

4. Angles

L-shape steel angles that can have equal or unequal legs, commonly used in construction where structural stability is required by joining with other steel members.

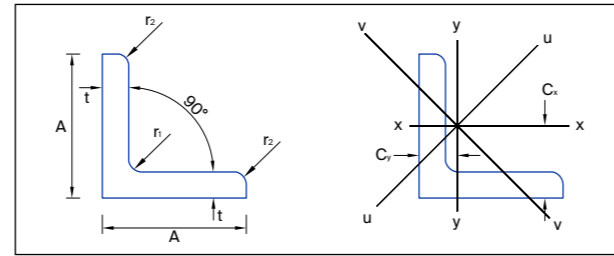
4.1 Equal Angles

4.2 Unequal Angles

Equal and Unequal Angles Standard specifications

Material	Yield strength			Tensile strength N/mm ²	Min. Elongation L ₀ =5.65√S ₀	Min. Charpy V-notch.	Dimensions & Tolerances
	≤11mm	>11 - <40mm	≥40mm				
AS 3679.1							
Grade 300	320	300	280	min. 440	22%	27J @ 0°C	AS 3679.1
Grade 350	360	340	330	min. 480	20%	27J @ 0°C	
ASTM A36 (1996)	min. 250			400-550	20-21 %	-	ASTM A6
ASTM A572							
Grade 42	min. 290			min. 415	20-24 %	-	
Grade 50	min. 345			min. 450	18-21 %	-	
Grade 60	min. 415			min. 520	16-18 %	-	
Grade 65	min. 450			min. 550	15-17 %	-	
ASTM A992	345 - 450			min. 450	18-21 %	-	
EN 10025							
S275JR	275	265	255 - 225	410-560	18-23 %	27J @ 20°C	EN 10279
S355JR	355	345	335 - 295	470-630	17-22 %	27J @ 20°C	
S355J0	355	345	335 - 295	470-630	17-22 %	27J @ 0°C	
S355J2	355	345	335 - 295	470-630	17-22 %	27J @ -20°C	
JIS 3101							
SS400	245	235	215	400-510	17-23 %	-	JIS 3192
SS490	285	275	255	490-610	15-21 %	-	
SS540	400	390	-	min. 540	13-17 %	-	
JIS 3106							
SM400A	245	235	215	400-510	18-24 %	-	JIS 3192
SM400B	245	235	215	400-510	18-24 %	27J @ 0°C	
SM400C	245	235	215	400-510	18-24 %	47J @ 0°C	
SM490A	325	315	295	490-610	17-23 %	-	
SM490B	325	315	295	490-610	17-23 %	27J @ 0°C	
SM490C	325	315	295	490-610	17-23 %	47J @ 0°C	
SM490YA	365	355	335	490-610	15-21 %	-	
SM490YB	365	355	335	490-610	15-21 %	27J @ 0°C	
SM520B	365	355	335	520-640	15-21%	27J @ 0°C	
SM520C	365	355	335	520-640	15-21 %	47J @ 0°C	

