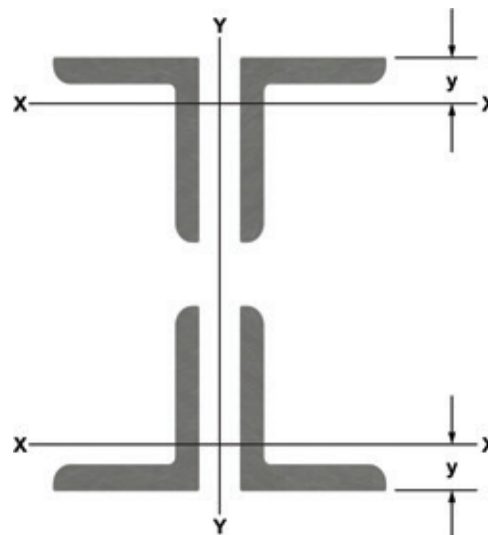
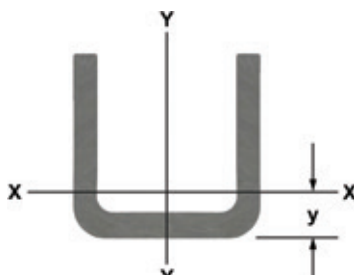
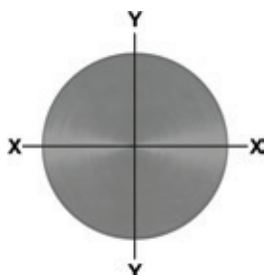


MATERIAL

AXES CONVENTION



SECTION PROPERTIES

ROUND AND SQUARE BARS

Material (in.)	Forming	Mass (kg/m)	Area (mm ²)	I (10 ³ mm ⁴)	r (mm)
1/2	Hot rolled	0.99	127	1.28	3.2
9/16	Hot rolled	1.26	160	2.05	3.6
5/8	Hot rolled	1.55	198	3.11	4.0
11/16	Hot rolled	1.88	239	4.56	4.4
3/4	Hot rolled	2.24	285	6.46	4.8
13/16	Hot rolled	2.62	335	8.91	5.2
7/8	Hot rolled	3.05	388	11.99	5.6
15/16	Hot rolled	3.49	445	15.78	6.0
1	Hot rolled	3.97	507	20.43	6.4
1 1/8	Hot rolled	5.03	641	32.73	7.1
1 square bar	Hot rolled	5.06	645	34.69	7.3

U SHAPES

								Axis X-X			Axis Y-Y	
Material					Forming	Mass (kg/m)	Area (mm²)	y (mm)	I _{xx} (10³ mm⁴)	r _{xx} (mm)	I _{yy} (10³ mm⁴)	r _{yy} (mm)
(in.)		(in.)		(in.)								
1	x	0.85	x	0.090	Cold formed	1.07	137	7.8	5.97	6.6	13.07	9.8
1	x	1	x	0.090	Cold formed	1.15	146	8.7	7.71	7.3	14.25	9.9
1	x	1.05	x	0.091	Cold formed	1.28	162	10.4	11.59	8.5	16.33	10.0
1	x	1	x	0.118	Cold formed	1.50	191	9.7	10.71	7.5	17.55	9.6
1	x	1.1	x	0.118	Cold formed	1.68	215	11.5	16.53	8.8	20.42	9.8
1	x	1.2	x	0.136	Cold formed	2.05	261	13.1	23.80	9.6	24.25	9.6
1 3/8	x	1 3/8	x	0.118	Cold formed	2.21	282	13.1	33.76	10.9	55.58	14.0
1 3/8	x	1.27	x	0.118	Cold formed	2.11	269	12.1	27.98	10.2	52.13	13.9
1 3/8	x	1 3/8	x	0.136	Cold formed	2.53	322	13.5	38.70	11.0	61.67	13.8
1 3/8	x	1 3/8	x	0.157	Cold formed	2.94	375	14.3	47.02	11.2	69.54	13.6
1 3/8	x	1 3/8	x	0.176	Cold formed	3.28	415	14.8	52.28	11.2	74.73	13.4
1 3/4	x	1 1/2	x	0.157	Cold formed	3.45	440	14.5	66.51	12.3	138.02	17.7
1 3/4	x	1 3/4	x	0.197	Cold formed	4.67	595	17.9	119.03	14.1	183.32	17.6
2 3/8	x	2	x	0.197	Cold formed	5.58	710	17.9	171.33	15.5	396.45	23.6

DOUBLE ANGLES (LONG LEGS BACK-TO-BACK)

