	33.90	26.60	3.51	8.49	4.96	446.00	52.50	3.63	705.00	4.56	186.00	37.50	2.34
130 X 12	14.0	7.0	30.00	23.60	3.64	9.19	5.15	472.00	50.40	3.97	750.00	5.00	194.00	37.70	2.54
130 X 14	14.0	7.0	34.70	27.20	3.72	9.19	5.26	540.00	58.20	3.94	857.00	4.97	223.00	42.40	2.53
130 X 16	14.0	7.0	39.30	30.90	3.80	9.19	5.37	605.00	65.80	3.92	959.00	4.94	251.00	46.70	2.52
140 X 13	15.0	7.5	35.00	27.50	3.92	9.90	5.54	638.00	63.30	4.27	1010.00	5.38	262.00	47.30	2.74
140 X 15	15.0	7.5	40.00	31.40	4.00	9.90	5.66	723.00	72.30	4.25	1150.00	5.36	298.00	52.70	2.73
150 X 12	16.0	8.0	34.80	27.30	4.12	10.60	5.38	737.00	67.70	4.60	1170.00	5.80	303.00	52.00	2.95
150 X 14	16.0	8.0	40.30	31.60	4.21	10.60	5.95	845.00	78.20	4.58	1340.00	5.77	347.00	58.30	2.94
150 X 15	16.0	8.0	43.00	33.80	4.25	10.60	6.01	898.00	83.50	4.57	1430.00	5.76	370.00	61.60	2.93
150 X 16	16.0	8.0	45.70	35.90	4.29	10.60	6.07	949.00	88.70	4.56	1510.00	5.74	391.00	64.40	2.93
150 X 18	16.0	8.0	51.00	40.10	4.36	10.60	6.17	1050.00	99.30	4.54	1670.00	5.70	438.00	71.00	2.93
150 X 20	16.0	8.0	56.30	44.20	4.44	10.60	6.28	1150.00	109.00	4.51	1820.00	5.68	477.00	76.00	2.91
160 X 15	17.0	8.5	46.10	36.20	4.49	11.30	6.35	1100.00	95.60	4.88	1750.00	6.15	453.00	71.30	3.14
160 X 17	17.0	8.5	51.80	40.70	4.57	11.30	6.46	1230.00	108.00	4.86	1950.00	6.13	506.00	78.30	3.13
160 X 19	17.0	8.5	57.50	45.10	4.65	11.30	6.58	1350.00	118.00	4.84	2140.00	6.10	558.00	84.80	3.12
180 X 16	18.0	9.0	55.40	43.50	5.02	12.70	7.11	1680.00	130.00	5.51	2690.00	6.96	679.00	95.50	3.50

180 X 18	18.0	9.0	61.90	48.60	5.10	12.70	7.22	1870.00	145.00	5.49	2970.00	6.93	757.00	105.00	3.49
180 X 20	18.0	9.0	68.40	53.70	5.18	12.70	7.33	2040.00	160.00	5.47	3260.00	6.90	830.00	113.00	3.49
180 X 22	18.0	9.0	74.70	58.60	5.26	12.70	7.44	2210.00	174.00	5.44	3510.00	6.86	918.00	123.00	3.50
200 X 16	18.0	9.0	61.80	48.50	5.52	14.10	7.80	2340.00	162.00	6.15	3740.00	7.78	943.00	121.00	3.91
200 X 18	18.0	9.0	69.10	54.30	5.60	14.10	7.92	2600.00	181.00	6.13	4150.00	7.75	1050.00	133.00	3.90
200 X 20	18.0	9.0	76.40	59.90	5.68	14.10	8.04	2850.00	199.00	6.11	4540.00	7.72	1160.00	144.00	3.89
200 X 24	18.0	9.0	90.60	71.10	5.84	14.10	8.26	3330.00	235.00	6.06	5280.00	7.64	1380.00	167.00	3.90
200 X 28	18.0	9.0	105.00	82.00	5.99	14.10	8.47	3780.00	270.00	6.02	5990.00	7.57	1580.00	186.00	3.89

L Angle [Unequal Leg]



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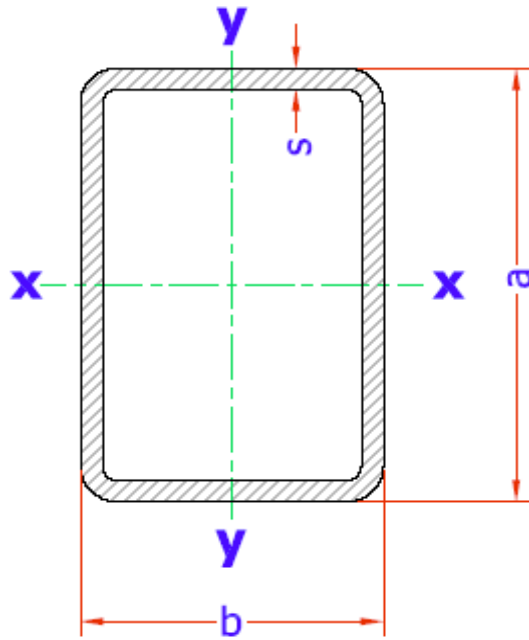
(C) IRANCIVILCENTER.COM

