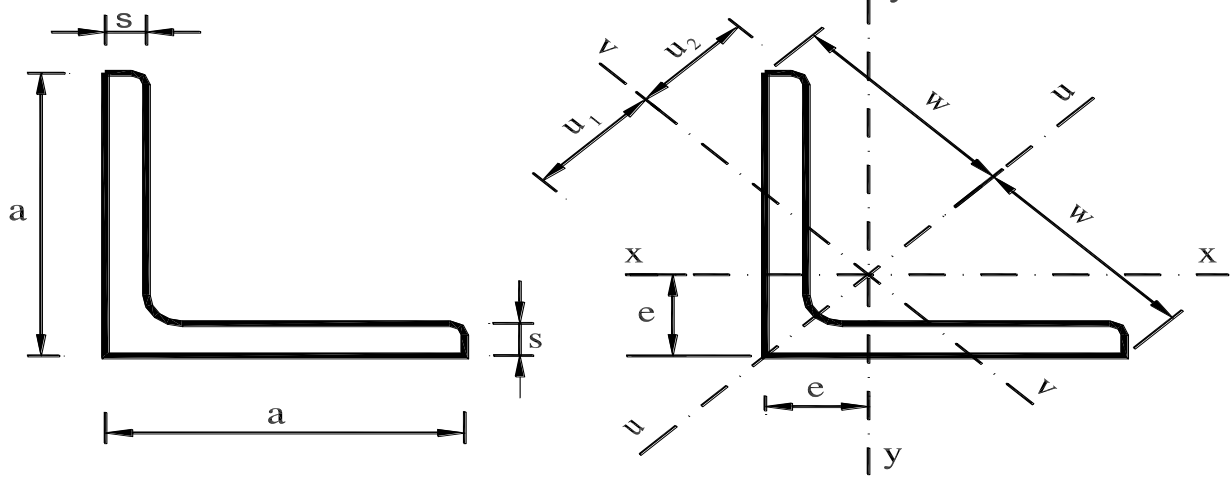
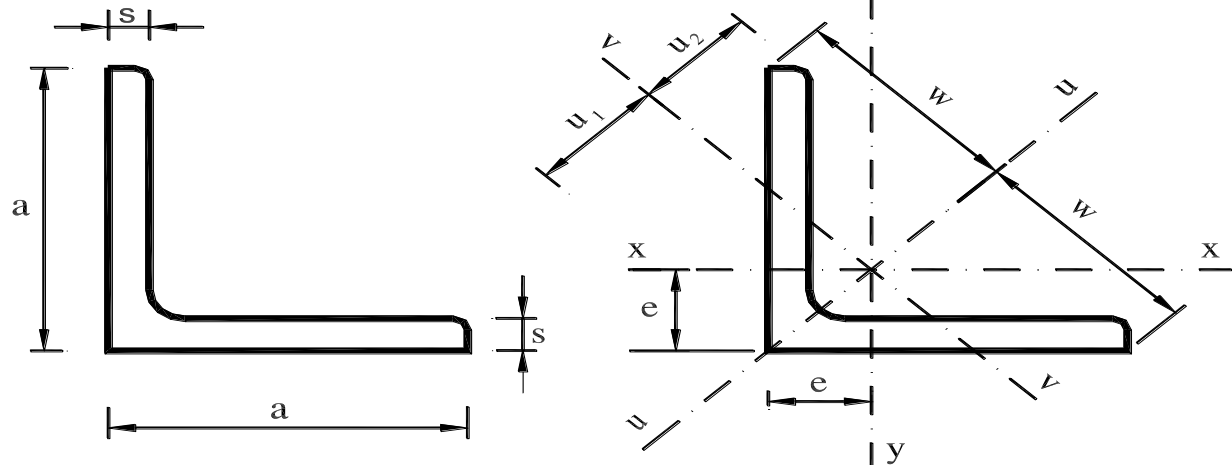


EQUAL ANGLES															
Dimensions and Properties															
															
Angle (mm)		Area (cm ²)	Weight (kg/m ¹)	Distances (cm)				x-x & y-y			u-u		v-v		
a	s			e	w	u ₁	u ₂	I _x (cm ⁴)	S _x (cm ³)	r _x (cm)	I _u (cm ⁴)	r _u (cm)	I _v (cm ⁴)	S _v (cm ³)	r _v (cm)
30	3	1.74	1.36	0.84	2.12	1.18	1.04	1.41	0.65	0.9	2.24	1.14	0.57	0.48	0.57
	4	2.27	1.78	0.89		1.24	1.05	1.81	0.86	0.89	2.85	1.12	0.76	0.61	0.58
	5	2.78	2.18	0.92		1.3	1.07	2.16	1.04	0.88	3.41	1.11	0.91	0.7	0.57
35	3	2.04	1.6	0.96	2.47	1.36	1.23	2.29	0.9	1.06	3.63	1.34	0.95	0.7	0.68
	4	2.67	2.1	1		1.41	1.24	2.96	1.18	1.05	4.68	1.33	1.24	0.88	0.68
	5	3.28	2.57	1.04		1.47	1.25	3.56	1.45	1.04	5.63	1.31	1.49	1.1	0.67
40	4	3.08	2.42	1.12	2.83	1.58	1.4	4.48	1.56	1.21	7.09	1.52	1.86	1.18	0.78
	5	3.79	2.97	1.16		1.64	1.42	5.43	1.91	1.2	8.64	1.51	2.22	1.35	0.77
	6	4.48	3.52	1.2		1.7	1.43	6.33	2.26	1.19	9.98	1.49	2.67	1.57	0.77
45	5	4.3	3.38	1.28	3.18	1.81	1.58	7.83	2.43	1.35	12.4	1.7	3.25	1.8	0.87
	6	5.09	4	1.32		1.87	1.59	9.16	2.88	1.34	14.5	1.69	3.85	2.05	0.87
	7	5.86	4.6	1.36		1.92	1.61	10.4	3.31	1.33	16.4	1.67	4.39	2.29	0.87
50	5	4.8	3.77	1.4	3.54	1.98	1.76	11	3.05	1.51	17.4	1.9	4.59	2.32	0.98
	6	5.69	4.47	1.45		2.04	1.77	12.8	3.51	1.5	20.4	1.89	5.24	2.57	0.96
	7	6.56	5.15	1.49		2.11	1.78	14.6	4.15	1.49	23.1	1.88	6.02	2.85	0.96
55	5	5.32	4.18	1.52	3.89	2.15	1.93	14.7	3.7	1.66	23.3	2.09	6.11	2.84	1.07
	6	6.31	4.95	1.56		2.21	1.94	17.8	4.4	1.66	27.4	2.08	7.24	3.26	1.07
	8	8.23	6.46	1.64		2.32	1.97	22.1	5.72	1.64	34.8	2.06	9.35	4.03	1.07
60	6	6.91	5.42	1.69	4.24	2.39	2.11	22.8	5.29	1.82	36.1	2.29	9.43	3.85	1.17
	8	9.03	7.09	1.77		2.5	2.14	29.1	6.88	1.8	46.1	2.26	12.1	4.84	1.16
	10	11.1	8.69	1.85		2.62	2.17	34.9	8.41	1.78	55.1	2.23	14.6	5.57	1.15
65	7	8.7	6.83	1.85	4.6	2.62	2.29	33.4	7.13	1.96	53	2.47	13.8	5.27	1.26
	8	9.85	7.73	1.89		2.67	2.31	37.5	8.13	1.95	59.4	2.46	15.6	5.84	1.26
	9	11	8.62	1.93		2.73	2.32	41.3	9.04	1.94	65.4	2.44	17.2	6.3	1.25
70	7	9.4	7.38	1.97	4.95	2.79	2.47	42.4	8.43	2.12	67.1	2.67	17.6	6.37	1.37
	9	11.9	9.34	2.05		2.9	2.5	52.6	10.6	2.1	83.1	2.64	22	7.59	1.36
	11	14.3	11.2	2.13		3.01	2.53	61.8	12.7	2.09	97.6	2.61	26	8.61	1.35
75	7	10.1	7.94	2.03	5.3	2.87	2.63	52.4	8.67	2.28	83.6	2.88	21.1	7.15	1.45
	8	11.5	9.03	2.13		3.01	2.65	58.9	11	2.26	93.3	2.85	24.4	8.11	1.46
	10	14.1	11.1	2.21		3.18	2.68	71.4	13.5	2.25	113	2.83	28.8	9.55	1.45
80	8	12.3	9.66	2.26	5.66	3.2	2.82	72.3	12.6	2.42	115	3.06	29.6	9.25	1.55
	10	15.1	11.9	2.34		3.31	2.85	87.5	15.5	2.41	139	3.03	35.9	10.9	1.54
	12	17.9	14.1	2.41		3.41	2.89	102	18.2	2.39	161	3	43	12.6	1.53
90	9	15.5	12.2	2.54	6.36	3.59	3.18	116	18	2.74	184	3.45	47.8	13.3	1.76
	11	18.7	14.7	2.62		3.7	3.21	138	21.6	2.72	218	3.41	57.1	15.4	1.75
	13	21.8	17.1	2.7		3.81	3.24	158	25.1	2.69	250	3.39	65.9	17.3	1.74
100	10	19.2	15.1	2.82	7.07	3.99	3.54	177	24.7	3.04	280	3.82	73.3	18.4	1.95
	12	22.7	17.8	2.9		4.1	3.57	207	29.2	3.02	328	3.8	86.2	21	1.95
	14	26.2	20.6	2.98		4.21	3.6	235	33.5	3	372	3.77	98.3	23.4	1.94

