MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE

NATIONAL AEROSPACE UNIVERSITY
“KHARKIV AVIATION INSTITUTE”

Series ENGINEERING EDUCATION

ASSORTMENT OF STEEL PRODUCTS

Vladislav Demenko

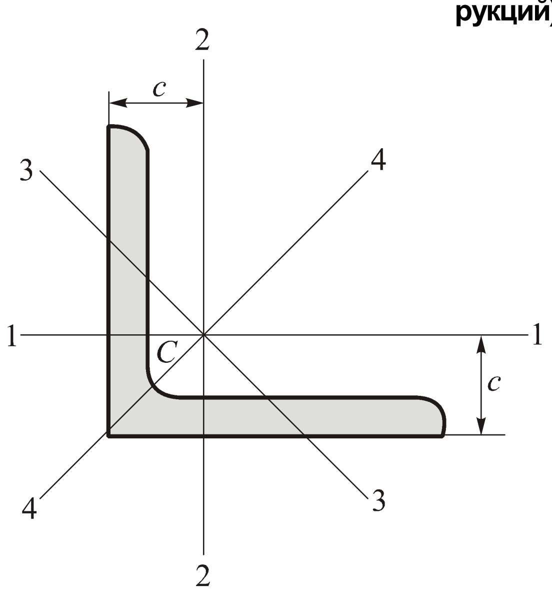
Kharkiv 2012

ASSORTMENT OF STEEL PRODUCTS

Geometrical properties of angle sections with equal legs (L shapes) (AISC)

Геометрические характеристики стали прокатной угловой равнополочной (стандарт Американского института стальных конструкций)

Геометричні характеристики сталі прокатної кутової рівнополичної (стандарт Американського інституту стальних конструкцій)



Notes: Axes 1-1 and 2-2 are centroidal axes parallel to the legs.

The distance c is measured from the centroid to the back of the legs.

For axes 1-1 and 2-2, the tabulated value of W is the smaller of the two section moduli for those axes.

Axes 3-3 and 4-4 are principal centroidal axes.

The moment of inertia for axis 3-3, which is the smaller of the two principal moments of inertia, can be found from the equation $I_{33} = A i_{\min}^2$.

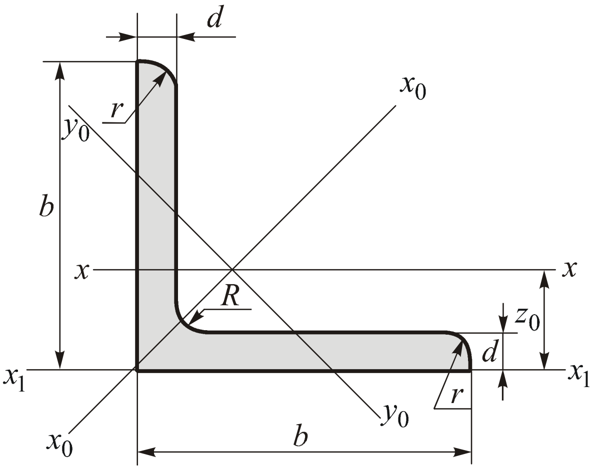
The moment of inertia for axis 4-4, which is the larger of the two principal moments of inertia, can be found from the equation $I_{44} + I_{33} = I_{11} + I_{22}$.

Designation	Weight per foot	Area	Axis 1-1 and Axis 2-2				Axis 3-3
			I	W	i	c	$i_{\min}$
in.	lb	in.^{2}	in.^{4}	in.^{3}	in.	in.	in.
L 8 × 8 × 1	51.0	15.0	89.0	15.8	2.44	2.37	1.56
L 8 × 8 × 3/4	38.9	11.4	69.7	12.2	2.47	2.28	1.58
L 8 × 8 × 1/2	26.4	7.75	48.6	8.36	2.50	2.19	1.59
L 6 × 6 ×1	37.4	11.0	35.5	8.57	1.80	1.86	1.17
L 6 × 6 × 3/4	28.7	8.44	28.2	6.66	1.83	1.78	1.17
L 6 × 6 × 1/2	19.6	5.75	19.9	4.61	1.86	1.68	1.18
L 5 × 5 × 7/8	27.2	7.98	17.8	5.17	1.49	1.57	0.973
L 5 × 5 × 1/2	16.2	4.75	11.3	3.16	1.54	1.43	0.983
L 5 × 5 × 3/8	12.3	3.61	8.74	2.42	1.56	1.39	0.990
L 4 × 4 × 3/4	18.5	5.44	7.67	2.81	1.19	1.27	0.778
L 4 × 4 × 1/2	12.8	3.75	5.56	1.97	1.22	1.18	0.782
L 4 × 4 × 3/8	9.8	2.86	4.36	1.52	1.23	1.14	0.788
L 3 1/2 × 3 1/2 × 3/8	8.5	2.48	2.87	1.15	1.07	1.01	0.687
L 3 1/2 × 3 1/2 × 1/4	5.8	1.69	2.01	0.794	1.09	0.968	0.694
L 3 × 3 × 1/2	9.4	2.75	2.22	1.07	0.898	0.932	0.584
L 3 × 3 × 1/4	4.9	1.44	1.24	0.577	0.930	0.842	0.592

Geometrical properties of angle sections with equal legs (L shapes) (GOST 8509-72)

Геометрические характеристики стали прокатной угловой равнополочной (ГОСТ 8509-72)

Геометричні характеристики сталі прокатної кутової рівнополичної (Держстандарт 8509-72)



b – width of web,
d – thickness,
I – moment of inertia,
i – radius of gyration,
z_0 – distance to centroid.