4.1 Equal Angles

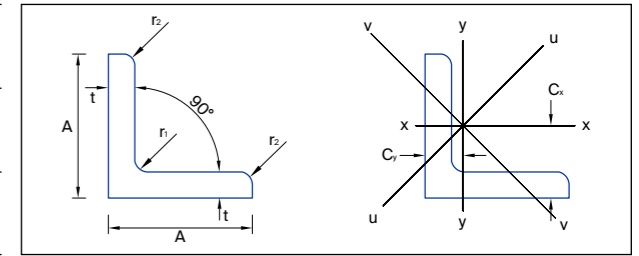


Designation		Mass per Metre	Radius		Area of Section	Distance Centre of Gravity	Second Moment of Area			Radius of Gyration			Elastic Modulus
Size	Thickness		Root	Toe			Axis x-x, y-y	Axis u-u	Axis v-v	Axis x-x, y-y	Axis u-u	Axis v-v	
mm	mm	kg/m	mm	mm	cm²	cm	cm⁴	cm⁴	cm⁴	cm	cm	cm	cm²
20x20	3	0.885	3.5	2.4	1.11	0.593	0.381	0.601	0.160	0.585	0.735	0.380	0.271
25x25	3	1.12	3.5	2.4	1.41	0.718	0.784	1.24	0.326	0.745	0.938	0.481	0.440
	4	1.45	3.5	2.4	1.84	0.758	1.00	1.58	0.422	0.737	0.926	0.479	0.574
	5	1.70	3.5	2.4	2.25	0.796	1.19	1.87	0.516	0.728	0.912	0.479	0.701
30x30	3	1.36	5	2.4	1.74	0.836	1.41	2.23	0.590	0.901	1.13	0.582	0.652
	4	1.76	5	2.4	2.27	0.879	1.81	2.86	0.758	0.893	1.12	0.578	0.853
	5	2.16	5	2.4	2.78	0.919	2.17	3.42	0.921	0.884	1.11	0.576	1.04
35x35	6	1.65	5	2.4	3.87	1.08	4.13	6.51	1.76	1.03	1.30	0.674	1.71
38x38	3	1.72	6	2.4	2.24	1.03	2.99	4.72	1.25	1.15	1.45	0.748	1.08
	4	2.36	6	2.4	2.93	1.07	3.85	6.10	1.61	1.15	1.44	0.741	1.41
40x40	3	1.83	6	2.4	2.36	1.08	3.51	5.55	1.47	1.22	1.53	0.789	1.20
	4	2.42	6	2.4	3.09	1.12	4.53	7.18	1.89	1.21	1.52	0.782	1.58
	5	2.95	6	2.4	3.80	1.17	5.48	8.68	2.29	1.20	1.51	0.776	1.94
45x45	6	3.52	6	2.4	4.49	1.20	6.37	10.1	2.69	1.19	1.50	0.773	2.28
	4	2.74	7	2.4	3.52	1.24	6.59	10.4	2.75	1.37	1.72	0.884	2.02
	5	3.38	7	2.4	4.33	1.29	7.99	12.6	3.34	1.36	1.71	0.878	2.49
50x50	3	2.33	7	2.4	2.99	1.32	7.06	11.1	2.97	1.54	1.93	0.997	1.92
	4	3.06	7	2.4	3.92	1.37	9.17	14.5	3.82	1.53	1.92	0.987	2.52
	4.5	3.40	7	2.4	4.38	1.39	10.2	16.1	4.23	1.52	1.92	0.984	2.82
	5	3.77	7	2.4	4.83	1.41	11.2	17.7	4.64	1.52	1.91	0.980	3.11
60x60	6	4.43	7	2.4	5.72	1.45	13.0	20.6	5.43	1.51	1.90	0.974	3.67
	8	5.78	7	2.4	7.44	1.53	16.5	25.9	6.97	1.49	1.87	0.968	4.74
	5	4.55	8	2.4	5.86	1.65	19.8	31.4	8.24	1.84	2.31	1.19	4.56
	6	5.42	8	2.4	6.95	1.70	23.2	36.8	9.65	1.83	2.30	1.18	5.40
63x63	5	4.75	8	2.4	6.16	1.73	23.1	36.6	9.58	1.93	2.44	1.25	5.05
	6	5.71	8	2.4	7.31	1.77	27.1	42.9	11.2	1.92	2.42	1.24	5.98
	8	7.42	8	2.4	9.55	1.85	34.5	54.6	14.4	1.90	2.39	1.23	7.76
65x65	5	5.00	9	2.4	6.40	1.77	25.5	40.3	10.6	2.00	2.51	1.29	5.39
	6	5.91	9	2.4	7.59	1.82	29.9	47.4	12.4	1.98	2.50	1.28	6.38
	8	7.66	9	2.4	9.91	1.90	38.2	60.4	15.9	1.96	2.47	1.27	8.29
	9	8.55	9	2.4	11.0	1.94	42.0	66.4	17.6	1.95	2.45	1.26	9.21
70x70	6	6.38	9	2.4	8.19	1.94	37.7	59.8	15.7	2.15	2.70	1.38	7.46
	7	7.38	9	2.4	9.46	1.98	43.1	68.3	17.9	2.13	2.69	1.38	8.59
75x75	5.5	6.30	10	4.8	8.06	2.02	42.2	66.8	17.6	2.29	2.88	1.48	7.71
	6	6.85	10	4.8	8.76	2.04	45.7	72.4	19.0	2.28	2.88	1.47	8.38
	8	9.03	10	4.8	11.5	2.13	59.0	93.5	24.5	2.27	2.85	1.46	11.0
	9	9.96	10	4.8	12.8	2.17	65.3	103	27.2	2.26	2.84	1.46	12.3
	10	10.99	10	4.8	14.1	2.21	71.3	113	29.8	2.25	2.83	1.45	13.5
	12	13.00	10	4.8	16.7	2.29	82.7	130	35.0	2.23	2.80	1.45	15.9
80x80	6	7.34	10	4.8	9.36	2.17	56.0	88.7	23.2	2.45	3.08	1.58	9.6
	8	9.66	10	4.8	12.3	2.26	72.4	115	30.0	2.43	3.06	1.56	12.6
	10	11.8	10	4.8	15.1	2.34	87.7	139	36.5	2.41	3.03	1.55	15.5