<div><div>EQUAL ANGLES</div><div>Dimensions and Properties</div><div></div></div>																
Angle (mm)		Area (cm ²)	Weight (kg/m [`])	Distances (cm)				x-x & y-y			u-u		v-v			
a	s			e	w	u ₁	u ₂	I _x (cm ⁴)	S _x (cm ³)	r _x (cm)	I _u (cm ⁴)	r _u (cm)	I _v (cm ⁴)	S _v (cm ³)	r _v (cm)	
110	10	21.2	16.6	3.07	7.78	4.34	3.89	239	30.1	3.36	379	4.23	98.6	22.7	2.16	
	12	25.1	19.7	3.15		4.45	3.93	280	35.7	3.34	444	4.21	116	25.1	2.15	
	14	29	22.8	3.21		4.54	3.98	319	41	3.32	505	4.18	133	29.3	2.14	
120	12	27.5	21.6	3.4	8.49	4.8	4.26	368	42.7	3.65	584	4.6	152	31.6	2.35	
	13	29.9	23.3	3.44		4.86	4.27	394	46	3.64	625	4.59	162	33.3	2.34	
	15	33.9	26.6	3.51		4.96	4.31	446	52.5	3.63	705	4.56	186	37.5	2.34	
130	12	30	23.6	3.64	9.19	5.15	4.6	472	50.4	3.97	750	5	194	37.7	2.54	
	14	34.7	27.2	3.72		5.26	4.63	540	55.2	3.94	857	4.97	223	42.4	2.53	
	16	39.3	30.9	3.8		5.37	4.66	605	65.8	3.92	959	4.94	251	46.7	2.52	
140	13	35	27.5	3.92	9.9	5.54	4.96	638	63.3	4.27	1010	5.38	262	47.3	2.74	
	15	40	31.4	4		5.66	4.99	723	72.3	4.25	1150	5.36	298	52.7	2.73	
150	14	40.3	31.6	4.21	10.6	5.95	5.31	845	78.2	4.58	1340	5.77	347	58.3	2.94	
	15	43	33.8	4.25		6.01	5.33	898	82.5	4.57	1430	5.76	370	61.6	2.93	
	16	45.7	35.9	4.29		6.07	5.34	949	88.7	4.56	1510	5.74	391	64.4	2.93	
	18	51	40.1	4.36		6.17	5.38	1050	99.3	4.54	1670	5.7	438	71	2.93	
	20	56.3	44.2	4.44		6.28	5.41	1150	109	4.51	1820	5.68	477	76	2.91	
160	15	46.1	36.2	4.49	11.3	6.35	5.67	1100	95.6	4.88	1750	6.15	453	71.3	3.14	
	17	51.8	40.7	4.57		6.46	5.7	1230	108	4.86	1950	6.13	506	78.3	3.13	
	19	57.5	45.1	4.65		6.58	5.73	1350	118	4.84	2140	6.1	558	84.8	3.12	
180	16	55.4	43.5	5.02	12.7	7.11	6.39	1680	130	5.51	2690	6.96	679	95.5	3.5	
	18	61.9	48.6	5.1		7.22	6.41	1870	145	5.49	2970	6.93	757	105	3.49	
	20	68.4	53.7	5.18		7.33	6.44	2040	160	5.47	3260	6.9	830	113	3.49	
	22	74.7	58.6	5.26		7.44	6.47	2210	174	5.44	3510	6.86	918	123	3.5	
200	16	61.8	48.5	5.52	14.1	7.8	7.09	2340	168	6.15	3740	7.78	943	121	3.91	
	18	69.1	54.3	5.6		7.92	7.12	2600	181	6.13	4150	7.75	1050	133	3.9	
	20	76.4	59.9	5.68		8.04	7.15	2850	199	6.11	4540	7.72	1160	144	3.89	
	24	90.6	71.1	5.84		8.26	7.21	3330	235	6.06	5280	7.64	1380	167	3.9	
	28	105	82	5.99		8.47	7.28	3780	270	6.02	5990	7.57	1580	186	3.89	