Designation (number)	*b*	*d*	Area, cm^2	Axes						z_0, cm	Mass per meter, kg
	mm			$X - X$		$X_0 - X_0$		$Y_0 - Y_0$			
				I_x, cm^4	i_x, cm	$I_{x_0 \max}$, cm^4	$i_{x_0 \max}$, cm	$I_{y_0 \min}$, cm^4	$i_{y_0 \min}$, cm		
1	2	3	4	5	6	7	8	9	10	11	12
2	20	3	1,13	0,40	0,59	0,63	0,75	0,17	0,39	0,60	0,89
		4	1,46	0,50	0,58	0,78	0,73	0,22	0,38	0,64	1,15
2,5	25	3	1,43	0,81	0,75	1,29	0,95	0,34	0,49	0,73	1,12
		4	1,86	1,03	0,74	1,62	0,93	0,44	0,48	0,76	1,46
2,8	28	3	1,62	1,16	0,85	1,84	1,07	0,48	0,55	0,80	1,27
3,2	32	3	1,86	1,77	0,97	2,80	1,23	0,74	0,63	0,89	1,46
		4	2,43	2,26	0,96	3,58	1,21	0,94	0,62	0,94	1,91
3,6	36	3	2,10	2,56	1,10	4,06	1,39	1,06	0,71	0,99	1,65
		4	2,75	3,29	1,09	5,21	1,38	1,36	0,70	1,04	2,16
4	40	3	2,35	3,55	1,23	5,63	1,55	1,47	0,79	1,09	1,85
		4	3,08	4,58	1,22	7,26	1,53	1,90	0,78	1,13	2,42
		5	3,79	5,53	1,20	8,75	1,54	2,30	0,79	1,17	2,97
4,5	45	3	2,65	5,13	1,39	8,13	1,75	2,12	0,89	1,21	2,08
		4	3,48	6,63	1,38	10,50	1,74	2,74	0,89	1,26	2,73
		5	4,29	8,03	1,37	12,70	1,72	3,33	0,88	1,30	3,37
5	50	3	2,96	7,11	1,55	11,30	1,95	2,95	1,00	1,33	2,32
		4	3,89	9,21	1,54	14,60	1,94	3,80	0,99	1,38	3,05
		5	4,80	11,20	1,53	17,80	1,92	4,63	0,98	1,42	3,77
5,6	56	4	4,38	13,10	1,73	20,80	2,18	5,41	1,11	1,52	3,44
		5	5,41	16,00	1,72	25,40	2,16	6,59	1,10	1,57	4,25
6,3	63	4	4,96	18,90	1,95	29,90	2,45	7,81	1,25	1,69	3,90
		5	6,13	23,10	1,94	36,60	2,44	9,52	1,25	1,74	4,81
		6	7,28	27,10	1,93	42,90	2,43	11,20	1,24	1,78	5,72

(continued)

1	2	3	4	5	6	7	8	9	10	11	12
7	70	4,5	6,20	29,0	2,16	46,0	2,72	12,0	1,39	1,88	4,87
		5	6,86	31,9	2,16	50,7	2,72	13,2	1,39	1,90	5,38
		6	8,15	37,6	2,15	59,6	2,71	15,5	1,38	1,94	6,39
		7	9,42	43,0	2,14	68,2	2,69	17,8	1,37	1,99	7,39
		8	10,70	48,2	2,13	76,4	2,68	20,0	1,37	2,02	8,37
7,5	75	5	7,39	39,5	2,31	62,6	2,91	16,4	1,49	2,02	5,80
		6	8,78	46,6	2,30	73,9	2,90	19,3	1,48	2,06	6,89
		7	10,10	53,3	2,29	84,6	2,89	22,1	1,48	2,10	7,96
		8	11,50	59,8	2,28	94,6	2,87	24,8	1,47	2,15	9,02
		9	12,80	66,1	2,27	105,0	2,86	27,5	1,46	2,18	10,10
8	80	5,5	8,63	52,7	2,47	83,6	3,11	21,8	1,59	2,17	6,78
		6	9,38	57,0	2,47	90,4	3,11	23,5	1,58	2,19	7,36
		7	10,80	65,3	2,45	104,0	3,09	27,0	1,58	2,23	8,51
		8	12,30	73,4	2,44	116,0	3,08	30,3	1,57	2,27	9,65
9	90	6	10,60	82,1	2,78	130,0	3,50	34,0	1,79	2,43	8,33
		7	12,30	94,3	2,77	150,0	3,49	38,9	1,78	2,47	9,64
		8	13,90	106,0	2,76	168,0	3,48	43,8	1,77	2,51	10,90
		9	15,60	118,0	2,75	186,0	3,46	48,6	1,77	2,55	12,20
10	100	6,5	12,80	122,0	3,09	193,0	3,88	50,7	1,99	2,68	10,10
		7	13,80	131,0	3,08	207,0	3,88	54,2	1,98	2,71	10,80
		8	15,60	147,0	3,07	233,0	3,87	60,9	1,98	2,75	12,20
		10	19,20	179,0	3,05	284,0	3,84	74,1	1,96	2,83	15,10
		12	22,80	209,0	3,03	331,0	3,81	86,9	1,95	2,91	17,90
		14	26,30	237,0	3,00	375,0	3,78	99,3	1,94	2,99	20,60
		16	29,70	264,0	2,98	416,0	3,74	112,0	1,94	3,06	23,30
11	110	7	15,20	176,0	3,40	279,0	4,29	72,7	2,19	2,96	11,90
		8	17,20	198,0	3,39	315,0	4,28	81,8	2,18	3,00	13,50
12,5	125	8	19,7	294	3,87	467	4,87	122	2,49	3,36	15,5
		9	22,0	327	3,86	520	4,86	135	2,48	3,40	17,3
		10	24,3	360	3,85	571	4,84	149	2,47	3,45	19,1
		12	28,9	422	3,82	670	4,82	174	2,46	3,53	22,7
		14	33,4	482	3,80	764	4,78	200	2,45	3,61	26,2
		16	37,8	539	3,78	853	4,75	224	2,44	3,68	29,6
14	140	9	24,7	466	4,34	739	5,47	192	2,79	3,78	19,4
		10	27,3	512	4,33	814	5,46	211	2,78	3,82	21,5
		12	32,5	602	4,31	957	5,43	248	2,76	3,90	25,5
16	160	10	31,4	774	4,96	1229	6,25	319	3,19	4,30	24,7
		11	34,4	844	4,95	1341	6,24	348	3,18	4,35	27,0
		12	37,4	913	4,94	1450	6,23	376	3,17	4,39	29,4
		14	43,3	1046	4,92	1662	6,20	431	3,16	4,47	34,0
		16	49,1	1175	4,89	1866	6,17	485	3,14	4,55	38,5
		18	54,8	1299	4,87	2061	6,13	537	3,13	4,63	43,0
		20	60,4	1419	4,85	2248	6,10	589	3,12	4,70	47,4