a x b x s mm	r ₁ mm	r ₂ mm	A cm ²	G kg/m	e _x cm	e _y cm	tan α	I _x cm ⁴	Z _x cm ³	k _x cm	I _y cm ⁴	Z _y cm ³	k _y cm	I _ξ cm ⁴	k _ξ cm	I _n cm ⁴	k _n cm	a ₁ mm
30 X 20 X 3	3.5	2.0	1.42	1.11	0.99	0.50	0.431	1.25	0.62	0.94	0.44	0.29	0.56	1.43	1.00	0.25	0.42	5.2
30 X 20 X 4	3.5	2.0	1.85	1.45	1.03	0.54	0.423	1.59	0.81	0.93	0.55	0.38	0.55	1.81	0.99	0.33	0.42	4.2
40 X 20 X 3	3.5	2.0	1.72	1.35	1.43	0.44	0.259	2.79	1.08	1.27	0.47	0.30	0.52	2.96	1.31	0.30	0.42	14.6
40 X 20 X 4	3.5	2.0	2.25	1.77	1.47	0.48	0.252	3.59	1.42	1.26	0.60	0.39	0.52	3.79	1.30	0.39	0.42	13.8
45 X 30 X 3	4.5	2.0	2.19	1.72	1.43	0.70	0.436	4.47	1.46	1.43	1.60	0.70	0.86	5.15	1.53	0.93	0.65	9.0
45 X 30 X 4	4.5	2.0	2.87	2.25	1.48	0.74	0.436	5.78	1.91	1.42	2.05	0.91	0.85	6.65	1.52	1.18	0.64	18.0
45 X 30 X 5	4.5	2.0	3.53	2.77	1.52	0.78	0.430	6.99	2.35	1.41	2.47	1.11	0.84	8.02	1.51	1.44	0.64	7.2
50 X 30 X 5	4.5	2.0	3.78	2.96	1.73	0.74	0.353	9.41	2.88	1.58	2.54	1.12	0.82	10.40	1.66	1.56	0.64	12.2
50 X 40 X 4	4.0	2.0	3.46	2.71	1.52	1.03	0.629	8.54	2.47	1.57	4.86	1.64	1.19	10.90	1.78	2.46	0.84	—
50 X 40 X 5	4.0	2.0	4.27	3.35	1.56	1.07	0.625	10.40	3.02	1.56	5.89	2.01	1.18	13.30	1.76	3.02	0.84	—
60 X 30 X 5	6.0	3.0	4.29	3.37	2.15	0.68	0.256	15.60	4.04	1.90	2.60	1.12	0.78	16.50	1.96	1.69	0.63	21.4
60 X 30 X 7	6.0	3.0	5.85	4.59	2.24	0.76	0.248	20.70	5.50	1.88	3.41	1.52	0.76	21.80	1.93	2.28	0.62	19.2
60 X 40 X 5	6.0	3.0	4.79	3.76	1.96	0.97	0.437	17.20	4.25	1.89	6.11	2.02	1.13	19.80	2.03	3.50	0.86	11.2
60 X 40 X 6	6.0	3.0	5.68	4.46	2.00	1.01	0.433	20.10	5.03	1.88	7.12	2.38	1.12	23.10	2.02	4.12	0.85	10.2
60 X 40 X 7	6.0	3.0	6.55	5.14	2.04	1.05	0.429	23.00	5.79	1.87	8.07	2.74	1.11	26.30	2.00	4.73	0.85	9.2
65 X 50 X 5	6.5	3.5	5.54	4.35	1.99	1.25	0.583	23.10	5.11	2.04	11.90	3.18	1.47	28.80	2.28	6.21	1.06	3.6
65 X 50 X 7	6.5	3.5	7.60	5.97	2.07	1.33	0.574	31.00	6.99	2.02	15.80	4.31	1.44	38.40	2.25	8.37	1.05	1.8
65 X 50 X 9	6.5	3.5	9.58	7.52	2.15	1.41	0.567	38.20	8.77	2.00	19.40	5.39	1.42	47.00	2.22	10.50	1.05	—
75 X 50 X 5	6.5	3.5	6.04	4.74	2.40	1.17	0.437	34.40	6.74	2.39	12.30	3.21	1.43	39.60	2.56	7.10	1.08	15.0
75 X 50 X 7	6.5	3.5	8.30	6.51	2.48	1.25	0.433	46.40	9.24	2.36	16.50	4.39	1.41	53.30	2.53	9.56	1.07	13.0
75 X 50 X 9	6.5	3.5	10.50	8.23	2.56	1.32	0.427	57.40	11.60	2.34	20.20	5.49	1.39	65.70	2.50	11.90	1.07	11.0
75 X 55 X 5	7.0	3.5	6.30	4.95	2.31	1.33	0.530	35.50	6.84	2.37	16.20	3.89	1.60	43.10	2.61	8.68	1.17	8.4
75 X 55 X 7	7.0	3.5	8.66	6.80	2.40	1.41	0.527	47.90	9.39	2.35	21.80	5.32	1.59	57.90	2.59	11.80	1.17	6.6
75 X 55 X 9	7.0	3.5	10.90	8.59	2.47	1.48	0.518	59.40	11.80	2.33	26.80	6.66	1.57	71.30	2.55	14.80	1.16	5.0
80 X 40 X 6	7.0	3.5	6.89	5.41	2.85	0.88	0.259	44.90	8.73	2.55	7.59	2.44	1.05	47.60	2.63	4.90	0.84	29.0
80 X 40 X 8	7.0	3.5	9.01	7.07	2.94	0.95	0.253	57.60	11.40	2.53	9.68	3.18	1.04	60.90	2.60	6.41	0.84	27.2
80 X 65 X 6	8.0	4.0	8.41	6.60	2.39	1.65	0.649	52.80	9.41	2.51	31.20	6.44	1.93	68.50	2.85	15.60	1.36	—
80 X 65 X 8	8.0	4.0	11.00	8.66	2.47	1.73	0.645	68.10	12.30	2.49	40.10	8.41	1.91	88.00	2.82	20.30	1.36	—
80 X 65 X 10	8.0	4.0	13.60	10.70	2.55	1.81	0.640	82.20	15.10	2.46	48.30	10.30	1.89	106.00	2.79	24.80	1.35	—
90 X 60 X 6	7.0	3.5	8.69	6.82	2.89	1.41	0.442	71.70	11.70	2.87	25.80	5.61	1.72	82.80	3.09	14.60	1.30	17.8
90 X 60 X 8	7.0	3.5	11.40	8.96	2.97	1.49	0.437	92.50	15.40	2.85	33.00	7.31	1.70	107.00	3.06	19.00	1.29	16.0
90 X 75 X 7	8.5	4.5	11.10	8.74	2.67	1.93	0.683	88.10	13.90	2.81	55.50	9.98	2.23	117.00	3.24	27.10	1.56	—