مدونة المهندس المحترف

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صرح هندسي ضخم



هندسة مدنية

هندسة معمارية

كثيرة ومراجع هندسية

أبحاث ودراسات هندسية

مواضيع تقنية

برامج هندسية

تصميم إنشائي

تنفيذ إنشائي

مقالات هندسية

مقالات تقنية

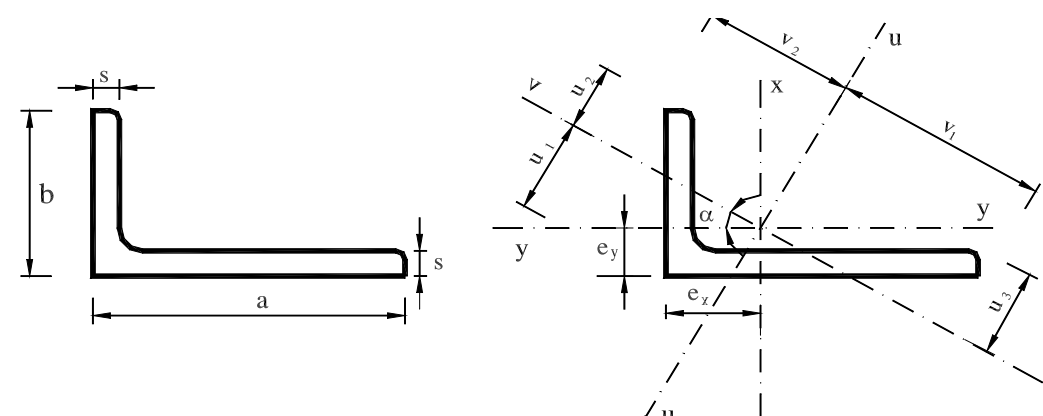
والترتيب

كورسات هندسية

شهادات إكمال

UNEQUAL ANGLES

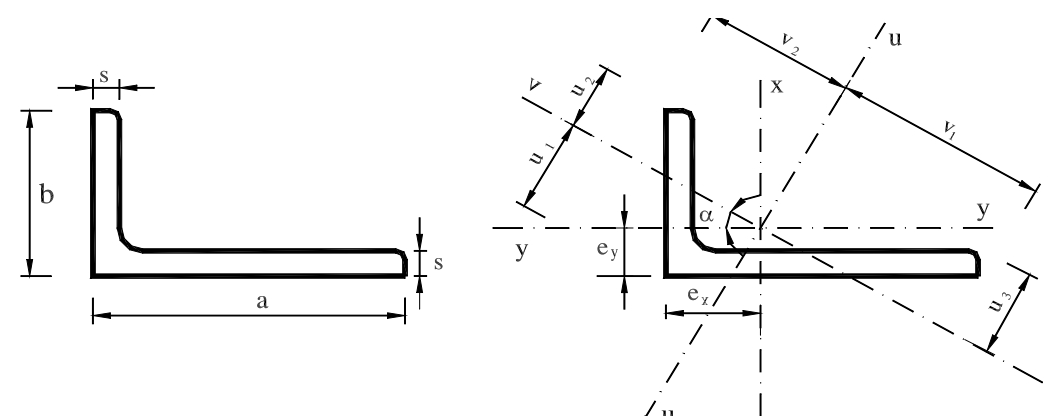
Dimensions and Properties



Angle (mm)			Area (cm ²)	Weight (kg/m ³)	Distances (cm)							tan a	x-x			y-y			u-u		v-v	
a	b	s			e _x	e _y	v ₁	v ₂	u ₁	u ₂	u ₃		I _x (cm ⁴)	S _x (cm ³)	r _x (cm)	I _y (cm ⁴)	S _y (cm ³)	r _y (cm)	I _u (cm ⁴)	r _u (cm)	I _v (cm ⁴)	r _v (cm)
30	20	3	1.42	1.11	0.99	0.50	2.04	1.51	0.86	1.04	0.56	0.431	1.25	0.62	0.94	0.44	0.29	0.56	1.43	1.00	0.25	0.42
		4	1.85	1.45	1.03	0.54	2.02	1.52	0.91	1.03	0.58	0.423	1.59	0.81	0.93	0.55	0.38	0.55	1.81	0.99	0.33	0.42
40	20	3	1.72	1.35	1.43	0.44	2.61	1.77	0.79	1.19	0.46	0.259	2.79	1.08	1.27	0.47	0.30	0.52	2.96	1.31	0.30	0.42
		4	2.25	1.77	1.47	0.48	2.57	1.80	0.83	1.18	0.50	0.252	3.59	1.42	1.26	0.60	0.39	0.52	3.79	1.30	0.39	0.42
45	30	3	2.19	1.72	1.43	0.70	3.09	2.23	1.21	1.59	0.80	0.436	4.47	1.46	1.43	1.60	0.70	0.86	5.15	1.53	0.93	0.65
		4	2.87	2.25	1.48	0.74	3.07	2.26	1.27	1.58	0.83	0.433	5.78	1.91	1.42	2.05	0.91	0.85	6.65	1.52	1.18	0.64
		5	3.53	2.77	1.52	0.78	3.05	2.27	1.32	1.58	0.85	0.430	6.99	2.95	1.41	2.47	1.11	0.84	8.02	1.51	1.44	0.64
60	30	5	4.29	3.37	2.15	0.68	3.90	2.67	1.20	1.77	0.72	0.256	15.60	4.04	1.90	2.60	1.12	0.78	16.50	1.96	1.69	0.63
		7	5.85	4.59	2.24	0.76	3.83	2.72	1.28	1.73	0.78	0.248	20.70	5.50	1.88	3.41	1.52	0.76	21.80	1.93	2.28	0.62
60	40	5	4.79	3.76	1.96	0.97	4.08	3.01	1.68	2.09	1.10	0.437	17.20	4.25	1.89	6.11	2.02	1.13	19.80	2.03	3.50	0.86
		6	5.68	4.46	2.00	1.01	4.06	3.02	1.72	2.08	1.12	0.437	20.10	5.03	1.88	7.12	2.38	1.12	23.10	2.02	4.12	0.85
		7	6.55	5.14	2.04	1.05	4.04	3.03	1.77	2.07	1.14	0.422	23.00	5.79	1.87	8.07	2.74	1.11	26.30	2.00	4.73	0.85
75	50	5	6.04	4.74	2.40	1.17	5.14	3.73	2.03	2.64	1.32	0.437	34.40	6.74	2.39	12.30	3.21	1.43	39.60	2.56	7.10	1.08
		7	8.30	6.51	2.48	1.25	5.10	3.77	2.13	2.63	1.38	0.433	46.40	9.24	2.36	16.50	4.39	1.41	53.30	2.53	9.56	1.07
		9	10.50	8.23	2.56	1.32	5.06	3.80	2.22	2.62	1.44	0.427	57.40	11.60	2.34	20.20	5.49	1.39	65.70	2.50	11.90	1.07
80	40	6	6.89	5.41	2.85	0.88	5.21	3.53	1.55	2.42	0.89	0.259	44.90	8.73	2.55	7.59	2.44	1.05	47.60	2.63	4.90	0.84
		8	9.01	7.07	2.94	0.95	5.15	3.57	1.65	2.38	1.04	0.253	57.60	11.40	2.53	9.68	3.18	1.04	60.90	2.60	6.41	0.84
90	60	6	8.69	6.82	2.89	1.41	6.14	4.50	2.46	3.16	1.60	0.442	71.70	11.70	2.87	25.80	5.61	1.72	82.80	3.09	14.60	1.30
		8	11.40	8.96	2.97	1.49	6.11	4.54	2.56	3.15	1.69	0.497	92.50	15.40	2.85	33.00	7.31	1.70	107.00	3.06	19.00	1.29
100	50	6	8.73	6.85	3.49	1.04	6.50	4.39	1.91	2.98	1.15	0.263	89.70	13.80	3.20	15.30	3.86	1.32	95.20	3.30	9.78	1.06
		8	11.50	8.99	3.59	1.13	6.48	4.44	2.00	2.95	1.18	0.258	116	18.00	3.18	19.50	5.04	1.31	123	3.28	12.60	1.05
		10	14.10	11.10	3.67	1.20	6.43	4.49	2.08	2.91	1.22	0.252	141	22.20	3.16	23.40	6.17	1.29	149	3.25	15.50	1.04
100	65	7	11.20	8.77	3.23	1.51	6.83	4.91	2.66	3.48	1.73	0.419	113	16.60	3.17	37.60	7.54	1.84	128	3.39	21.60	1.39
		9	14.20	11.10	3.32	1.59	6.78	4.94	2.76	3.46	1.78	0.415	141	21.00	3.15	46.70	9.52	1.82	160	3.36	27.20	1.39
		11	17.10	13.40	3.40	1.67	6.74	4.97	2.85	3.45	1.83	0.410	167	25.30	3.13	55.10	11.40	1.80	190	3.34	32.60	1.38

UNEQUAL ANGLES

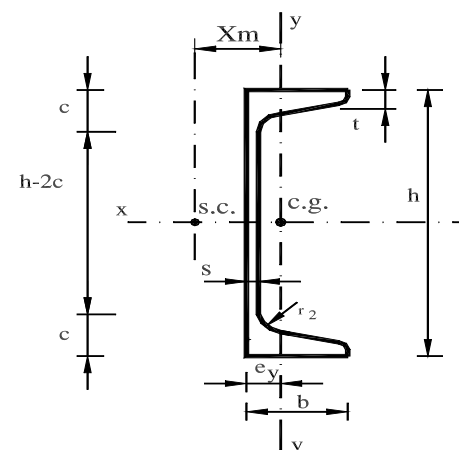
Dimensions and Properties



Angle (mm)			Area (cm ²)	Weight (kg/m)	Distances (cm)							tan a	x-x			y-y			u-u		v-v	
a	b	s			e _x	e _y	v ₁	v ₂	u ₁	u ₂	u ₃		I _x (cm ⁴)	S _x (cm ³)	r _x (cm)	I _y (cm ⁴)	S _y (cm ³)	r _y (cm)	I _u (cm ⁴)	r _u (cm)	I _v (cm ⁴)	r _v (cm)
120	80	8	15.50	12.20	3.83	1.87	8.23	5.99	3.27	4.20	2.16	0.441	226	27.60	3.82	80.80	13.20	2.29	261	4.10	45.80	1.73
		10	19.10	15.00	3.92	1.95	8.18	6.03	3.37	4.19	2.19	0.438	276	34.10	3.80	98.10	16.20	2.27	318	4.07	56.10	1.71
		12	22.70	17.80	4.00	2.03	8.14	6.06	3.46	4.18	2.25	0.433	323	40.40	3.77	114.00	19.10	2.25	371	4.04	66.10	1.71
		14	26.20	20.50	4.08	2.10	8.10	6.08	3.55	4.17	2.29	0.429	368	46.40	3.75	130.00	22.00	2.23	421	4.01	75.80	1.70
130	65	8	15.10	11.90	4.56	1.37	8.50	5.71	2.49	3.86	1.47	0.263	263	31.10	4.17	44.80	8.72	1.72	280	4.31	28.60	1.38
		10	18.60	14.60	4.65	1.45	8.43	5.76	2.58	3.82	1.54	0.259	321	38.40	4.15	54.20	10.70	1.71	340	4.27	35.00	1.37
		12	22.10	17.30	4.74	1.53	8.37	5.81	2.66	3.80	1.60	0.255	376	45.50	4.12	63.00	12.70	1.69	397	4.24	41.20	1.37
130	90	10	21.20	16.60	4.15	2.18	8.92	6.69	3.75	4.62	2.51	0.472	358	40.50	4.11	141.00	20.60	2.58	420	4.46	78.50	1.93
		12	25.10	19.70	4.84	2.26	8.88	6.72	3.85	4.60	2.56	0.463	420	48.00	4.09	165.00	24.40	2.56	492	4.43	92.60	1.92
150	75	9	19.50	15.30	5.28	1.57	9.79	6.62	2.90	4.46	1.72	0.265	455	46.80	4.83	78.30	13.20	2.00	484	4.98	50.00	1.60
		11	23.60	18.60	5.37	1.65	9.73	6.66	2.97	4.44	1.77	0.261	545	56.60	4.80	93.00	15.90	1.98	578	4.95	59.80	1.59
150	100	10	24.20	19.00	4.80	2.34	10.30	7.50	4.10	5.25	2.68	0.442	552	54.10	4.78	198.00	25.80	2.86	637	5.13	112.00	2.15
		12	28.70	22.60	4.89	2.42	10.20	7.53	4.19	5.24	2.79	0.439	650	64.20	4.76	232.00	30.60	2.84	749	5.10	133.00	2.15
		14	33.20	26.10	4.97	2.50	10.20	7.56	4.28	5.23	2.77	0.435	744	74.10	4.73	264.00	35.20	2.82	856	5.07	152.00	2.14
160	80	10	23.20	18.20	5.63	1.69	10.50	7.06	3.07	4.76	1.82	0.263	611	58.90	5.14	104.00	16.50	2.12	648	5.29	67.00	1.70
		12	27.50	21.60	5.72	1.77	10.40	7.10	3.15	4.75	1.89	0.259	720	70.00	5.11	122.00	19.60	2.10	763	5.26	78.90	1.69
		14	31.80	25.00	5.81	1.85	10.30	7.16	3.23	4.72	1.95	0.256	823	80.70	5.09	139.00	22.50	2.09	871	5.23	90.50	1.69
180	90	10	26.20	20.60	6.28	1.85	11.80	7.89	3.38	5.42	2.00	0.262	880	75.10	5.80	151.00	21.10	2.40	934	5.97	97.40	1.93
		12	31.20	24.50	6.37	1.93	11.70	7.95	3.48	5.38	2.07	0.261	1040	89.30	5.77	177.00	25.10	2.38	1100	5.94	114.00	1.92
		14	36.10	28.30	6.46	2.01	11.70	8.01	3.57	5.34	2.14	0.259	1190	103.00	5.75	202.00	28.90	2.37	1260	5.92	131.00	1.91
200	100	10	29.20	23.00	6.93	2.01	13.20	8.76	3.75	5.98	2.22	0.266	1220	92.20	6.46	210.00	26.30	2.68	1300	6.66	133.00	2.14
		12	34.80	27.30	7.03	2.10	13.10	8.82	3.84	5.95	2.26	0.264	1440	111.00	6.43	247.00	31.30	2.67	1530	6.63	158.00	2.13
		14	40.30	31.60	7.12	2.18	13.00	8.88	3.93	5.92	2.32	0.262	1650	128.00	6.41	282.00	36.10	2.65	1760	6.60	181.00	2.13
		16	45.70	35.90	7.20	2.26	12.90	8.93	4.02	5.88	2.39	0.259	1860	145.00	6.38	316.00	40.80	2.63	1970	6.57	204.00	2.11