Dimensions EN 10056/ JIS G 3192

Specification EN10025/ ASTM A36/ ASTM A572/ JIS G 3101

Size Range 25mm x 25mm to 250mm x 250mm



Designation		Mass per Metre	Radius		Area of Section	Distance Centre of Gravity	Second Moment of Area			Radius of Gyration			Elastic Modulus
Size	Thickness		Root	Toe			Axis x-x, y-y	Axis u-u	Axis v-v	Axis x-x, y-y	Axis u-u	Axis v-v	
mm	mm	kg/m	mm	mm	cm²	cm	cm⁴	cm⁴	cm⁴	cm	cm	cm	cm²
90x90	6	8.30	11	4.8	10.6	2.41	81.0	128	33.7	2.76	3.48	1.78	12.3
	7	9.61	11	4.8	12.3	2.46	93.2	148	38.7	2.76	3.47	1.77	14.3
	8	10.90	11	4.8	13.9	2.50	105	167	43.5	2.75	3.46	1.77	16.2
	9	12.20	11	4.8	15.6	2.54	117	185	48.2	2.74	3.45	1.76	18.0
	10	13.40	11	4.8	17.2	2.58	128	202	52.9	2.73	3.43	1.76	19.9
	12	15.90	11	4.8	20.3	2.66	149	235	62.1	2.70	3.40	1.75	23.5
100x100	13	17.00	11	4.8	21.9	2.70	159	251	66.6	2.69	3.39	1.74	25.2
	6	9.20	12	4.8	11.9	2.65	113	178	47.0	3.08	3.88	1.99	15.3
	7	10.70	12	4.8	13.7	2.70	130	206	53.9	3.08	3.87	1.98	17.8
	8	12.20	12	4.8	15.6	2.75	146	232	60.6	3.07	3.86	1.97	20.2
	10	15.00	12	4.8	19.2	2.83	178	283	73.8	3.05	3.84	1.96	24.8
120x120	12	17.80	12	4.8	22.8	2.91	208	330	86.5	3.02	3.81	1.95	29.4
	13	19.10	12	4.8	24.5	2.95	222	352	92.8	3.01	3.79	1.95	31.5
	15	21.90	12	4.8	28.0	3.02	250	395	105	2.99	3.76	1.94	35.8
	8	14.70	13	4.8	18.8	3.24	259	411	107	3.71	4.67	2.38	29.5
	10	18.20	13	4.8	23.3	3.32	316	502	130	3.69	4.64	2.37	36.4
125x125	12	21.60	13	4.8	27.6	3.41	371	588	153	3.66	4.62	2.36	43.1
	15	26.60	13	4.8	34.0	3.52	448	710	186	3.63	4.57	2.34	52.8
	8	14.90	14	4.8	19.7	3.36	294	466	122	3.87	4.87	2.49	32.2
	10	19.09	14	4.8	24.3	3.44	360	570	149	3.84	4.84	2.47	39.7
130x130	12	22.67	14	4.8	28.9	3.53	422	669	174	3.82	4.81	2.46	47.0
	9	17.90	14	4.8	22.9	3.53	370	586	153	4.02	5.06	2.58	39.0
	10	19.70	14	4.8	25.3	3.57	406	645	168	4.01	5.05	2.57	43.1
	12	23.50	14	4.8	30.1	3.65	477	758	197	3.98	5.02	2.56	51.1
	15	28.80	14	4.8	37.1	3.77	578	916	240	3.95	4.97	2.54	62.6
	16	30.70	14	4.8	39.4	3.81	610	966	253	3.94	4.95	2.54	66.3
150x150	8	18.00	16	4.8	23.8	3.97	518	820	215	4.66	5.87	3.01	46.9
	10	23.00	16	4.8	29.5	4.06	635	1008	263	4.64	5.85	2.99	58.0
	12	27.30	16	4.8	35.0	4.14	748	1187	309	4.62	5.82	2.97	68.9
	15	33.80	16	4.8	43.2	4.26	909	1442	375	4.59	5.78	2.95	84.6
	16	35.70	16	4.8	45.9	4.30	960	1523	397	4.57	5.76	2.94	89.8
	18	40.10	16	4.8	51.2	4.38	1060	1680	440	4.55	5.73	2.93	99.8
175x175	19	41.90	16	4.8	53.8	4.42	1109	1756	462	4.54	5.71	2.93	105
	12	31.80	16	4.8	41.0	4.77	1208	1920	497	5.43	6.84	3.48	94.9
	15	39.40	16	4.8	50.7	4.89	1474	2342	606	5.39	6.80	3.46	117
	200x200	12	36.55	18	4.8	47.2	5.38	1829	2906	753	6.23	7.85	4.00
13		39.49	18	4.8	50.9	5.42	1967	3126	809	6.22	7.84	3.99	135
15		45.30	18	4.8	58.3	5.50	2237	3555	919	6.19	7.81	3.97	154
16		48.50	18	4.8	62.0	5.54	2369	3765	973	6.18	7.79	3.96	164
18		54.20	18	4.8	69.4	5.62	2627	4174	1080	6.15	7.76	3.95	183
20		59.90	18	4.8	76.6	5.70	2877	4569	1185	6.13	7.72	3.93	201
24		71.10	18	4.8	90.8	5.85	3357	5322	1391	6.08	7.65	3.91	237
25		73.60	18	4.8	94.3	5.89	3472	5502	1442	6.07	7.64	3.91	246
26		76.80	18	4.8	97.8	5.93	3586	5680	1492	6.05	7.62	3.91	255
250x250	25	93.70	20	4.8	120	7.14	7030	11170	2891	7.67	9.67	4.92	394
	28	104.00	20	4.8	133	7.25	7741	12290	3195	7.63	9.61	4.90	436
	32	118.00	20	4.8	151	7.40	8650	13710	3593	7.58	9.54	4.89	491
	35	128.00	20	4.8	164	7.51	9305	14720	3887	7.54	9.49	4.88	532