100 X 50 X 6	9.0	4.5	8.73	6.85	3.49	1.04	0.263	89.70	13.80	3.20	15.30	3.86	1.32	95.20	3.30	9.78	1.06	37.6
100 X 50 X 8	9.0	4.5	11.50	8.99	3.59	1.13	0.258	116.00	18.00	3.18	19.50	5.04	1.31	123.00	3.28	12.60	1.05	35.4
100 X 50 X 10	9.0	4.5	14.10	11.10	3.67	1.20	0.252	141.00	22.20	3.16	23.40	6.17	1.29	149.00	3.25	15.50	1.04	33.8
100 X 65 X 7	10.0	5.0	11.20	8.77	3.23	1.51	0.419	113.00	16.60	3.17	37.60	7.54	1.84	128.00	3.39	21.60	1.39	21.8
100 X 65 X 9	10.0	5.0	14.20	11.10	3.32	1.59	0.415	141.00	21.00	3.15	46.70	9.52	1.82	160.00	3.36	27.20	1.39	19.8
100 X 65 X 11	10.0	5.0	17.10	13.40	3.40	1.67	0.410	167.00	25.30	3.13	55.10	11.40	1.80	190.00	3.34	32.60	1.38	17.8
100 X 75 X 7	10.0	5.0	11.90	9.32	3.06	1.83	0.553	118.00	17.00	3.15	56.90	10.00	2.19	145.00	3.49	30.10	1.59	8.8
100 X 75 X 9	10.0	5.0	15.10	11.80	3.15	1.91	0.549	148.00	21.50	3.13	71.00	12.70	2.17	181.00	3.47	37.80	1.59	7.0
100 X 75 X 11	10.0	5.0	18.20	14.30	3.23	1.99	0.545	176.00	25.90	3.11	84.00	15.30	2.15	214.00	3.44	45.40	1.58	5.2
120 X 80 X 8	11.0	5.5	15.50	12.20	3.83	1.87	0.441	226.00	27.60	3.82	80.80	13.20	2.29	261.00	4.10	45.80	1.72	24.0
120 X 80 X 10	11.0	5.5	19.10	15.00	3.92	1.95	0.438	276.00	34.10	3.80	98.10	16.20	2.27	318.00	4.07	56.10	1.71	22.2
120 X 80 X 12	11.0	5.5	22.70	17.80	4.00	2.03	0.433	323.00	40.40	3.77	114.00	19.10	2.25	371.00	4.04	66.10	1.71	20.2
120 X 80 X 14	11.0	5.5	26.20	20.50	4.08	2.10	0.429	368.00	46.40	3.75	130.00	22.00	2.23	421.00	4.01	75.80	1.70	18.4
130 X 65 X 8	11.0	5.5	15.10	11.90	4.56	1.37	0.263	263.00	31.10	4.17	44.80	8.72	1.72	280.00	4.31	28.60	1.38	48.6
130 X 65 X 10	11.0	5.5	18.60	14.60	4.65	1.45	0.259	321.00	38.40	4.15	54.20	10.70	1.71	340.00	4.27	35.00	1.37	46.8
130 X 65 X 12	11.0	5.5	22.10	17.30	4.74	1.53	0.255	376.00	45.50	4.12	63.00	12.70	1.69	397.00	4.24	41.20	1.37	44.6
130 X 75 X 8	10.5	5.5	15.90	12.50	4.36	1.65	0.339	276.00	31.90	4.17	68.30	11.70	2.08	303.00	4.37	41.30	1.61	39.2
130 X 75 X 10	10.5	5.5	19.60	15.40	4.45	1.73	0.336	337.00	39.40	4.14	82.90	14.40	2.06	369.00	4.34	50.60	1.61	37.4
130 X 75 X 12	10.5	5.5	23.30	18.30	4.53	1.81	0.332	395.00	46.60	4.12	96.50	17.00	2.04	432.00	4.31	59.60	1.60	35.4
130 X 90 X 10	12.0	6.0	21.20	16.60	4.15	2.18	0.472	358.00	40.50	4.11	141.00	20.60	2.58	420.00	4.46	78.50	1.93	20.4
130 X 90 X 12	12.0	6.0	25.10	19.70	4.24	2.26	0.468	420.00	48.00	4.09	165.00	24.40	2.56	492.00	4.43	92.60	1.92	18.6