CHANNELS (UPN)

Dimensions and Properties

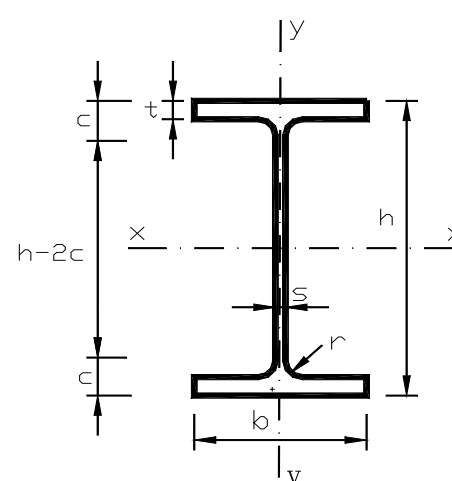


Sec.	Area (cm ²)	Weight (kg/m)	Dimensions (mm)						x-x			y-y			For Details	
			h	b	s	t=r ₂	c	h-2c	I _x (cm ⁴)	S _x (cm ³)	r _x (cm)	I _y (cm ⁴)	S _y (cm ³)	r _y (cm)	e _y (cm)	X _m (cm)
30x15	2.21	1.74	30	15	4	4.5	9.0	12	2.53	1.69	1.07	0.38	0.39	0.42	0.52	0.74
30	5.44	4.27	30	33	5	7.0	14.5	1	6.39	4.26	1.08	5.33	2.68	0.99	1.31	2.22
40x20	3.66	2.87	40	20	5	5.5	11.0	18	7.58	3.79	1.44	1.14	0.86	0.56	0.67	1.01
40	6.21	4.87	40	35	5	7.0	14.5	11	14.10	7.05	1.50	6.68	3.08	1.04	1.33	2.32
50x25	4.92	3.86	50	25	5	6.0	12.5	25	16.60	6.73	1.85	2.49	1.48	0.71	0.81	1.34
50	7.12	5.59	50	38	5	7.0	15.0	20	26.40	10.60	1.92	9.12	3.75	1.13	1.37	2.47
60	6.46	5.07	60	30	6	6.0	12.5	35	31.60	10.50	2.21	4.51	2.16	0.84	0.91	1.50
65	9.03	7.09	65	42	5.5	7.5	16.0	33	57.50	17.70	2.52	14.10	5.07	1.25	1.42	2.60
70	8.57	6.73	70	40	6	6.5	16.0	38	61.10	17.50	2.67	11.40	4.10	1.15	1.22	2.20
80	11.00	8.64	80	45	6	8.0	17.0	47	106	26.50	3.10	19.40	6.36	1.33	1.45	2.67
100	13.50	10.60	100	50	6	8.5	18.0	64	206	41.20	3.91	29.30	8.49	1.47	1.55	2.93
120	17.00	13.40	120	55	7	9.0	19.0	82	364	60.70	4.62	43.20	11.10	1.59	1.60	3.03
140	20.40	16.00	140	60	7	10.0	21.0	97	605	86.40	5.45	62.70	14.80	1.75	1.75	3.37
160	24.00	18.80	160	65	7.5	10.5	22.5	116	925	116	6.21	85.30	18.30	1.89	1.84	3.56
180	28.00	22.00	180	70	8	11.0	23.5	133	1350	150	6.95	114	22.40	2.02	1.92	3.75
200	32.20	25.30	200	75	8.5	11.5	24.5	151	1910	191	7.70	148	27.00	2.14	2.01	3.94
220	37.40	29.40	220	80	9	12.5	26.5	166	2690	245	8.48	197	33.60	2.30	2.14	4.20
240	42.30	33.20	240	85	9.5	13.0	28.0	185	3600	300	9.22	248	39.60	2.42	2.23	4.39
260	48.30	37.90	260	90	10	14.0	30.0	201	4820	371	9.99	317	47.70	2.56	2.36	4.66
280	53.30	41.80	280	95	10	15.0	32.0	213	6280	448	10.90	399	57.20	2.74	2.53	5.02
300	58.80	46.20	300	100	10	16.0	34.0	232	8030	535	11.70	495	67.80	2.90	2.70	5.41
320	75.80	59.50	320	100	14	17.5	37.0	247	10870	679	12.10	597	80.60	2.81	2.60	4.82
350	77.30	60.60	350	100	14	16.0	34.0	283	12840	734	12.90	570	75.00	2.72	2.40	4.45
380	80.40	63.10	380	102	13.5	16.0	33.5	313	15760	829	14.00	615	78.70	2.77	2.38	4.58
400	91.50	71.80	400	110	14	18.0	38.0	325	20350	1020	14.90	846	102.00	3.04	2.65	5.11

I - BEAMS WITH PARALLEL FLANGES

(I. P. E.)

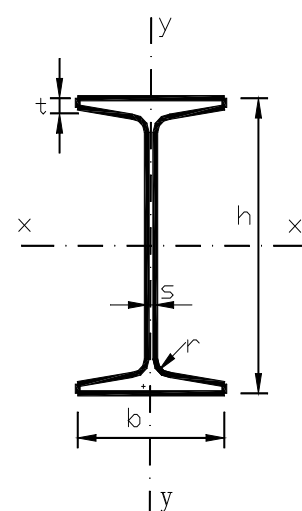
Dimensions and Properties



Sec. No.	Area (cm ²)	Weight (kg/m ³)	Dimensions (mm)							x-x			y-y		
			h	b	s	r	t	c	h-2c	I _x (cm ⁴)	S _x (cm ³)	r _x (cm)	I _y (cm ⁴)	S _y (cm ³)	r _y (cm)
80	7.64	6	80	46	3.8	5	5.2	10.2	59	80.1	20	3.24	8.49	3.69	1.05
100	10.3	8.1	100	55	4.1	7	5.7	12.7	74	171	34.2	4.07	15.9	5.79	1.24
120	13.2	10.4	120	64	4.4	7	6.3	13.3	93	318	53	4.9	27.7	8.65	1.45
140	16.4	12.9	140	73	4.7	7	6.9	13.9	112	541	77.3	5.74	44.9	12.3	1.65
160	20.1	15.8	160	82	5	9	7.4	16.4	127	869	109	6.58	68.3	16.7	1.84
180	23.9	18.8	180	91	5.3	9	8	17	146	1320	146	7.42	101	22.2	2.05
200	28.5	22.4	200	100	5.6	12	8.5	20.5	159	1940	194	8.26	142	28.5	2.24
220	33.4	26.2	220	110	5.9	12	9.2	21.2	177	2770	252	9.11	205	37.3	2.48
240	39.1	30.7	240	120	6.2	15	9.8	24.8	190	3890	324	9.97	284	47.3	2.69
270	45.9	36.1	270	135	6.6	15	10.2	25.2	219	5790	429	11.2	420	62.2	3.02
300	53.8	42.2	300	150	7.1	15	10.7	25.7	248	8360	557	12.5	604	80.5	3.35
330	62.6	49.1	330	160	7.5	18	11.5	29.5	271	11770	713	13.7	788	98.5	3.55
360	72.7	57.1	360	170	8	18	12.7	30.7	298	16270	904	15	1040	123	3.79
400	84.5	66.3	400	180	8.6	21	13.5	34.5	331	23130	1160	16.5	1320	146	3.95
450	98.8	77.6	450	190	9.4	21	14.6	35.6	378	33740	1500	18.5	1680	176	4.12
500	116	90.7	500	200	10.2	21	16	37	426	48200	1930	20.4	2140	214	4.31
550	134	106	550	210	11.1	24	17.2	41.2	467	67120	2440	22.3	2670	254	4.45
600	156	122	600	220	12	24	19	43	514	92080	3070	24.3	3390	308	4.66