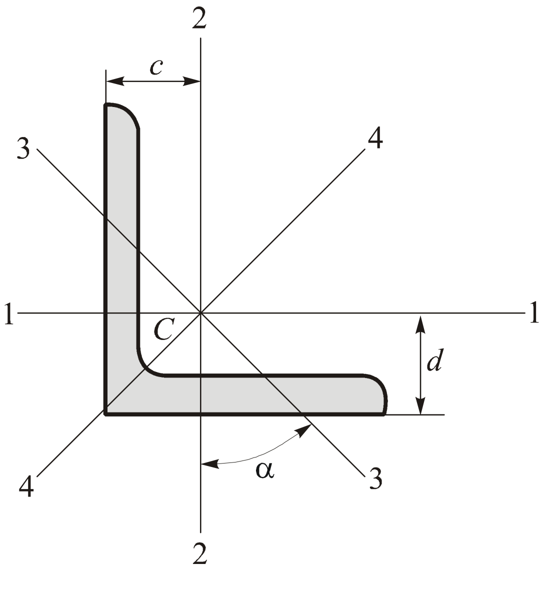
(finished)

1	2	3	4	5	6	7	8	9	10	11	12
18	180	11	38,8	1216	5,60	1133	7,06	500	3,59	4,85	30,5
		12	42,2	1317	5,59	2093	7,04	540	3,58	4,89	33,1
20	200	12	47,1	1823	6,22	2896	7,84	749	3,99	5,37	37,0
		13	50,9	1961	6,21	3116	7,83	805	3,98	5,42	39,9
		14	54,6	2097	6,20	3333	7,81	861	3,97	5,46	42,8
		16	62,0	2363	6,17	3755	7,78	970	3,96	5,54	48,7
		20	76,5	2871	6,12	4560	7,72	1182	3,93	5,70	60,1
		25	94,3	3466	6,06	5494	7,63	1438	3,91	5,89	74,0
		30	111,5	4020	6,00	6351	7,55	1688	3,89	6,07	87,6
22	220	14	60,4	2814	6,83	1170	8,60	1159	4,38	5,93	47,4
		16	68,6	3175	6,81	5045	8,58	1306	4,36	6,02	53,8
25	250	16	78,4	4717	7,76	7492	9,78	1942	4,98	6,75	61,5
		18	87,7	5247	7,73	8337	9,75	2158	4,96	6,83	68,9
		20	97,0	5765	7,71	9160	9,72	2370	4,94	6,91	76,1
		22	106,1	6270	7,69	9961	9,69	2579	4,93	7,00	83,3
		25	119,7	7006	7,65	11125	9,64	2887	4,91	7,11	94,0
		28	133,1	7717	7,61	12244	9,59	3190	4,89	7,23	104,5
		30	142,0	8177	7,59	12965	9,56	3389	4,89	7,31	111,4

Geometrical properties of angle sections with unequal legs (L shapes) (AISC)

Геометрические характеристики стали прокатной угловой неравнополочной (стандарт Американского института стальных конструкций)

Геометричні характеристики сталі прокатної кутової нерівнополичної (стандарт Американського інституту стальних конструкцій)



Notes**:** Axes 1-1 and 2-2 are centroidal axes parallel to the legs.

The distances c and d are measured from the centroid to the backs of the legs.

For axes 1-1 and 2-2, the tabulated value of *W* is the smaller of the two section moduli for those axes.

Axes 3-3 and 4-4 are principal centroidal axes.

The moment of inertia for axis 3-3, which is the smaller of the two principal moments of inertia, can be found from the equation $I_{33} = Ai^2_{min}$.

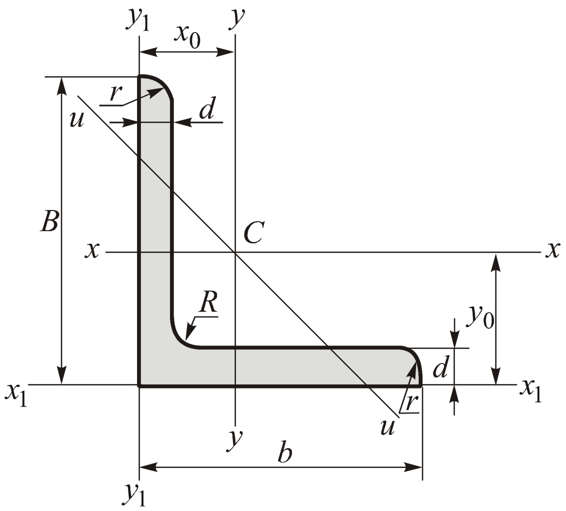
The moment of inertia for axis 4-4, which is the larger of the two principal moments of inertia, can be found from the equation $I_{44} + I_{33} = I_{11} + I_{22}$.