150 X 75 X 9	10.5	5.5	19.50	15.30	5.28	1.57	0.265	455.00	46.80	4.83	78.30	13.20	2.00	484.00	4.98	50.00	1.60	56.4
150 X 75 X 11	10.5	5.5	23.60	18.60	5.37	1.65	0.261	545.00	56.60	4.80	93.00	15.90	1.98	578.00	4.95	59.80	1.59	54.4
150 X 90 X 10	12.5	6.5	23.20	18.20	4.99	2.03	0.360	532.00	53.10	4.79	145.00	20.90	2.51	589.00	5.05	88.00	1.95	41.0
150 X 90 X 12	12.5	6.5	27.50	21.60	5.08	2.11	0.358	626.00	63.10	4.77	170.00	24.70	2.49	693.00	5.02	103.00	1.94	39.2
150 X 100 X 10	13.0	6.5	24.20	19.00	4.80	2.34	0.442	552.00	54.10	4.78	198.00	25.80	2.86	637.00	5.13	112.00	2.15	29.8
150 X 100 X 12	13.0	6.5	28.70	22.60	4.89	2.42	0.439	650.00	64.20	4.76	232.00	30.60	2.84	749.00	5.10	132.00	2.15	28.0
150 X 100 X 14	13.0	6.5	33.20	26.10	4.97	2.50	0.435	744.00	74.10	4.73	264.00	35.20	2.82	856.00	5.07	152.00	2.14	26.2
160 X 80 X 10	13.0	6.5	23.20	18.20	5.63	1.69	0.263	611.00	58.90	5.14	104.00	16.50	2.12	648.00	5.29	67.00	1.70	59.7
160 X 80 X 12	13.0	6.5	27.50	21.60	5.72	1.77	0.259	720.00	70.00	5.11	122.00	19.60	2.10	763.00	5.26	78.90	1.69	57.9
160 X 80 X 14	13.0	6.5	31.80	25.00	5.81	1.85	0.256	823.00	80.70	5.09	139.00	22.50	2.09	871.00	5.23	90.50	1.69	55.8
180 X 90 X 10	14.0	7.0	26.20	20.60	6.28	1.85	0.262	880.00	75.10	5.80	151.00	21.20	2.40	934.00	5.97	97.40	1.93	69.0
180 X 90 X 12	14.0	7.0	31.20	24.50	6.37	1.93	0.261	1040.00	89.30	5.77	177.00	25.10	2.38	1100.00	5.94	114.00	1.92	67.0
180 X 90 X 14	14.0	7.0	36.10	28.30	6.46	2.01	0.259	1190.00	103.00	5.75	202.00	28.90	2.37	1260.00	5.92	131.00	1.91	65.0
200 X 100 X 10	15.0	7.5	29.20	23.00	6.93	2.01	0.266	1220.00	93.20	6.46	210.00	26.30	2.68	1300.00	6.66	133.00	2.14	77.4
200 X 100 X 12	15.0	7.5	34.80	27.30	7.03	2.10	0.264	1440.00	111.00	6.43	247.00	31.30	2.67	1530.00	6.63	158.00	2.13	75.2
200 X 100 X 14	15.0	7.5	40.30	31.60	7.12	2.18	0.262	1650.00	128.00	6.41	282.00	36.10	2.65	1760.00	6.60	181.00	2.12	73.0
200 X 100 X 16	15.0	7.5	45.70	35.90	7.20	2.26	0.259	1860.00	145.00	6.38	316.00	40.80	2.63	1970.00	6.57	204.00	2.11	71.0
250 X 90 X 10	15.0	7.5	33.20	26.10	9.45	1.56	0.154	2170.00	140.00	8.08	161.00	21.70	2.20	2220.00	8.17	112.00	1.84	126.0
250 X 90 X 12	15.0	7.5	39.60	31.10	9.55	1.65	0.153	2570.00	166.00	8.05	189.00	25.80	2.19	2630.00	8.14	132.00	1.83	124.0
250 X 90 X 14	15.0	7.5	45.90	36.00	9.65	1.73	0.152	2960.00	192.00	8.03	216.00	29.70	2.17	3020.00	8.11	152.00	1.82	120.0
250 X 90 X 16	15.0	7.5	52.10	40.90	9.74	1.81	0.150	3330.00	218.00	8.00	242.00	33.60	2.16	3400.00	8.08	171.00	1.81	118.0