STANDARD I - BEAMS **(S. I. B.) - (I. P. N.)**

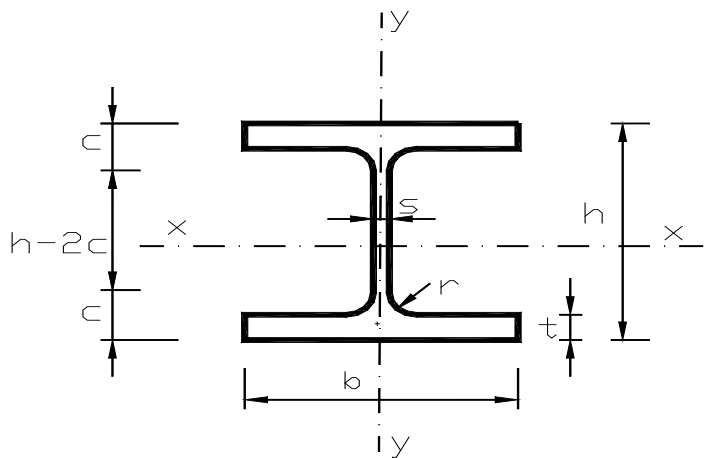
Dimensions and Properties



Sec. No.	Area (cm ²)	Weight (kg/m)	Dimensions (mm)				x-x			y-y		
			h	b	s	t	I _x (cm ⁴)	S _x (cm ³)	r _x (cm)	I _y (cm ⁴)	S _y (cm ³)	r _y (cm)
80	7.57	5.94	80	42	3.9	5.9	77.8	19.5	3.2	6.29	3	0.91
100	10.6	8.34	100	50	4.5	6.8	171	34.2	4.01	12.2	4.88	1.07
120	14.2	11.1	120	58	5.1	7.7	328	54.7	4.81	21.5	7.41	1.23
140	18.2	14.3	140	66	5.7	8.6	573	81.9	5.61	35.2	10.7	1.4
160	22.8	17.9	160	74	6.3	9.5	935	117	6.4	54.7	14.8	1.55
180	27.9	21.9	180	82	6.9	10.4	1450	161	7.2	81.3	19.8	1.71
200	33.4	26.2	200	90	7.5	11.3	2140	214	8	117	26	1.87
220	39.5	31.1	220	98	8.1	12.2	3060	278	8.8	162	33.1	2.02
240	46.1	36.2	240	106	8.7	13.1	4250	354	9.59	221	41.7	2.2
260	53.3	41.9	260	113	9.4	14.1	5740	442	10.4	288	51	2.32
280	61	47.9	280	119	10.1	15.2	7590	542	11.1	364	61.2	2.45
300	69	54.2	300	125	10.8	16.2	9800	653	11.9	451	72.2	2.56
320	77.7	61	320	131	11.5	17.3	12510	782	12.7	555	84.7	2.67
340	86.7	68	340	137	12.2	18.3	15700	923	13.5	674	98.4	2.8
360	97	76.1	360	143	13	19.5	19610	1090	14.2	818	114	2.9
380	107	84	380	148	13.7	20.5	24010	1260	15	975	131	3.02
400	118	92.4	400	155	14.4	21.6	29210	1460	15.7	1160	149	3.13
425	132	104	425	163	15.3	23	36970	1740	16.7	1440	176	3.3
450	147	115	450	170	16.2	24.3	45850	2040	17.7	1730	203	3.43
475	163	128	475	178	17.1	25.6	56480	2380	18.6	2090	235	3.6
500	179	141	500	185	18	27	68740	2750	19.6	2480	268	3.72
550	212	166	550	200	19	30	99180	3610	21.6	3490	349	4.02
600	254	199	600	215	21.6	32.4	139000	4630	23.4	4670	434	4.3

WIDE FLANGE I - BEAMS
(H. E. B.)

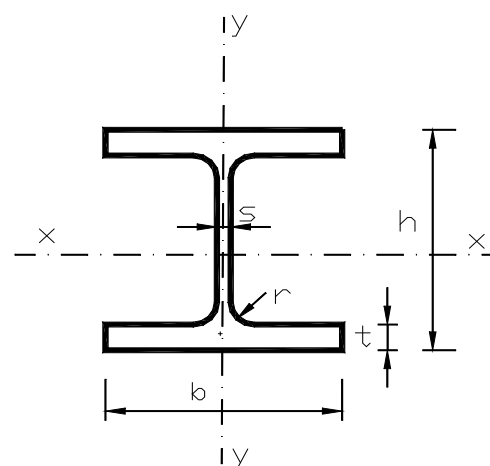
Dimensions and Properties



Sec. No.	Area (cm ²)	Weight (kg/m ³)	Dimensions (mm)						x-x			y-y		
			h	b	s	t	c	h-2c	I _x (cm ⁴)	S _x (cm ³)	r _x (cm)	I _y (cm ⁴)	S _y (cm ³)	r _y (cm)
100	26	20.4	100	100	6	10	22	56	450	89.9	4.16	167	33.5	2.53
120	34	26.7	120	120	6.5	11	23	74	864	144	5.04	318	52.9	3.06
140	43	33.7	140	140	7	12	24	92	1510	216	5.93	550	78.5	3.58
160	54.3	42.6	160	160	8	13	28	104	2490	311	6.78	889	111	4.05
180	65.3	51.2	180	180	8.5	14	29	122	3830	426	7.66	1360	151	4.57
200	78.1	61.3	200	200	9	15	33	134	5700	570	8.54	2000	200	5.07
220	91	71.5	220	220	9.5	16	34	152	8090	736	9.43	2840	258	5.59
240	106	83.2	240	240	10	17	38	164	11260	938	10.3	3920	327	6.08
260	118	93	260	260	10	17.5	41.5	177	14920	1150	11.2	5130	395	6.58
280	131	103	280	280	10.5	18	42	196	19270	1380	12.1	6590	471	7.09
300	149	117	300	300	11	19	46	208	25170	1680	13	8560	571	7.58
320	161	127	320	300	11.5	20.5	47.5	225	30820	1930	13.8	9240	616	7.57
340	171	134	340	300	12	21.5	48.5	243	36660	2160	14.6	9690	646	7.53
360	181	142	360	300	12.5	22.5	49.5	261	43190	2400	15.6	10140	676	7.49
400	198	155	400	300	13.5	24	51	298	57680	2880	17.1	10820	721	7.4
450	218	171	450	300	14	26	53	344	79890	3550	19.1	11720	781	7.33
500	239	187	500	300	14.5	28	65.5	390	107200	4290	21.2	12620	842	7.27
550	254	199	550	300	15	29	56	438	136700	4970	23.2	13080	872	7.17
600	270	212	600	300	15.5	30	57	486	171000	5700	25.2	13530	902	7.08
650	286	225	650	300	16	31	58	534	210600	6480	27.1	13980	932	6.99
700	306	241	700	300	17	32	59	582	256900	7340	29	14440	963	6.87
800	334	262	800	300	17.5	33	63	674	359100	9890	32.8	14900	994	6.68
900	371	291	900	300	18.5	35	65	770	494100	10980	36.5	15820	1050	6.53
1000	400	314	1000	300	19	36	66	868	644700	12890	40.1	16280	1090	6.38

WIDE FLANGE I - BEAMS (H. E. A.)

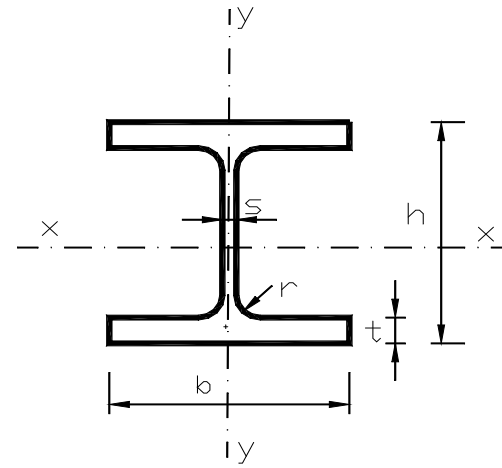
Dimensions and Properties



Sec.	Area	Weight	Dimensions (mm)					x-x			y-y		
No.	(cm ²)	(kg/m)	h	b	s	t	r	I _x (cm ⁴)	S _x (cm ³)	r _x (cm)	I _y (cm ⁴)	S _y (cm ³)	r _y (cm)
100	21.2	16.7	96	100	5	8	12	349	72.8	4.06	134	26.8	2.51
120	25.3	19.9	114	120	5	8	12	606	106	4.89	231	38.5	3.02
140	31.4	24.7	133	140	5.5	8.5	12	1030	155	5.73	389	55.6	3.52
160	38.8	30.4	152	160	6	9	15	1670	220	6.57	616	76.9	3.98
180	45.3	35.5	171	180	6	9.5	15	2510	294	7.45	925	103	4.52
200	53.8	42.3	190	200	6.5	10	18	3690	389	8.28	1340	134	4.98
220	64.3	50.5	210	220	7	11	18	5410	515	9.17	1950	178	5.51
240	76.8	60.3	230	240	7.5	12	21	7760	675	10.1	2770	231	6
260	86.8	68.2	250	260	7.5	12.5	24	10450	836	11	3670	282	6.5
280	97.3	76.4	270	280	8	13	24	13670	1010	11.9	4760	340	7
300	112	88.3	290	300	8.5	14	27	18260	1260	12.7	6310	421	7.49
320	124	97.6	310	300	9	15.5	27	22930	1480	13.6	6990	466	7.49
340	133	105	330	300	9.5	16.5	27	27690	1680	14.4	7440	496	7.46
360	143	112	350	300	10	17.5	27	33090	1890	15.2	7890	526	7.43
400	159	125	390	300	11	19	27	45070	2310	16.8	8560	571	7.34
450	178	140	440	300	11.5	21	27	63720	2900	18.9	9470	631	7.29
500	198	155	490	300	12	23	27	86970	3550	21	10370	691	7.24
550	212	166	540	300	12.5	24	27	111900	4150	23	10820	721	7.15
600	226	178	590	300	13	25	27	141200	4790	25	11270	751	7.05
650	242	190	640	300	13.5	26	27	175200	5470	26.9	11720	782	6.96
700	260	204	690	300	14.5	27	27	215300	6240	28.8	12180	812	6.84
800	286	224	790	300	15	28	30	303400	7680	32.6	12640	843	6.65
900	320	252	890	300	16	30	30	422100	9480	36.3	13550	903	6.5
1000	347	272	990	300	16.5	31	30	553800	11190	40	14000	934	6.35

WIDE FLANGE I - BEAMS (H. E. M.)