Designation, in.	Weight foot	Area	Axis 1-1				Axis 2-2				Axis 3-3	
			I	W	i	d	I	W	i	c	i_{min}	tan a
	lb	in.^{2}	in.^{4}	in.^{3}	in.	in.	in.^{4}	in.^{3}	in.	in.	in.	
L 8 × 6 × 1	44.2	13.00	80.8	15.1	2.49	2.65	38.8	8.92	1.73	1.65	1.28	0.543
L 8 × 6 × 1/2	23.0	6.75	44.3	8.02	2.56	2.47	21.7	4.79	1.79	1.47	1.30	0.558
L 7 × 4 × 3/4	26.2	7.69	37.8	8.42	2.22	2.51	9.05	3.03	L09	1.01	0.860	0.324
L 7 × 4 × 1/2	17.9	5.25	26.7	5.81	2.25	2.42	6.53	2.12	1.11	0.917	0.872	0.335
L 6 × 4 × 3/4	23.6	6.94	24.5	6.25	1.88	2.08	8.68	2.97	1.12	1.08	0.860	0.428
L 6 × 4 × 1/2	16.2	4.75	17.4	4.33	1.91	1.99	6.27	2.08	1.15	0.987	0.870	0.440
L 5 ×3 1/2 × 3/4	19.8	5.81	13.9	4.28	1.55	1.75	5.55	2.22	0.977	0.996	0.748	0.464
L 5 × 3 1/2 × 1/2	13.6	4.00	9.99	2.99	1.58	1.66	4.05	1.56	1.01	0.906	0.755	0.479
L 5 × 3 × 1/2	12.8	3.75	9.45	2.91	1.59	1.75	2.58	1.15	0.829	0.750	0.648	0.357
L 5 × 3 × 1/4	6.6	1.94	5.11	1.53	1.62	1.66	1.44	0.614	0.861	0.657	0.663	0.371
L 4 × 3 1/2 × 1/2	11.9	3.50	5.32	1.94	1.23	1.25	3.79	1.52	1.04	1.00	0.722	0.750
L 4 × 3 1/2 × 1/4	6.2	1.81	2.91	1.03	1.27	1.16	2.09	0.808	1.07	0.909	0.734	0.759
L 4 × 3 × 1/2	11.1	3.25	5.05	1.89	1.25	1.33	2.42	1.12	0.864	0.827	0.639	0.543
L 4 × 3 × 3/8	8.5	2.48	3.96	1.46	1.26	1.28	1.92	0.866	0.879	0.782	0.644	0.551
L 4 × 3 × 1/4	5.8	1.69	2.77	1.00	1.28	1.24	1.36	0.599	0.896	0.736	0.651	0.558

Geometrical properties of angle sections with unequal legs (L shapes) (GOST 8510-72)

Геометрические характеристики стали прокатной угловой неравнополочной (ГОСТ 8510-72)

Геометричні характеристики сталі прокатної кутової нерівнополичної (Держстандарт 8510-72)



B – width of larger leg,
b – width of smaller leg,
d – thickness of legs,
I – moment of inertia,
i – radius of gyration,
x_0, y_0 – distances from the centroid to the back of the legs.

Designation (number)	B	b	d	Area, cm^2	Axes								tan a	Mass per meter, kg
	mm				$X-X$		$Y-Y$		—		x_0	y_0		
					I_x, cm^4	i_x, cm	I_y, cm^4	i_y, cm	$I_{u\,min}$, cm^4	$i_{u\,min}$, cm	cm	cm		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2,5/1,6	25	16	3	1,16	0,70	0,78	0,22	0,44	0,13	0,34	0,42	0,86	0,392	0,91
3,2/2	32	20	3	1,49	1,52	1,01	0,46	0,55	0,28	0,43	0,49	1,08	0,382	1,17
			4	1,94	1,93	1,00	0,57	0,54	0,35	0,43	0,53	1,12	0,374	1,52
4/2,5	40	25	3	1,89	3,06	1,27	0,93	0,70	0,56	0,54	0,59	1,32	0,385	1,48
			4	2,47	3,93	1,26	1,18	0,69	0,71	0,54	0,63	1,37	0,381	1,94
4,5/2,8	45	28	3	2,14	4,41	1,43	1,32	0,79	0,79	0,61	0,64	1,47	0,382	1,68
			4	2,80	5,68	1,42	1,69	0,78	1,02	0,60	0,68	1,51	0,379	2,20
5/3,2	50	32	3	2,42	6,17	1,60	1,99	0,91	1,18	0,70	0,72	1,60	0,403	1,90
			4	3,17	7,98	1,59	2,56	0,90	1,52	0,69	0,76	1,85	0,401	1,49
5,6/3,6	56	36	4	3,58	11,40	1,78	3,70	1,02	2,19	0,78	0,84	1,82	0,406	2,81
			5	4,41	13,80	1,77	4,48	1,01	2,66	0,78	0,88	1,86	0,404	3,46
6,3/4,0	63	40	4	4,04	16,30	2,01	5,16	1,13	3,07	0,87	0,91	2,03	0,397	3,17
			5	4,98	19,90	2,00	6,26	1,12	3,72	0,86	0,95	2,08	0,396	3,91
			6	5,90	23,30	1,99	7,28	1,11	4,36	0,86	0,99	2,12	0,393	4,63
			8	7,68	29,60	1,96	9,15	1,09	5,58	0,85	1,07	2,20	0,386	6,03
7/4,5	70	45	5	5,59	27,80	2,23	9,05	1,27	5,34	0,98	1,05	2,28	0,406	4,39
7,5/5	75	50	5	6,11	34,80	2,39	12,50	1,43	7,24	1,09	1,17	2,39	0,436	4,79
			6	7,25	40,90	2,38	14,60	1,42	8,48	1,08	1,21	2,44	0,435	5,69
			8	9,47	52,40	2,35	18,50	1,40	10,90	1,07	1,29	2,52	0,430	7,43
8/5	80	50	5	6,36	41,60	2,56	12,70	1,41	7,58	1,09	1,13	2,60	0,387	4,99
			6	7,55	49,00	2,55	14,80	1,40	8,88	1,08	1,17	2,65	0,386	5,92
9/5,6	90	56	5,5	7,86	65,3	2,88	19,7	1,58	11,8	1,22	1,26	2,92	0,384	6,17
			6,0	8,54	70,6	2,88	21,2	1,58	12,7	1,22	1,28	2,95	0,384	6,70
			8,0	11,18	90,9	2,85	27,1	1,56	16,3	1,21	1,36	3,04	0,380	8,77
10/6,3	100	63	6,0	9,59	98,3	3,20	30,6	1,79	18,2	1,38	1,42	3,23	0,393	7,53
			7,0	11,10	113,0	3,19	35,0	1,78	20,8	1,37	1,46	3,28	0,392	8,70
			8,0	12,6	127,0	3,18	39,2	1,77	23,4	1,36	1,50	3,32	0,391	9,87
			10,0	15,50	154,0	3,15	47,1	1,75	28,3	1,35	1,58	3,40	0,387	2,10
11/7	110	70	6,5	11,40	142,0	3,53	45,6	2,00	26,9	1,53	1,58	3,55	0,402	9,98
			8,0	13,90	172,0	3,51	54,6	1,98	32,3	1,52	1,64	3,61	0,400	10,90
12,5/8	125	80	7,0	14,10	227,0	4,01	73,7	2,29	43,4	1,76	1,80	4,01	0,407	11,00
			8,0	16,00	256,0	4,00	83,0	2,28	48,8	1,75	1,84	4,05	0,406	12,50
			10,0	19,70	312,0	3,98	100,0	2,26	59,3	1,74	1,92	4,14	0,404	15,50
			12,0	23,40	365,0	3,95	117,0	2,24	69,5	1,72	2,00	4,22	0,400	18,30
14/9	140	90	8,0	18,00	364,0	4,49	120,0	2,58	70,3	1,98	2,03	4,49	0,411	14,10
			10,0	22,20	444,0	4,47	146,0	2,56	58,5	1,96	2,12	4,58	0,409	17,50
16/10	160	100	9,0	22,90	606,0	5,15	186,0	2,85	110,0	2,20	2,23	5,19	0,391	18,0
			10,0	25,30	667,0	5,13	204,0	2,84	121,0	2,19	2,28	5,23	0,390	19,80
			12,0	30,00	784,0	5,11	239,0	2,82	142,0	2,18	2,36	5,32	0,388	23,60
			14,0	34,70	897,0	5,09	272,0	2,80	162,0	2,16	2,43	5,40	0,385	27,30