Rectangular Tube



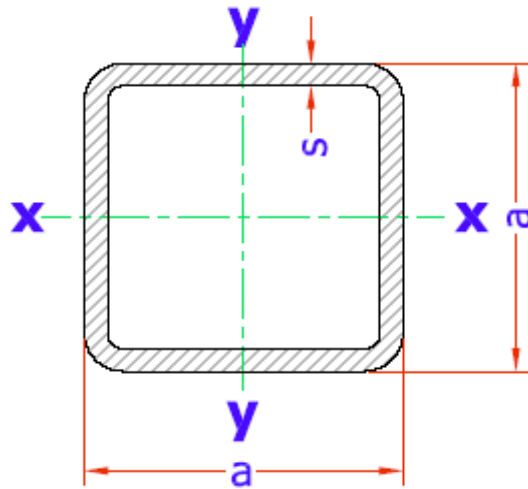
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a x b x s mm	A cm ²	G kg/m	I_x cm ⁴	Z_x cm ³	k_x cm	I_y cm ⁴	Z_y cm ³	k_y cm
50 X 30 X 2.9	4.23	3.32	13.4	5.36	1.78	5.88	3.92	1.18
50 X 30 X 4	5.62	4.41	16.9	6.75	1.73	7.25	4.83	1.14
60 X 40 X 2.9	5.39	4.23	26	8.67	2.2	13.7	6.83	1.59
60 X 40 X 4	7.22	5.67	33.3	11.1	2.15	17.3	8.65	1.55
70 X 40 X 2.9	5.97	4.69	38.1	10.9	2.53	15.7	7.83	1.62
70 X 40 X 4	8.02	6.3	49.2	14.1	2.48	19.9	9.95	1.58
80 X 40 X 2.9	6.55	5.14	53.1	13.3	2.85	17.7	8.83	1.64
80 X 40 X 4	8.82	6.93	69	17.3	2.8	22.5	11.3	1.6
80 X 40 X 5	10.8	8.47	81.7	20.4	2.75	26.2	13.1	1.56
90 X 50 X 3.2	8.46	6.64	89.7	19.9	3.26	35.5	14.2	2.05
90 X 50 X 4	10.4	8.18	108	24	3.22	42.3	16.9	2.02
90 X 50 X 5	12.8	10	129	28.7	3.18	49.9	19.9	1.98
100 X 50 X 3.6	10.2	7.98	129	25.8	3.56	42.9	17.2	2.05
100 X 50 X 4.5	12.5	9.83	155	31	3.52	50.9	20.4	2.02
100 X 50 X 5.6	15.3	12	184	36.8	3.47	59.4	23.8	1.97
100 X 60 X 3.6	10.9	8.55	146	29.1	3.66	65.2	21.7	2.45
100 X 60 X 4.5	13.4	10.5	176	35.1	3.62	77.9	26	2.41
100 X 60 X 5.6	16.4	12.9	209	41.8	3.57	91.8	30.6	2.37
120 X 60 X 4	13.5	10.6	247	41.1	4.27	82.7	27.6	2.47
120 X 60 X 5	16.6	13	296	49.3	4.22	98.2	32.7	2.43
120 X 60 X 6.3	20.5	16.1	354	59	4.16	116	38.6	2.38
140 X 80 X 4	16.7	13.1	438	62.5	5.12	183	45.7	3.31
140 X 80 X 5	20.6	16.2	529	75.6	5.07	220	55	3.27
140 X 80 X 6.3	25.5	20	639	91.3	5.01	263	65.8	3.21
160 X 90 X 4.5	21.2	16.6	715	89.4	5.81	293	65.1	3.72
160 X 90 X 5.6	25.9	20.4	858	107	5.75	350	77.7	3.67
160 X 90 X 7.1	32.2	25.3	1030	129	5.67	418	92.9	3.6
180 X 100 X 5.6	29.3	23	1240	137	6.5	496	99.1	4.11