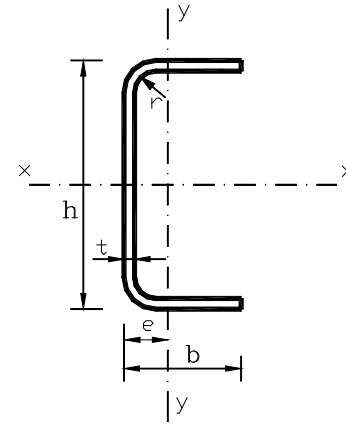
Dimensions and Properties



Sec. No.	Area (cm ²)	Weight (kg/m)	Dimensions (mm)					x-x			y-y		
			h	b	s	t	r	I _x (cm ⁴)	S _x (cm ³)	r _x (cm)	I _y (cm ⁴)	S _y (cm ³)	r _y (cm)
100	53.2	41.8	120	106	12	20	12	1140	190	4.63	399	75.3	2.74
120	66.4	52.1	140	126	12.5	21	12	2020	288	5.51	703	112	3.25
140	80.6	63.2	160	146	13	22	12	3290	411	6.39	1140	157	3.77
160	97.1	76.2	180	166	14	23	15	5100	566	7.25	1760	212	4.26
180	113	88.9	200	186	14.5	24	15	7480	748	8.13	2580	277	4.77
200	131	103	220	206	15	25	18	10640	967	9	3650	354	5.27
220	149	117	240	226	15.5	26	18	14600	1220	9.89	5010	444	5.79
240	200	157	270	248	18	32	21	24290	1800	11	8150	657	6.39
260	220	172	290	268	18	33	24	31310	2160	11.9	10450	780	6.9
280	240	189	310	288	18.5	33	24	39550	2550	12.8	13160	914	7.4
300	303	233	340	310	21	39	27	59200	3480	14	19400	1250	8
320/305	225	177	320	305	16	29	27	40950	2560	13.5	13740	901	7.81
320	312	245	359	309	21	40	27	68130	3800	14.8	19710	1280	7.95
340	316	248	377	309	21	40	27	76370	4050	15.6	19710	1280	7.9
360	319	250	395	308	21	40	27	84870	4300	16.3	19520	1270	7.83
400	326	256	432	307	21	40	27	104100	4820	17.9	19330	1260	7.7
450	335	263	478	307	21	40	27	131500	5500	19.8	19340	1260	7.59
500	344	270	524	306	21	40	27	161900	6180	21.7	19150	1250	7.46
550	354	278	572	306	21	40	27	198000	6920	23.6	19160	1250	7.35
600	364	285	620	305	21	40	27	237400	7660	25.6	18970	1240	7.22
650	374	293	668	305	21	40	27	281700	8430	27.5	18980	1240	7.13
700	383	301	716	304	21	40	27	329300	9200	29.3	18800	1240	7.01
800	404	317	814	303	21	40	30	442600	10870	33.1	18630	1230	6.79
900	424	333	910	302	21	40	30	570400	12540	36.7	18450	1220	6.6
1000	444	349	1008	302	21	40	30	722300	14330	40.3	18460	1220	6.45

COLD-FORMED C-SECTIONS

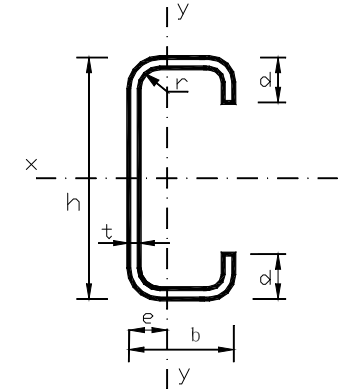
Dimensions and Properties



Dimensions (mm)				Area (cm ²)	Wt. (kg/m)	x-x			y-y			e (cm)
h	b	t	r			I _x (cm ⁴)	S _x (cm ³)	r _x (cm)	I _y (cm ⁴)	S _y (cm ³)	r _y (cm)	
30	25	4	6	2.54	1.99	2.87	1.91	1.06	1.28	0.89	0.71	1.06
40	20	4	6	2.54	1.99	4.8	2.4	1.38	0.73	0.58	0.54	0.73
40	24	4	6	2.86	2.24	5.84	2.92	1.43	1.35	0.9	0.69	0.9
50	25	4	6	3.34	2.62	10.8	4.32	1.8	1.73	1.05	0.72	0.85
50	35	4	6	4.14	3.25	15.03	6.01	1.91	4.78	2.14	1.07	1.27
60	30	4	6	4.14	3.24	20.3	6.77	2.22	3.29	1.62	0.89	0.97
65	38	4	6	4.98	3.9	30.71	9.45	2.48	6.82	2.68	1.17	1.25
70	25	4	6	4.14	3.25	25.4	7.26	2.48	2	1.13	0.7	0.73
80	45	4	6	6.14	4.81	58.81	14.7	3.1	12.05	3.91	1.4	1.41
100	50	4	6	7.34	5.76	109.4	21.88	3.86	17.67	5	1.56	1.46
120	60	4	6	8.94	7.01	195.8	32.63	4.68	31.5	7.34	1.88	1.71
140	65	4	6	10.14	7.96	300.13	42.88	5.44	41.54	8.78	2.02	1.77
160	65	4	6	10.94	8.58	411.28	51.41	6.13	43.37	8.95	1.99	1.65
180	80	4	6	12.94	10.16	637.23	70.8	7.02	80.45	13.6	2.49	2.09
200	80	4	6	13.74	10.78	816.04	81.6	7.71	83.13	13.8	2.46	1.98
200	100	4	6	15.34	12.04	969.7	96.97	7.95	154.37	21.17	3.17	2.71
60	40	3.6	6	4.48	3.51	24.48	8.16	2.34	7.02	2.66	1.25	1.36
60	40	4	6	4.94	3.87	26.58	8.86	2.32	7.64	2.92	1.24	1.38
80	40	2.25	6	3.32	2.61	32.33	8.08	3.12	5.24	1.83	1.26	1.14
80	40	2.5	6	3.68	2.89	35.52	8.88	3.11	5.75	2.02	1.25	1.15
80	40	3	6	4.37	3.43	41.66	10.42	3.09	6.75	2.39	1.24	1.18
80	40	4	6	5.74	4.5	53.04	13.26	3.04	8.6	3.09	1.22	1.22
80	50	5	6	8.05	6.32	77.3	19.33	3.1	19.55	5.85	1.56	1.66
100	40	3	6	4.97	3.91	70.96	14.19	3.78	7.31	2.48	1.21	1.05
100	40	4	6	6.54	5.13	90.97	18.19	3.73	9.33	3.21	1.19	1.09
100	50	5	6	9.05	7.1	131.83	26.37	3.82	21.32	6.1	1.53	1.51
120	60	4	6	8.94	7.01	195.8	32.63	4.68	31.5	7.35	1.88	1.71
140	63	4	6	9.98	7.83	292.73	41.82	5.42	38.05	8.27	1.95	1.7
160	63	4	6	10.78	8.46	401.54	50.19	6.1	39.7	8.43	1.92	1.59
180	75	4	6	12.54	9.84	606.25	67.36	6.95	67.2	12.01	2.32	1.9