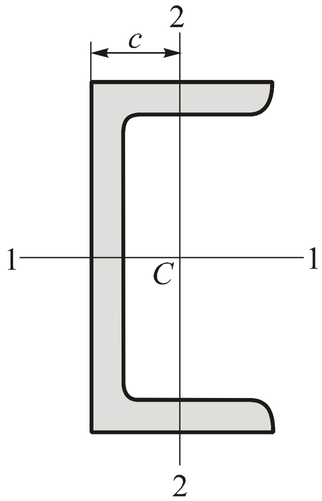
(finished)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
18/11	180	110	10,0	28,30	952,0	5,80	276,0	3,12	165,0	2,42	2,44	5,88	0,375	22,20
			12,0	33,70	1123	5,77	324,0	3,10	194,0	2,40	2,52	5,97	0,374	26,40
20/12,5	200	125	11	34,9	1449	6,45	446	3,58	264	2,75	2,79	6,5	0,392	27,4
			12	37,9	1568	6,43	482	3,57	285	2,74	2,83	6,54	0,392	29,7
			14	43,9	1801	6,41	551	3,54	327	2,73	2,91	6,62	0,390	34,4
			16	49,8	2026	6,38	617	3,52	367	2,72	2,99	6,71	0,388	39,1
25/16	250	160	12	48,3	3147	8,07	1032	4,62	604	3,54	3,53	7,97	0,410	37,9
			16	63,6	4091	8,02	1333	4,58	781	3,50	3,69	8,14	0,408	49,9
			18	71,1	4545	7,99	1475	4,56	866	3,49	3,77	8,23	0,407	55,8
			20	78,5	4987	7,97	1613	4,53	949	3,48	3,85	8,31	0,405	67,7

Geometrical properties of channel sections (C shapes) (AISC)

Геометрические характеристики швеллерных сечений (стандарт Американского института стальных конструкций)

Геометричні характеристики швелерних перерізів (стандарт Американського інституту стальних конструкцій)



Notes: Axes 1-1 and 2-2 are principal centroidal axes.

The distance *c* is measured from the centroid to the back of the web.

For axis 2-2, the tabulated value of *W* is the smaller of the two section moduli for this axis.

Designation	Weight per foot	Area	Depth	Web thickness	Flange		Axis 1-1			Axis 2-2			
					Width	Average thickness	*I*	*W*	*i*	*I*	*W*	*i*	*e*
	lb	in.^{2}	in.	in.	in.	in.	in.^{4}	in.^{3}	in.	in.^{4}	in.^{3}	in.	in.
1	2	3	4	5	6	7	8	9	10	11	12	13	14
C 15 × 50	50.0	14.7	15.00	0.716	3.716	0.650	404	53.8	5.24	11.0	3.78	0.867	0.798
C 15 × 40	40.0	11.8	15.00	0.520	3.520	0.650	349	46.5	5.44	9.23	3.37	0.886	0.777
C 15 × 33.9	33.9	9.96	15.00	0.400	3.400	0.650	315	42.0	5.62	8.13	3.11	0.904	0.787
C 12 × 30	30.0	8.82	12.00	0.510	3.170	0.501	162	27.0	4.29	5.14	2.06	0.763	0.674
C 12 × 25	25	7.35	12.00	0.387	3.047	0.501	144	24.1	4.43	4.47	1.88	0.780	0.674
C 12 × 20.7	20.7	6.09	12.00	0.282	2.942	0.501	129	21.5	4.61	3.88	1.73	0.799	0.698