180 X 100 X 7.1	36.4	28.6	1500	167	6.41	597	119	4.05
180 X 100 X 8.8	44.2	34.7	1760	196	6.32	696	139	3.97
200 X 120 X 6.3	37.7	29.6	2010	201	7.3	910	152	4.91
200 X 120 X 8	47	36.9	2440	244	7.21	1100	183	4.84
200 X 120 X 10	57.4	45.1	2890	289	7.1	1290	216	4.75
220 X 120 X 6.3	40.2	31.6	2540	231	7.95	992	165	4.97
220 X 120 X 8	50.2	39.4	3100	281	7.85	1200	200	4.89
220 X 120 X 10	61.4	48.2	3680	335	7.74	1410	236	4.8
260 X 140 X 6.3	47.8	37.5	4260	328	9.44	1630	233	5.85
260 X 140 X 8	59.8	46.9	5220	402	9.35	1990	284	5.77
260 X 140 X 10	73.4	57.6	6260	481	9.23	2370	339	5.68
260 X 180 X 6.3	52.8	41.5	5070	390	9.8	2880	320	7.39
260 X 180 X 8	66.2	52	6240	480	9.71	3540	393	7.31
260 X 180 X 10	81.4	63.9	7510	578	9.6	4240	472	7.22
280 X 180 X 7.1	62	48.7	6730	481	10.4	3410	379	7.42
280 X 180 X 8.8	75.9	59.6	8100	578	10.3	4090	454	7.34
280 X 180 X 11	93.2	73.2	9720	695	10.2	4890	543	7.24
280 X 220 X 8	75.8	59.5	8650	618	10.7	5970	543	8.88
280 X 220 X 10	93.4	73.3	10460	747	10.6	7210	656	8.79
280 X 220 X 12.5	115	90.1	12540	896	10.5	8620	784	8.67
320 X 180 X 8.8	82.9	65.1	11230	702	11.6	4600	511	7.45
320 X 180 X 10	93.4	73.3	12510	782	11.6	5110	568	7.4
320 X 180 X 12.5	115	90	14990	937	11.4	6090	677	7.29
320 X 220 X 8.8	89.9	70.6	12930	808	12	7270	661	8.99
320 X 220 X 10	101	79.6	14430	902	11.9	8090	736	8.93
320 X 220 X 12.5	125	97.9	17360	1080	11.8	9700	882	8.82
360 X 220 X 10	109	85.9	19210	1070	13.3	8980	816	9.06
360 X 220 X 12.5	135	106	23170	1290	13.1	10780	980	8.94
360 X 220 X 16	169	132	28190	1570	12.9	13030	1180	8.79
400 X 260 X 11	137	108	30330	1520	14.9	15610	1200	10.7
400 X 260 X 14.2	174	137	37610	1880	14.7	19280	1480	10.5
400 X 260 X 17.5	211	166	44440	2220	14.5	22680	1740	10.4