COLD-FORMED C-SECTIONS WITH LIPS

Dimensions and Properties

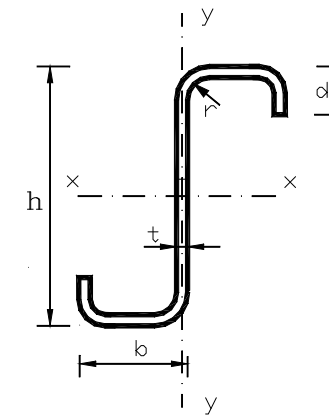


Dimensions (mm)					Area (cm ²)	Weight (kg/m)	x-x			y-y			e (cm)
h	b	d	t	r			I _x (cm ⁴)	S _x (cm ³)	r _x (cm)	I _y (cm ⁴)	S _y (cm ³)	r _y (cm)	
100	40	15	3	6	5.45	4.28	76.88	15.38	3.76	10.41	3.84	1.38	1.29
140	70	30	3	6	9.35	7.34	280.23	40.03	5.47	67.3	15.44	2.68	2.64
160	70	30	3	6	9.95	7.81	384.69	48.09	6.22	70.8	15.7	2.67	2.49
160	80	34	3	6	10.79	8.47	427.2	53.4	6.29	103.1	20.68	3.09	3.01
160	80	34	3.65	6	13.01	10.21	510.03	63.75	6.26	121.93	24.46	3.06	3.01
160	80	30	4	6	13.87	10.89	545.86	68.23	6.27	124.07	24.35	2.99	2.9
160	80	35	4	6	14.27	11.2	554.9	69.36	6.24	133.39	26.9	3.06	3.04
180	80	25	3.6	6	12.91	11.14	642.27	71.36	7.05	109.29	20.3	2.91	2.62
180	80	25	4	6	14.27	11.2	705.6	78.4	7.03	119.15	22.13	2.89	2.62
100	50	20	2	6	4.33	3.4	65.92	13.18	3.9	15.36	4.85	1.88	1.84
200	60	20	2	6	6.73	5.28	386.55	38.66	7.58	30.47	6.96	2.13	1.62
250	70	20	2	6	8.13	6.38	723.51	57.88	9.43	47.56	9.05	2.42	1.74
185	60	25	1.5	6	5	3.93	251.81	27.22	7.09	25.6	6.12	2.26	1.82
185	60	26.4	2	6	6.69	5.25	333.19	36.02	7.06	34.09	8.22	2.26	1.85
185	60	27.7	2.5	6	8.36	6.56	412.99	44.65	7.03	42.46	10.32	2.25	1.89
185	60	29.1	3	6	10.05	7.89	491.57	53.14	7	50.82	12.46	2.25	1.92
215	60	25	1.5	6	5.46	4.29	360.67	33.55	8.13	26.86	6.21	2.22	1.67
215	60	26.4	2	6	7.29	5.72	477.98	44.46	8.1	35.79	8.34	2.21	1.7
215	60	27.7	2.5	6	9.11	7.15	593.41	55.2	8.07	44.59	10.47	2.21	1.74
215	60	29.1	3	6	10.95	8.59	707.49	65.81	8.04	53.41	12.64	2.21	1.78

COLD-FORMED Z-SECTIONS WITH LIPS

Dimensions and Properties

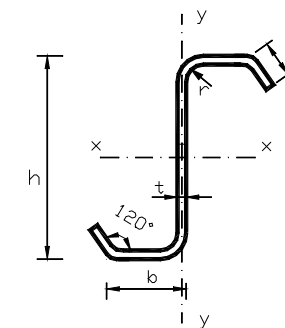
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Dimensions (mm)					Area (cm ²)	Weight (kg/m)	x-x			y-y		
h	b	d	t	r			I _x (cm ⁴)	S _x (cm ³)	r _x (cm)	I _y (cm ⁴)	S _y (cm ³)	r _y (cm)
100	50	20	2	6	4.33	3.4	65.92	13.18	3.9	28.4	5.8	2.56
150	60	20	2	6	5.73	4.5	195.22	26.03	5.84	46.04	7.8	2.83
150	60	20	2.5	6	7.1	5.58	239.74	31.97	5.81	55.66	9.47	2.8
200	60	20	2	6	6.73	5.28	386.55	38.65	7.58	46.04	7.8	2.62
200	60	20	2.5	6	8.35	6.56	475.94	47.59	7.55	55.66	9.47	2.58
250	70	20	2	6	8.13	6.38	723.51	57.88	9.43	69.53	10.08	2.92
250	70	20	2.5	6	10.1	7.93	893.12	71.45	9.4	84.41	12.28	2.89

COLD-FORMED Z-SECTIONS WITH INCLINED LIPS

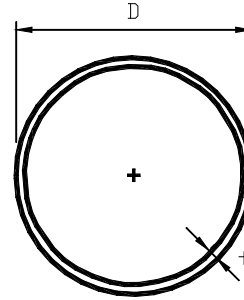
Dimensions and Properties



Dimensions (mm)					Area (cm ²)	Wt. (kg/m)	x-x			y-y		
h	b	d	t	r			I _x (cm ⁴)	S _x (cm ³)	r _x (cm)	I _y (cm ⁴)	S _y (cm ³)	r _y (cm)
185	60	20.8	1.5	6	4.88	3.83	246.1	26.6	7.1	37.66	6.36	2.78
185	60	21.8	2	6	6.5	5.1	325.13	35.15	7.07	50.12	8.5	2.78
185	60	22.8	2.5	6	8.12	6.37	402.66	43.53	7.04	62.53	10.64	2.78
185	60	23.8	3	6	9.73	7.64	478.65	51.75	7.01	74.88	12.8	2.77
215	60	20.8	1.5	6	5.33	4.19	352.12	32.76	8.13	37.66	6.36	2.66
215	60	21.8	2	6	7.1	5.58	465.85	43.33	8.1	50.12	8.5	2.66
215	60	22.8	2.5	6	8.87	6.96	577.73	53.74	8.07	62.53	10.64	2.66
215	60	23.8	3	6	10.63	8.34	687.74	63.98	8.04	74.04	12.8	2.65

PIPES

Dimensions and Properties



Pipe No.	D (mm)	t (mm)	Area (cm ²)	Weight (kg/m)	x-x		
					I _x (cm ⁴)	S _x (cm ³)	r _x (cm)
38	38	3	3.3	2.59	5	2.63	1.24
	38	4	4.27	3.35	6.26	3.29	1.21
44.5	44.5	3	3.91	3.07	8.46	3.8	1.47
	44.5	4	5.09	4.00	10.5	4.74	1.44
	44.5	5	6.2	4.87	12.3	5.53	1.41
60	60	3	5.37	4.22	21.9	7.29	2.02
	60	4	7.04	5.52	27.7	9.24	1.99
	60	5	8.64	6.78	32.9	11	1.95
70	70	3	6.31	4.96	35.5	10.1	2.37
	70	4	8.29	6.51	45.3	13	2.34
	70	5	10.2	8.01	54.2	15.5	2.31
	70	6	12.06	9.47	62.3	17.8	2.27
76	76	3	6.88	5.40	45.9	12.1	2.58
	76	4	9.05	7.10	58.5	15.5	2.55
	76	5	11.15	8.75	70.6	18.6	2.52
	76	6	13.2	10.4	81.4	21.4	2.48
89	89	4	10.7	8.38	96.7	21.7	3.01
	89	5	13.2	10.40	117	26.2	2.98
	89	6	15.6	12.30	135	30.4	2.94
	89	7	18	14.2	153	34.3	2.91
108	108	5	16.2	12.70	215	39.8	3.65
	108	6	19.2	15.10	251	46.5	3.61
	108	7	22.2	17.40	285	52.7	3.58
	108	8	25.1	19.7	316	58.6	3.55
133	133	5	20.1	15.80	412	62	4.53
	133	6	23.9	18.80	484	72.7	4.5
	133	7	27.7	21.80	552	82.9	4.46
	133	8	31.4	24.7	616	92.6	4.43

159	159	5	24.2	19.00	718	90.3	5.45
	159	6	28.8	22.60	845	106	5.41
	159	7	33.4	26.20	967	122	5.38
	159	8	38	29.80	1080	136	5.35
	159	10	46.8	36.70	1300	164	5.28



مدونة المهندس المكترف

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صرح هندسي ضخم



أبحاث ودراسات هندسية

كتب ومراجع هندسية

هندسة معمارية

هندسة مدنية

تنفيذ إنشائي

تصميم إنشائي

برامج هندسية

مواضيع تقنية

شهادات إكمال

كورسات هندسية

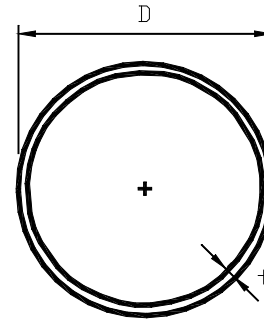
والمزيد

مقالات تقنية

مقالات هندسية

PIPES

Dimensions and Properties



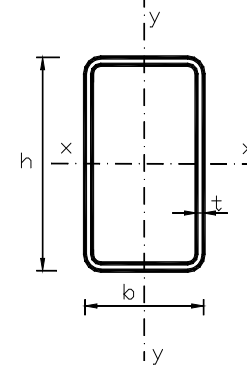
Pipe No.	D (mm)	t (mm)	Area (cm ²)	Weight (kg/m)	x-x		
					I _x (cm ⁴)	S _x (cm ³)	r _x (cm)
194	194	6	35.4	27.8	1570	162	6.65
	194	7	41.1	32.3	1800	186	6.62
	194	8	46.7	36.7	2030	209	6.59
	194	10	57.8	45.4	2440	253	6.53
219	219	6	40.2	31.6	2280	208	7.53
	219	7	46.6	36.6	2620	240	7.5
	219	8	53	41.6	2960	270	7.46
	219	10	65.7	51.6	3590	328	7.4
	219	12	78	61.2	4190	383	7.32
245	245	7	52.3	41.1	3710	303	8.42
	245	8	59.6	46.8	4190	342	8.37
	245	10	73.8	57.9	5110	417	8.32
	245	12	87.8	68.9	5980	488	8.25
	245	14	102	80.1	6800	555	8.17
273	273	7	58.5	45.9	5180	379	9.4
	273	8	66.6	52.3	5850	429	9.37
	273	10	82.6	64.8	7150	524	9.3
	273	12	98.4	77.2	8400	615	9.24
	273	14	114	89.5	9580	702	9.17
325	325	8	79.7	62.6	10010	616	11.2
	325	10	99	77.7	12290	756	11.1
	325	12	118	92.6	14470	891	11.1
	325	14	137	107.5	16570	1020	11
	325	16	155	121.7	18590	1140	10.9
368	368	8	90.5	71.0	14660	797	12.7
	368	10	112	87.9	18030	980	12.7
	368	12	134	105.2	21290	1160	12.6
	368	14	156	122.5	24430	1330	12.5
	368	16	177	138.9	27460	1490	12.5
	368	20	219	171.9	33210	1800	12.3
419	419	10	128	100.5	26880	1283	14.5
	419	12	153	120.1	31800	1518	14.4
	419	16	203	159.4	41190	1970	14.3
	419	20	251	197.0	50020	2390	14.1
529	529	9	147	115.4	49710	1879	18.4
	529	10	163	128.0	54920	2077	18.4