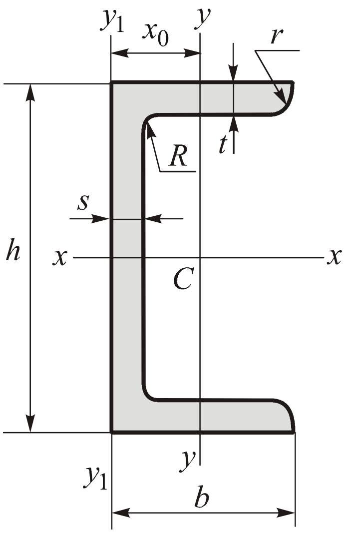
(finished)

1	2	3	4	5	6	7	8	9	10	11	12	13	14
C 10 × 30	30.0	8.82	10.00	0.673	3.033	0.436	103	20.7	3.42	3.94	1.65	0.669	0.649
C 10 × 25	25	7.35	10.00	0.520	2.886	0.436	91.2	18.2	3.52	3.36	1.48	0.676	0.617
C 10 × 20	20.0	5.88	10.00	0.379	2.739	0.436	78.9	15.8	3.66	2.81	1.32	0.692	0.606
C 10 × 15.3	15.3	4.49	10.00	0.240	2.600	0.436	67.4	13.5	3.87	2.28	1.16	0.713	0.634
C 8 × 18.75	18.75	5.51	8.00	0.487	2.527	0.390	44.0	11.0	2.82	1.98	1.01	0.599	0.565
C 8 × 13.75	13.75	4.04	8.00	0.303	2.343	0.390	36.1	9.03	2.99	1.53	0.854	0.615	0.553
C 8 × 11.5	11.5	3.38	8.00	0.220	2.260	0.390	32.6	8.14	3.11	1.32	0.781	0.625	0.571
C 6 × 13	13.0	3.83	6.00	0.437	2.157	0.343	17.4	5.80	2.13	1.05	0.642	0.525	0.514
C 6 × 10.5	10.5	3.09	6.00	0.314	2.034	0.343	15.2	5.06	2.22	0.866	0.564	0.529	0.499
C 6 × 8.2	8.2	2.40	6.00	0.200	1.920	0.343	13.1	4.38	2.34	0.693	0.492	0.537	0.511
C 4 × 7.25	7.25	2.13	4.00	0.321	1.721	0.296	4.59	2.29	1.47	0.433	0.343	0.450	0.459
C 4 × 5.4	5.4	1.59	4.00	0.184	1.584	0.296	3.85	1.93	1.56	0.319	0.283	0.449	0.457

Geometrical properties of channel sections (C shapes) (GOST 8240-72)

Геометрические характеристики швеллерных сечений (ГОСТ 8240-72)

Геометричні характеристики швелерних перерізів (Держстандарт 8240-72)



h – height of a beam,
b – width of a flange,
s – thickness of a web,
t – average thickness of a flange,
W – sectional modulus,
i – radius of gyration,
S_x – first moment of area,
I – moment of inertia,
x_0 – distance from the centroid to the back of the web.

Designation (number)	Dimensions, mm				Area, cm^2	I_x, cm^4	W_x, cm^3	i_x, cm	S_x, cm^3	I_y, cm^4	W_y, cm^3	i_y, cm	x_0, cm	Weight per meter, kg
	h	b	s	t										
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
5	50	32	4,4	7,0	6,16	22,8	9,1	1,92	5,59	5,61	2,75	0,954	1,16	4,84
6,5	65	36	4,4	7,2	7,51	48,6	15,0	2,54	9,0	8,7	3,68	1,08	1,24	5,90
8	80	40	4,5	7,4	8,98	89,4	22,4	3,16	13,3	12,8	4,75	1,19	1,31	7,05
10	100	46	4,5	7,6	10,9	174	34,8	3,99	20,4	20,4	6,46	1,37	1,44	8,59
12	120	52	4,8	7,8	13,3	304	50,6	4,78	29,6	31,2	8,52	1,53	1,54	10,4

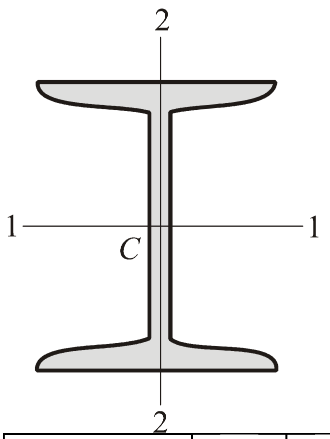
(finished)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
14	140	58	4,9	8,1	15,6	491	70,2	5,60	40,8	45,4	11,0	1,70	1,67	12,3
14a	140	62	4,9	8,7	17,0	545	77,8	5,66	45,1	57,5	13,3	1,84	1,87	13,3
16	160	64	5,0	8,4	18,1	747	93,4	6,42	54,1	63,3	13,8	1,87	1,80	14,2
16a	160	68	5,0	9,0	19,5	823	103	6,49	59,4	78,8	16,4	2,01	2,00	15,3
18	180	70	5,1	8,7	20,7	1090	121	7,24	69,8	86	17,0	2,04	1,94	16,3
18a	180	74	5,1	9,3	22,2	1190	132	7,32	76,1	105	20,0	2,18	2,13	17,4
20	200	76	5,2	9,0	23,4	1520	152	8,07	87,8	113	20,5	2,20	2,07	18,4
20a	200	80	5,2	9,7	25,2	1670	167	8,15	95,9	139	24,2	2,35	2,28	19,8
22	220	82	5,4	9,5	26,7	2110	192	8,89	110	151	25,1	2,37	2,21	21,0
22a	220	87	5,4	10,2	28,8	2330	212	8,99	121	187	30,0	2,55	2,46	22,6
24	240	90	5,6	10,0	30,6	2900	242	9,73	139	208	31,6	2,60	2,42	24,0
24a	240	95	5,6	10,7	32,9	3180	265	9,84	151	254	37,2	2,78	2,67	25,8
27	270	95	6,0	10,5	35,2	4160	308	10,9	178	262	37,3	2,73	2,47	27,7
30	300	100	6,5	11,0	40,5	5810	387	12,0	224	327	43,6	2,84	2,52	31,8
33	330	105	7,0	11,7	46,5	7980	484	13,1	281	410	51,8	2,97	2,59	36,5
36	360	110	7,5	12,6	53,4	10820	601	14,2	350	513	61,7	3,10	2,68	41,9
40	400	115	8,0	13,5	61,5	15220	761	15,7	444	642	73,4	3,26	2,75	48,3

Geometrical properties of S shapes (I-beam sections) (AISC)

Геометрические характеристики двутавровых сечений (стандарт Американского института стальных конструкций)

Геометричні характеристики двотаврових перерізів (стандарт Американського інституту стальних конструкцій)



Note: Axes 1-1 and 2-2 are principal centroidal axes.