Square Tube



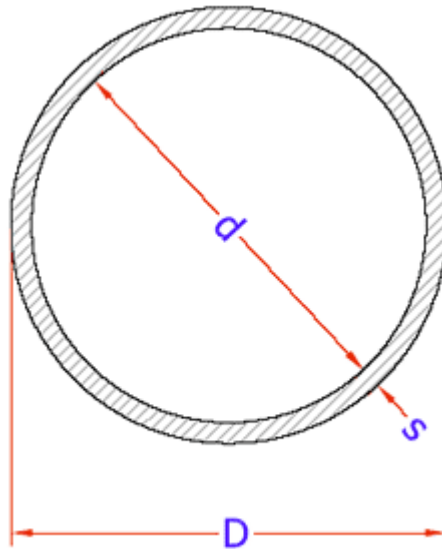
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a x s mm	A cm ²	G kg/m	I cm ⁴	Z cm ³	k cm
40 X 2.9	4.23	3.32	9.66	4.83	1.51
40 X 4	5.62	4.41	12.1	6.05	1.47
50 X 2.9	5.39	4.23	19.8	7.94	1.92
50 X 4	7.22	5.67	25.4	10.1	1.87
60 X 2.9	6.55	5.14	35.5	11.8	2.33
60 X 4	8.82	6.93	45.9	15.3	2.28
60 X 5	10.8	8.47	54.1	18	2.24
70 X 3.2	8.46	6.64	62.7	17.9	2.72
70 X 4	10.4	8.18	75.3	21.5	2.69
70 X 5	12.8	10	89.6	25.6	2.65
80 X 3.6	10.9	8.55	106	26.4	3.11
80 X 4.5	13.4	10.5	127	31.7	3.08
80 X 5.6	16.4	12.9	151	37.6	3.03
90 X 3.6	12.3	9.68	153	34	3.52
90 X 4.5	15.2	11.9	185	41	3.48
90 X 5.6	18.6	14.6	220	49	3.44
100 X 4	15.2	12	233	46.6	3.91
100 X 5	18.8	14.7	281	56.3	3.87
100 X 6.3	23.3	18.3	339	67.8	3.82
120 X 4.5	20.5	16.1	452	75.3	4.7
120 X 5.6	25.1	19.7	544	90.6	4.65
120 X 6.3	28	22	598	99.7	4.62
140 X 5.6	29.6	23.3	885	126	5.47
140 X 7.1	37	29	1080	154	5.4
140 X 8.8	45	35.3	1280	182	5.33
160 X 6.3	37.7	29.6	1460	183	6.23
160 X 8	47	36.9	1780	222	6.15
160 X 10	57.4	45.1	2100	263	6.05
180 X 6.3	42.8	33.6	2120	236	7.05
180 X 8	53.4	41.9	2590	288	6.97
180 X 10	65.4	51.4	3090	343	6.87
200 X 6.3	47.8	37.5	2960	296	7.86
200 X 8	59.8	46.9	3620	362	7.78

200 X 10	73.4	57.6	4340	434	7.69
220 X 6.3	52.8	41.5	3980	362	8.68
220 X 8	66.2	52	4890	445	8.6
220 X 10	81.4	63.9	5890	535	8.5
260 X 7.1	70.5	55.4	7450	573	10.3
260 X 8.8	86.4	67.8	8980	691	10.2
260 X 11	106	83.6	10830	833	10.1
280 X 8	85.4	67	10430	745	11
280 X 10	105	82.8	12650	903	11
280 X 12.5	130	102	15220	1090	10.8
320 X 10	121	95.3	19240	1200	12.6
320 X 12.5	150	118	23270	1450	12.5
320 X 16	188	148	28430	1780	12.3
360 X 10	137	108	27790	1540	14.2
360 X 12.5	170	133	33740	1870	14.1
360 X 16	214	168	41450	2300	13.9
400 X 12.5	190	149	46970	2350	15.7
400 X 16	239	188	57950	2900	15.6
400 X 20	294	231	69400	3470	15.4



Round Tube



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D x s mm	A cm ²	G kg/m	I_x cm ⁴	Z_x cm ³	k_x cm
21.3 X 2	1.21	0.962	0.571	0.536	0.686
21.3 X 2.6	1.53	1.21	0.681	0.639	0.668
21.3 X 3.2	1.82	1.44	0.768	0.722	0.65
26.9 X 2	1.56	1.24	1.22	0.907	0.883
26.9 X 2.6	1.98	1.57	1.48	1.1	0.864
26.9 X 3.2	2.38	1.89	1.7	1.27	0.846
33.7 X 2.6	2.54	2.01	3.09	1.84	1.1
33.7 X 3.2	3.07	2.42	3.6	2.14	1.08
33.7 X 4	3.73	2.95	4.19	2.49	1.06
42.4 X 2.6	3.25	2.57	6.46	3.05	1.41
42.4 X 3.2	3.94	3.11	7.62	3.59	1.39
42.4 X 4	4.83	3.81	8.99	4.24	1.36
48.3 X 2.6	3.73	2.95	9.78	4.05	1.62
48.3 X 3.2	4.53	3.59	11.6	4.8	1.6
48.3 X 4	5.57	4.41	13.8	5.7	1.57
60.3 X 2.9	5.23	4.14	21.6	7.16	2.03
60.3 X 3.6	6.41	5.07	25.9	8.58	2.01
60.3 X 4	7.07	5.59	28.2	9.34	2
60.3 X 5	8.69	6.82	33.5	11.1	1.96
76.1 X 2.9	6.67	5.82	44.7	11.8	2.59
76.1 X 3.6	8.2	6.49	54	14.2	2.57
76.1 X 4	9.06	7.17	59.1	15.5	2.55
76.1 X 5	11.2	8.77	70.9	18.6	2.52
88.9 X 3.2	8.62	6.81	79.2	17.8	3.03
88.9 X 3.6	9.65	7.57	87.9	19.8	3.02
88.9 X 4	10.7	8.43	96.3	21.7	3
88.9 X 5	13.2	10.3	116	26.2	2.97
88.9 X 6.3	16.3	12.9	140	31.5	2.93
101.6 X 3.6	11.1	8.76	133	26.2	3.47
101.6 X 4.5	13.7	10.7	162	31.9	3.44
101.6 X 5.6	16.9	13.2	195	38.4	3.4