							Axis X-X			r _{yy} with different gaps							Axis Z
Material			Forming	Mass	Area	y	I _{xx}	r _{xx}	12.7	19	25	35	45	60	r _z		
(in.)	(in.)	(in.)		(kg/m)	(mm ²)	(mm)	(10 ⁶ mm ⁴)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)		
1	x	1	x	7/64	Hot rolled	2.09	266	7.4	0.016	7.8	15.8	18.6	21.3	26.1	30.9	5.0	
1	x	1	x	1/8	Hot rolled	2.38	302	7.5	0.018	7.7	15.9	18.7	21.5	26.2	31.0	5.0	
1 1/4	x	1 1/4	x	0.118	Cold formed	2.77	352	9.4	0.034	9.8	18.5	21.3	24.0	28.6	33.3	6.1	
1 1/4	x	1 1/4	x	1/8	Hot rolled	3.00	383	9.1	0.037	9.8	18.3	21.0	23.7	28.3	33.1	6.2	
1 1/4	x	1 1/4	x	3/16	Hot rolled	4.40	560	9.7	0.051	9.6	18.7	21.4	24.2	28.8	33.6	6.2	
1 3/8	x	1 3/8	x	0.118	Cold formed	3.07	390	10.1	0.046	10.9	19.7	22.4	25.1	29.7	34.4	6.8	
1 1/2	x	1 1/2	x	0.118	Cold formed	3.36	429	10.9	0.061	11.9	21.0	23.6	26.3	30.8	35.5	7.4	
1 1/2	x	1 1/2	x	1/8	Hot rolled	3.66	464	10.7	0.065	11.8	20.7	23.4	26.0	30.6	35.2	7.5	
1 1/2	x	1 1/2	x	5/32	Hot rolled	4.49	574	11.0	0.079	11.7	20.9	23.6	26.2	30.8	35.5	7.5	
1 1/2	x	1 1/2	x	0.157	Cold formed	4.39	559	11.4	0.077	11.7	21.3	24.0	26.7	31.2	35.9	7.3	
1 1/2	x	1 1/2	x	3/16	Hot rolled	5.36	680	11.3	0.092	11.6	21.1	23.8	26.5	31.0	35.7	7.5	
1 5/8	x	1 5/8	x	0.118	Cold formed	3.66	467	11.7	0.078	12.9	22.2	24.8	27.5	32.0	36.6	8.1	
1 5/8	x	1 5/8	x	0.157	Cold formed	4.79	610	12.2	0.099	12.8	22.5	25.2	27.8	32.3	37.0	8.0	
1 3/4	x	1 3/4	x	0.118	Cold formed	3.96	505	12.5	0.098	13.9	23.5	26.1	28.6	33.1	37.7	8.7	
1 3/4	x	1 3/4	x	5/32	Hot rolled	5.31	674	12.6	0.127	13.7	23.4	26.0	28.6	33.1	37.7	8.8	
1 3/4	x	1 3/4	x	0.157	Cold formed	5.18	661	13.0	0.126	13.8	23.8	26.4	29.0	33.5	38.1	8.6	
1 3/4	x	1 3/4	x	3/16	Hot rolled	6.31	801	12.9	0.149	13.6	23.6	26.2	28.8	33.3	37.9	8.7	
1 7/8	x	1 7/8	x	0.157	Cold formed	5.58	711	13.8	0.156	14.8	25.0	27.6	30.2	34.6	39.2	9.3	
1 7/8	x	1 7/8	x	0.197	Cold formed	6.85	873	14.3	0.188	14.7	25.3	27.9	30.5	35.0	39.6	9.1	
2	x	2	x	0.118	Cold formed	4.56	581	14.1	0.148	16.0	26.0	28.5	31.0	35.4	39.9	10.0	
2	x	2	x	0.157	Cold formed	5.98	762	14.6	0.191	15.8	26.3	28.8	31.4	35.8	40.3	9.9	
2	x	2	x	3/16	Hot rolled	7.26	922	14.5	0.227	15.7	26.1	28.6	31.2	35.6	40.1	10.0	
2	x	2	x	0.197	Cold formed	7.35	937	15.1	0.231	15.7	26.6	29.2	31.7	36.2	40.7	9.8	
2	x	2	x	7/32	Hot rolled	8.37	1,068	14.7	0.259	15.6	26.2	28.8	31.4	35.8	40.4	10.0	
2	x	2	x	1/4	Hot rolled	9.50	1,210	15.0	0.289	15.5	26.4	29.0	31.6	36.0	40.6	9.9	
2 1/8	x	2 1/8	x	0.157	Cold formed	6.38	813	15.4	0.231	16.9	27.5	30.1	32.6	37.0	41.5	10.6	
2 1/8	x	2 1/8	x	0.197	Cold formed	7.85	1,000	15.9	0.280	16.7	27.8	30.4	32.9	37.3	41.8	10.4	