Designation	Weight foot	Area	Depth	Web thickness	Flange		Axis 1-1			Axis 2-2		
					Width	Average thickness	I	W	i	I	W	i
	lb	in.^{2}	in.	in.	in.	in.	in.^{4}	in.^{3}	in.	in.^{4}	in.^{3}	in.
1	2	3	4	5	6	7	8	9	10	11	12	13
S 24 × 100	100	29.3	24.00	0.745	7.245	0.870	2390	199	9.02	47.7	13.2	1.27
S 24 × 80	80	23.5	24.00	0.500	7.000	0.870	2100	175	9.47	42.2	12.1	1.34

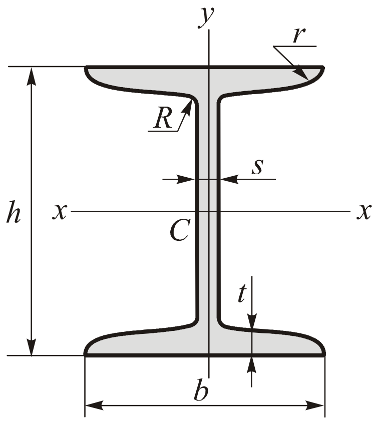
(finished)

1	2	3	4	5	6	7	8	9	10	11	12	13
S 18 × 70	70	20.6	18.00	0.711	6.251	0.691	926	103	6.71	24.1	7.72	1.08
S 18 × 54.7	54.7	16.1	18.00	0.461	6.001	0.691	804	89.4	7.07	20.8	6.94	1.14
S 15 × 50	50	14.7	15.00	0.550	5.640	0.622	486	64.8	5.75	15.7	5.57	1.03
S 15 × 42.9	42.9	12.6	15.00	0.411	5.501	0.622	447	59.6	5.95	14.4	5.23	1.07
S 12 × 50	50	14.7	12.00	0.687	5.477	0.659	305	50.8	4.55	15.7	5.74	1.03
S 12 × 35	35	10.3	12.00	0.428	5.078	0.544	229	38.2	4.72	9.87	3.89	0.980
S 10 × 35	35	10.3	10.00	0.594	4.944	0.491	147	29.4	3.78	8.36	3.38	0.901
S 10 × 25.4	25.4	7.46	10.00	0.311	4.661	0.491	124	24.7	4.07	6.79	2.91	0.954
S 8 × 23	23	6.77	8.00	0.441	4.171	0.426	64.9	16.2	3.10	4.31	2.07	0.798
S 8 × 18.4	18.4	5.41	8.00	0.271	4.001	0.426	57.6	14.4	3.26	3.73	1.86	0.831
S 6 × 17.25	17.25	5.07	6.00	0.465	3.565	0.359	26.3	8.77	2.28	2.31	1.30	0.675
S 6 × 12.5	12.5	3.67	6.00	0.232	3.332	0.359	22.1	7.37	2.45	1.82	1.09	0.705
S 4 × 9.5	9.5	2.79	4.00	0.326	2.796	0.293	6.79	3.39	1.56	0.903	0.646	0.569
S 4 × 7.7	7.7	2.26	4.00	0.193	2.663	0.293	6.08	3.04	1.64	0.764	0.574	0.581

Geometrical properties of S shapes (I-beam sections) (GOST 8239-72)

Геометрические характеристики двутавровых сечений (ГОСТ 8239-72)

Геометричні характеристики двотаврових перерізів (Держстандарт 8239-72)



h – height of a beam,
b – width of a flange,
s – thickness of a web,
t – average thickness of a flange,
I – axial moment of inertia,
W – sectional modulus,
i – radius of gyration,
S_x – first moment of a half-section.

Designation (number)	Dimensions, mm				Area, cm^2	I_x, cm^4	W_x, cm^3	i_x, cm	S_x, cm^3	I_y, cm^4	W_y, cm^3	i_y, cm	Mass per meter, kg
	h	b	s	t									
1	2	3	4	5	6	7	8	9	10	11	12	13	14
10	100	55	4,5	7,2	12,0	198	39,7	4,06	23,0	17,9	6,49	1,22	9,46
12	120	64	4,8	7,3	14,7	350	58,4	4,88	33,7	27,9	8,72	1,38	11,5
14	140	73	4,9	7,5	17,4	572	81,7	5,73	46,8	41,9	11,5	1,55	13,7
16	160	81	5,0	7,8	20,2	873	109	6,57	62,	58,6	14,5	1,70	15,9

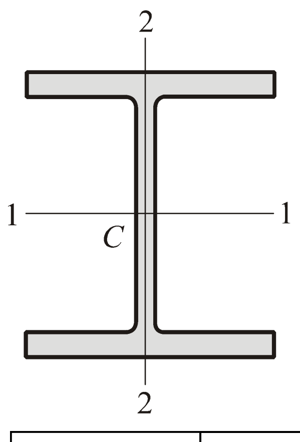
(finished)