101.6 X 7.1	21.1	16.6	237	46.6	3.35
108 X 3.6	11.8	9.27	161	29.8	3.69
108 X 4.5	14.6	11.5	196	36.4	3.66
108 X 5.6	18	14.1	237	43.9	3.63
114.3 X 3.6	12.5	9.9	192	33.6	3.92
114.3 X 4.5	15.5	12.1	234	41	3.89
114.3 X 5.6	19.1	15	283	49.6	3.85
114.3 X 7.1	23.9	18.8	345	60.4	3.8
133 X 4	16.2	12.7	337	50.8	4.56
133 X 5.6	22.4	17.6	456	68.5	4.51
133 X 6.3	25.1	19.7	504	75.9	4.49
139.7 X 4	17.1	13.5	393	56.2	4.8
139.7 X 5.6	23.6	18.5	531	76.1	4.75
139.7 X 6.3	26.4	20.8	589	84.3	4.72
139.7 X 7.1	29.6	23.3	652	93.3	4.69
159 X 4.5	21.8	17.2	652	82.1	5.46
159 X 5.6	27	21.2	795	100	5.43
159 X 6.3	30.2	23.7	882	111	5.4
168.3 X 4.5	23.2	18.1	777	92.4	5.79
168.3 X 5.6	28.6	22.4	948	113	5.76
168.3 X 6.3	32.1	25.2	1050	125	5.73
168.3 X 7.1	36	28.3	1170	139	5.7
168.3 X 8.8	44.1	34.5	1410	167	5.65
193.7 X 4.5	26.7	21	1200	124	6.69
193.7 X 5	29.6	23.3	1320	136	6.67
193.7 X 5.4	31.9	25	1420	146	6.66
193.7 X 6.3	37.1	29.1	1630	168	6.63
193.7 X 7.1	41.6	32.8	1810	187	6.6
193.7 X 8	46.7	36.5	2020	208	6.57
193.7 X 8.8	51.1	40	2190	226	6.54
219.1 X 4.5	30.3	23.8	1750	159	7.59
219.1 X 5	33.6	26.4	1930	176	7.57
219.1 X 5.9	39.5	31	2250	205	7.54
219.1 X 6.3	42.1	33.1	2390	218	7.53
219.1 X 7.1	47.3	37.2	2660	243	7.5
219.1 X 8.8	58.1	45.4	3220	294	7.44
219.1 X 10	65.7	51.6	3600	328	7.4
244.5 X 6.3	47.1	37.1	3350	274	8.42
244.5 X 8	59.4	46.5	4160	340	8.37
244.5 X 10	73.3	57.8	5070	415	8.3
244.5 X 11	80.7	63.6	5510	451	8.26
273 X 5	42.1	33.1	3780	277	9.48
273 X 5.6	47	36.9	4210	308	9.46
273 X 6.3	52.8	41.4	4700	344	9.43
273 X 7.1	59.3	46.7	5240	384	9.4
273 X 8.8	73	57.1	6380	467	9.37
273 X 11	90.5	71.4	7780	570	9.27
323.9 X 5	50.1	39.3	6370	393	11.3
323.9 X 5.6	56	44	7090	438	11.3
323.9 X 6.3	62.9	49.3	7930	490	11.2
323.9 X 7.1	70.7	55.6	8870	548	11.2
323.9 X 8.8	87.1	68.1	10820	668	11.1
323.9 X 11	108	85.3	13250	818	11.1
355.6 X 8	87.4	68.3	13200	742	12.3
355.6 X 10	109	85.2	16220	912	12.2
355.6 X 12.5	135	107	19850	1120	12.1
406.4 X 8.8	110	85.9	21730	1070	14.1

406.4 X 11	137	108	26720	1320	14
406.4 X 14.2	175	138	33690	1660	13.9
457.2 X 10	140	110	35140	1540	15.8
457.2 X 14.2	198	156	48350	2120	15.7
457.2 X 17.5	242	189	58510	2560	15.6
508 X 8.8	138	108	43000	1690	17.7
508 X 20	307	241	91430	3600	17.3
558.8 X 8.8	152	119	57510	2060	19.4
558.8 X 20	330	266	123000	4400	19.1
609.6 X 10	188	148	84680	2780	21.2
711.2 X 10	220	173	135400	3810	24.8
812.8 X 16	401	313	318000	7820	28.2
914.4 X 10	284	223	290500	6350	32
914.4 X 25	699	552	691200	15120	31.5
1016 X 10	316	248	399800	7870	35.6
1016 X 25	778	615	956100	18820	35