RECTANGULAR HOLLOW SECTIONS

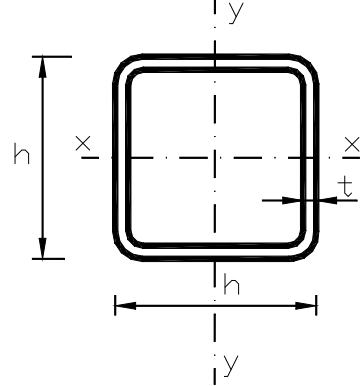
(R H S)

مدرسة المهندس المحترف

Dimensions and Properties



h (mm)	b (mm)	t (mm)	Area (mm ²)	Wt. (kg/m)	x-x			y-y		
					I_x mm ⁴ ×10 ⁶	S_x mm ³ ×10 ³	r_x (mm)	I_y mm ⁴ ×10 ⁶	S_y mm ³ ×10 ³	r_y (mm)
50	30	2.6	386	3.0	0.124	4.96	17.9	0.0545	3.63	11.9
		3.2	466	3.7	0.145	5.82	17.7	0.0631	4.21	11.6
60	40	3.2	594	4.7	0.283	9.44	21.8	0.148	7.39	15.8
		4	728	5.7	0.336	11.2	21.5	0.173	8.67	15.4
80	40	3.2	722	5.7	0.581	14.5	28.4	0.191	9.56	16.3
		4	888	7.0	0.696	17.4	28	0.226	11.3	15.9
90	50	3.6	950	7.5	0.996	22.2	32.4	0.391	15.6	20.3
		5	1290	10.1	1.3	28.9	31.8	0.5	20	19.7
100	50	3.2	914	7.2	1.17	23.5	35.8	0.391	15.6	20.7
		4	1130	8.9	1.42	28.4	35.5	0.467	18.7	20.3
		5	1390	10.9	1.7	34	35	0.551	22	19.9
		6.3	1710	13.4	2.02	40.5	34.4	0.642	25.7	19.4
	60	3.6	1090	8.6	1.47	29.3	36.6	0.654	21.8	24.5
		5	1490	11.7	1.92	38.5	36	0.847	28.2	23.9
		6.3	1840	14.4	2.3	46	35.4	0.999	33.3	23.3
120	60	3.6	1240	9.7	2.3	38.3	43.1	0.769	25.6	24.9
		5	1690	13.3	3.04	50.7	42.4	0.999	33.3	24.3
		6	2090	16.4	3.66	61	41.8	1.18	39.4	23.8
	80	5	1890	14.8	3.7	61.7	44.3	1.95	48.8	32.1
		6.3	2340	18.4	4.47	74.6	43.7	2.34	58.4	31.6
		8	2910	22.8	5.37	89.5	42.9	2.78	69.4	30.9
		10	3550	27.9	6.28	105	42	3.2	80	30
150	100	5	2390	18.8	7.47	99.5	55.9	3.96	79.1	40.7
		6.3	2970	23.3	9.1	121	55.3	4.79	95.9	40.2
		8	3710	29.1	11.06	147	54.6	5.77	115	39.4
		10	4550	35.7	13.12	175	53.7	6.78	136	38.6
160	80	5	2290	18.0	7.53	94.1	57.4	2.51	62.8	33.1
		6.3	2850	22.3	9.17	115	56.8	3.02	75.6	32.6
		8	3550	27.9	11.13	139	56	3.61	90.2	31.9
		10	4350	34.1	13.18	165	55	4.19	105	31
200	100	5	2890	22.7	15.09	151	72.3	5.09	102	42
		6.3	3600	28.3	18.51	185	71.7	6.18	124	41.4
		8	4510	35.4	22.69	227	70.9	7.47	149	40.7
		10	5550	43.6	27.18	272	70	8.81	176	39.8
		12.5	6800	53.4	32.18	322	68.8	10.22	204	38.8
		16	8450	66.3	38.08	381	67.1	11.75	235	37.3
250	150	6.3	4860	38.2	41.78	334	92.7	18.86	252	62.3
		8	6110	48.0	51.67	416	91.9	23.17	309	61.6
		10	7550	59.3	62.59	501	91	27.84	371	60.7
		12.5	9300	73.0	75.18	601	89.9	33.1	441	59.7
		16	11700	91.8	90.89	727	88.3	39.43	526	58.2
300	200	6.3	6120	48.0	78.8	525	113	42.16	422	83
		8	7710	60.5	98.98	653	113	52.19	522	82.3
		10	9550	75.0	119.4	796	112	63.31	633	81.4
		12.5	11800	92.6	144.6	964	111	76.19	762	80.4
		16	14900	117.0	177	1180	109	92.39	924	78.9
400	200	10	11600	91.1	241.4	1207	145	81.38	814	83.9
		12.5	14300	112.3	294.1	1471	143	98.2	982	82.9
		16	18100	142.1	363	1815	142	119.5	1195	81.4
450	250	10	13600	106.8	371.8	1653	166	149	1192	105
		12.5	16800	131.9	454.7	2021	165	181	1448	104
		16	21300	167.2	564.2	2508	163	222.5	1780	102

<div> <div>SQUARE HOLLOW SECTIONS</div> <div>(S H S)</div> <div>Dimensions and Properties</div> </div> <div>  </div>						
h	t	Area	Weight	x-x		
(mm)	(mm)	(mm ²)	(kg/m)	I _x (mm ⁴ ×10 ⁶)	S _x (mm ³ ×10 ³)	r _x (mm)
40	4	568	4.5	0.121	6.07	14.6
50	3.2	594	4.7	0.216	8.62	19.1
	4	728	5.7	0.255	10.2	18.7
	5	888	7.0	0.296	11.9	18.3
60	3.2	722	5.7	0.387	12.9	23.1
	4	888	7.0	0.461	15.4	22.8
	5	1090	8.6	0.544	18.1	22.4
70	3.6	950	7.5	0.695	19.9	27
	5	1290	10.1	0.901	25.7	26.4
80	3.6	1090	8.6	1.06	26.5	31.1
	5	1490	11.7	1.39	34.7	30.5
	6.3	1840	14.4	1.65	41.3	30
90	3.6	1240	9.7	1.54	34.1	35.2
	5	1690	13.3	2.02	45	34.6
	6.3	2090	16.4	2.42	53.9	34.1
100	4	1530	12.0	2.34	46.8	39.1
	5	1890	14.8	2.83	56.6	38.7
	6.3	2340	18.4	3.41	68.2	38.1
	8	2910	22.8	4.08	81.5	37.4
	10	3550	27.9	4.74	94.9	36.5
120	5	2290	18.0	5.03	83.8	46.9
	6.3	2850	22.4	6.1	102	46.3
	8	3550	27.9	7.38	123	45.6
	10	4350	34.1	8.7	145	44.7
140	5	2690	21.1	8.14	116	55
	6.3	3350	26.3	9.94	142	54.5
	8	4190	32.9	12.12	173	53.8
	10	5150	40.4	14.41	206	52.9
150	5	2890	22.7	10.09	135	59.1
	6.3	3600	28.3	12.36	165	58.6
	8	4510	35.4	15.1	201	57.8
	10	5550	43.6	18.03	240	57
	12.5	6800	53.4	21.25	283	55.9
	16	8450	66.3	25	333	54.4
180	6.3	4360	34.2	21.86	243	70.8
	8	5470	42.9	26.89	299	70.1
	10	6750	53.0	32.37	360	69.2
	12.5	8300	65.2	38.56	428	68.2
	16	10400	81.6	46.07	512	66.6
200	6.3	4860	38.2	30.33	303	79
	8	6110	48.0	37.44	374	78.3
	10	7550	59.3	45.25	452	77.4
	12.5	9300	73.0	54.19	542	76.3
	16	11700	91.8	65.24	652	74.8
250	6.3	6120	48.0	60.49	484	99.4
	8	7710	60.5	75.1	601	98.7
	10	9550	75.0	91.41	731	97.8
	12.5	11800	92.6	110.5	884	96.8
	16	14900	117.0	134.8	1078	95.3
300	10	11600	91.1	161.5	1077	118
	12.5	14300	112.3	196.3	1309	117
	16	18100	142.1	241.6	1610	116
350	10	13600	106.8	260.5	1489	139
	12.5	16800	131.9	318.1	1817	138
	16	21300	167.2	393.7	2250	136
400	10	15600	122.5	393.5	1968	159
	12.5	19300	151.5	481.9	2409	158