1	2	3	4	5	6	7	8	9	10	11	12	13	14
18	180	90	5,1	8,1	23,4	1290	143	7,42	81,4	82,6	18,4	1,88	18,4
18a	180	100	5,1	8,3	25,4	1430	159	7,51	89,8	114	22,8	2,12	19,9
20	200	100	5,2	8,4	26,8	1840	184	8,28	104	115	23,1	2,07	21,0
20a	200	110	5,2	8,6	28,9	2030	203	8,37	114	155	28,2	2,32	22,7
22	220	110	5,4	5,4	30,6	2550	232	9,13	131	157	28,6	2,27	24,0
22a	220	120	5,4	8,9	32,8	2790	254	9,22	143	206	34,3	2,50	25,8
24	240	115	5,6	9,5	34,8	3460	289	9,97	163	198	34,5	2,37	27,3
24a	240	125	5,6	9,8	37,5	3800	317	10,1	178	260	41,6	2,63	29,4
27	270	125	6,0	9,8	40,2	5010	371	11,2	210	260	41,5	2,54	31,5
27a	270	135	6,0	10,2	43,2	5500	407	11,3	229	337	50,0	2,80	33,9
30	300	135	6,5	10,2	46,5	7080	472	12,3	268	337	49,9	2,69	36,5
30a	300	145	6,5	10,7	49,9	7780	518	12,5	292	436	60,1	2,95	39,2
33	330	140	7,0	11,2	53,8	9840	597	13,5	389	419	69,9	2,79	42,2
36	360	145	7,5	12,3	61,9	13380	743	14,7	423	519	71,1	2,89	48,6
40	400	155	8,3	13,0	72,6	19062	953	16,2	545	667	86,1	3,03	57,0
45	450	160	9	14,2	84,7	27696	1231	18,1	708	808	101	3,09	66,5
50	500	170	10	15,2	100	39727	1589	19,9	919	1043	123	3,23	78,5
55	550	180	11	16,5	118	35962	2035	21,8	1181	1366	151	3,39	92,7
60	600	190	12	17,8	138	76806	2560	23,6	1481	1725	182	3,54	108

Geometrical properties of W shapes (wide-flange sections) (AISC)

Геометрические характеристики двутавровых широкополочных сечений (стандарт Американского института стальных конструкций)

Геометричні характеристики двотаврових широкополичних перерізів (стандарт Американського інституту стальних конструкцій)



Note: Axes 1-1 and 2-2 are principal centroidal axes.

Designation	Weight per foot	Area	Depth	Web thick-ness	Flange		Axis 1-1			Axis 2-2		
					Width	Thick-ness	*I*	*S*	*r*	*I*	*S*	r
	lb	in.^{2}	in.	in.	in.	in.	in.^{4}	in.^{3}	in.	in.^{4}	in.^{3}	in.
1	2	3	4	5	6	7	8	9	10	11	12	13
W 30 X 211	211	62.0	30.94	0.775	15.105	1.315	10300	663	12.9	757	100	3.49
W 30 X 132	132	38.9	30.31	0.615	10.545	1.000	5770	380	12.2	196	37.2	2.25

(finished)

1	2	3	4	5	6	7	8	9	10	11	12	13
W 24 X 162	162	47.7	25.00	0.705	12.955	1.220	5170	414	10.4	443	68.4	3.05
W 24 X 94	94	27.7	24.31	0.515	9.065	0.875	2700	222	9.87	109	24.0	1.98
W18 X 119	119	35.1	18.97	0.655	11.265	1.060	2190	231	7.90	253	44.9	2.69
W18 X 71	71	20.8	18.47	0.495	7.635	0.810	1170	127	7.50	60.3	15.8	1.70
W 16 X 100	100	29.4	16.97	0.585	10.425	0.985	1490	175	7.10	186	35.7	2.51
W 16 X 77	77	22.6	16.52	0.455	10.295	0.760	1110	134	7.00	138	26.9	2.47
W 16 X 57	57	16.8	16.43	0.430	7.120	0.715	758	92.2	6.72	43.1	12.1	1.60
W 16 X 31	31	9.12	15.88	0.275	5.525	0.440	375	47.2	6.41	12.4	4.49	1.17
W 14 X 120	120	35.3	14.48	0.590	14.670	0.940	1380	190	6.24	495	67.5	3.74
W 14 X 82	82	24.1	14.31	0.510	10.130	0.855	882	123	6.05	148	29.3	2.48
W 14 X 53	53	15.6	13.92	0.370	8.060	0.660	541	77.8	5.89	57.7	14.3	1.92
W 14 X 26	26	7.69	13.91	0.255	5.025	0.420	245	35.3	5.65	8.91	3.54	1.08
W 12 X 87	87	25.6	12.53	0.515	12.125	0.810	740	118	5.38	241	39.7	3.07
W 12 X 50	50	14.7	12.19	0.370	8.080	0.640	394	64.7	5.18	56.3	13.9	1.96
W 12 X 35	35	10.3	12.50	0.300	6.560	0.520	285	45.6	5.25	24.5	7.47	1.54
W 12 X 14	14	4.16	11.91	0.200	3.970	0.225	88.6	14.9	4.62	2.36	1.19	0.753
W 10 X 60	60	17.6	10.22	0.420	10.080	0.680	341	66.7	4.39	116	23.0	2.57
W 10 X 45	45	13.3	10.10	0.350	8.020	0.620	248	49.1	4.32	53.4	13.3	2.01
W 10 X 30	30	8.84	10.47	0.300	5.810	0.510	170	32.4	4.38	16.7	5.75	1.37
W 10 X 12	12	3.54	9.87	0.190	3.960	0.210	53.8	10.9	3.90	2.18	1.10	0.785
W 8 X 35	35	10.3	8.12	0.310	8.020	0.495	127	31.2	3.51	42.6	10.6	2.03
W 8 X 28	28	8.25	8.06	0.285	6.535	0.465	98.0	24.3	3.45	21.7	6.63	1.62
W 8 X 21	21	6.16	8.28	0.250	5.270	0.400	75.3	18.2	3.49	9.77	3.71	1.26
W 8 X 15	15	4.44	8.11	0.245	4.015	0.315	48.0	11.8	3.29	3.41	1.70	0.876