2 1/8	x	2 1/8	x	0.236	Cold formed	9.27	1,181	16.3	0.325	16.6	28.1	30.7	33.3	37.7	42.2	10.3	
2 1/4	x	2 1/4	x	0.197	Cold formed	8.35	1,064	16.6	0.335	17.8	29.1	31.6	34.1	38.5	43.0	11.1	
2 1/4	x	2 1/4	x	0.236	Cold formed	9.87	1,257	17.1	0.390	17.6	29.4	31.9	34.5	38.9	43.4	11.0	
2 3/8	x	2 3/8	x	0.197	Cold formed	8.85	1,127	17.4	0.398	18.8	30.3	32.8	35.3	39.7	44.1	11.7	
2 3/8	x	2 3/8	x	0.236	Cold formed	10.47	1,333	17.9	0.463	18.6	30.6	33.2	35.7	40.0	44.5	11.6	
2 1/2	x	2 1/2	x	0.197	Cold formed	9.35	1,191	18.2	0.467	19.8	31.6	34.1	36.6	40.9	45.3	12.4	
2 1/2	x	2 1/2	x	0.236	Cold formed	11.07	1,410	18.7	0.545	19.7	31.9	34.4	36.9	41.2	45.7	12.3	
2 1/2	x	2 1/2	x	1/4	Hot rolled	12.21	1,532	18.2	0.585	19.5	31.4	33.9	36.4	40.7	45.2	12.5	
2 1/2	x	2 1/2	x	5/16	Hot rolled	14.89	1,890	18.8	0.706	19.3	31.7	34.3	36.8	41.1	45.6	12.4	
2 5/8	x	2 5/8	x	0.236	Cold formed	11.66	1,486	19.5	0.636	20.7	33.1	35.6	38.1	42.4	46.8	12.9	
2 3/4	x	2 3/4	x	0.236	Cold formed	12.26	1,562	20.3	0.737	21.7	34.4	36.9	39.3	43.6	48.0	13.6	
2 7/8	x	2 7/8	x	0.236	Cold formed	12.86	1,638	21.1	0.848	22.7	35.6	38.1	40.6	44.8	49.2	14.2	
3	x	3	x	0.236	Cold formed	13.46	1,714	21.9	0.969	23.8	36.9	39.4	41.8	46.0	50.3	14.9	
3	x	2	x	5/16	Hot rolled	14.89	1,890	25.8	1.096	24.1	24.2	26.8	29.4	33.8	38.4	11.0	
3	x	3	x	5/16	Hot rolled	18.15	2,293	22.0	1.257	23.4	36.7	39.2	41.7	45.9	50.3	15.0	
3	x	3	x	3/8	Hot rolled	21.44	2,722	22.5	1.465	23.2	37.1	39.6	42.0	46.3	50.7	14.9	
3 1/8	x	3 1/8	x	0.236	Cold formed	14.05	1,791	22.7	1.101	24.8	38.2	40.6	43.0	47.2	51.5	15.5	
3 1/2	x	3 1/2	x	3/8	Hot rolled	25.30	3,206	25.7	2.385	27.3	42.1	44.6	47.0	51.1	55.4	17.4	
4	x	4	x	3/8	Hot rolled	29.19	3,690	28.9	3.628	31.4	47.2	49.6	51.9	56.0	60.2	20.0	
4	x	3	x	1/2	Hot rolled	33.05	4,194	33.7	4.203	31.7	35.1	37.6	40.0	44.3	48.7	16.2	
4	x	4	x	1/2	Hot rolled	38.12	4,839	30.1	4.630	30.9	47.8	50.2	52.6	56.7	61.0	19.9	
4	x	4	x	9/16	Hot rolled	42.56	5,398	30.6	5.097	30.7	48.1	50.5	53.0	57.1	61.4	19.8	
5	x	5	x	1/2	Hot rolled	48.25	6,129	36.4	9.365	39.1	57.9	60.3	62.6	66.6	70.7	25.0	
5	x	5	x	9/16	Hot rolled	53.91	6,850	37.0	10.352	38.9	58.2	60.6	62.9	66.9	71.1	24.9	
5	x	5	x	5/8	Hot rolled	59.57	7,561	37.6	11.303	38.7	58.5	60.9	63.3	67.3	71.4	24.8	
6	x	6	x	9/16	Hot rolled	65.17	8,301	43.4	18.369	47.0	68.4	70.8	73.0	76.9	80.9	30.0	
6	x	6	x	5/8	Hot rolled	72.08	9,173	43.9	20.110	46.8	68.7	71.1	73.3	77.3	81.3	29.9	
6	x	6	x	3/4	Hot rolled	85.48	10,887	45.1	23.438	46.4	69.3	71.6	74.0	77.9	82.0	29.8	
8	x	8	x	3/4	Hot rolled	115.86	14,758	57.8	58.054	62.7	89.7	92.0	94.2	98.0	101.9	40.0	
8	x	8	x	1	Hot rolled	151.78	19,355	60.1	74.075	61.9	90.8	93.1	95.4	99.3	103.2	39.7	