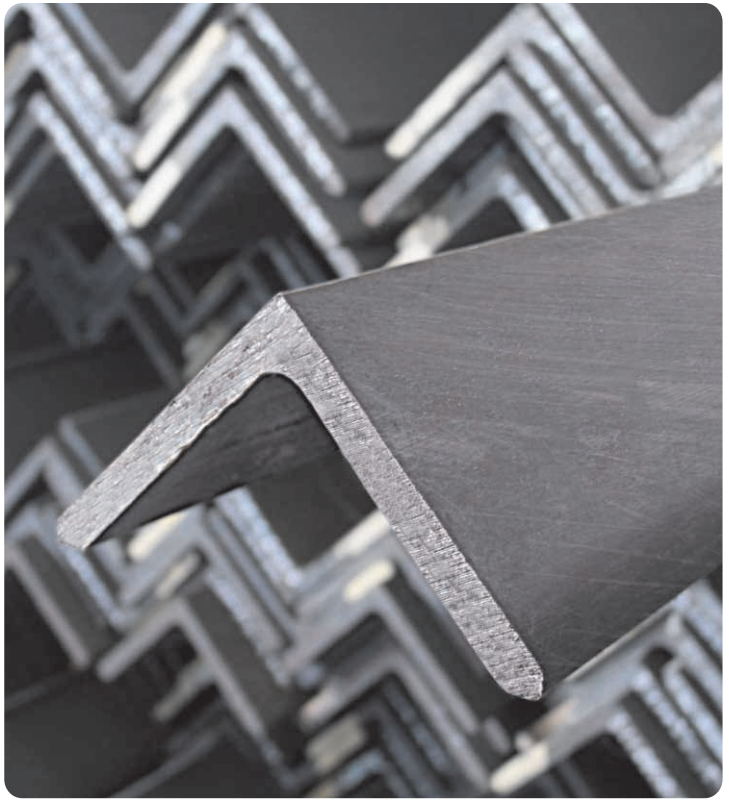
Angle (Hot Rolled)



For uses that requires one leg of the angle to be longer than the other, the unequal Angle/L-Angle can be used. If the steel angle's requires the angle of degree other than 90 degrees, a V-Angle will be more suitable.

For this type of product, our company produces two variations, the Unequal Angle/L-Angle and the Equal Angle. There are certain variations in the steel angles depending on its basic construction.

One of hot rolled product under our range is the Angle Beam. Steel Angle is an important structural steel section for the manufacture of communication tower and power towers, as well as workshops and other engineering projects. It can be composed into different bearing components with different structures and it can also be used as joint piece between the components.

Gunung Garuda's Angles are hot rolled and are produced by rolling pre-heated blooms into an Angle shape. Our angle bars are manufactured under strict quality controls to ensure consistency and conformity to regional and international standards.

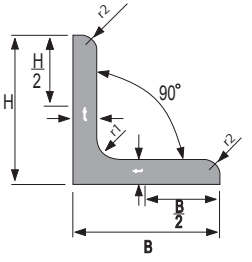
Grades and sizes other than shown on the table may also be available depending upon section and quantity requirements.

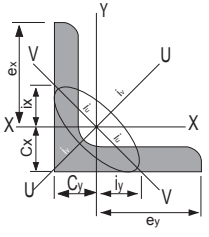
Size Range	:	50x50 to 250x250
Standard Length	:	6m & 12m
Thickness Range	:	5mm to 35mm
Annual Capacity	:	> 60.000 MT/Y
Standards	:	JIS G 3101 SS400 (Mild Steel)
		JIS G 3101 SS540 (High Strength)

EQUAL ANGLE

Metric Size

STANDARD SECTIONAL DIMENSIONS				SECTION AREA	UNIT WEIGHT			INFORMATIVE REFERENCE								REMARKS
								CENTER OF GRAVITY	GEOMETRICAL MOMENT OF INERTIA			RADIUS OF GYRATION OF AREA			MODULUS OF SECTION	
H x B	t	r_1	r_2	A				$C_x = C_y$	$I_x = I_y$	Max I_u	Min I_v	$i_x = i_y$	Max i_u	Min i_v	$Z_x = Z_y$	
mm x mm	mm	mm	mm	cm^2	kg/m	kg/6m	kg/12m	cm	cm^4	cm^4	cm^4	cm	cm	cm	cm^3	
40 x 40	4	4.5	2	2.336	1.83	10.98	21.96	1.090	3.530	5.60	1.460	1.230	1.55	0.79	1.210	
50 x 50	5	6.5	3	4.802	3.77	22.62	45.24	1.410	11.100	17.50	4.580	1.520	1.91	0.98	3.080	
50 x 50	6	6.5	4.5	5.644	4.43	26.58	53.16	1.440	12.600	20.00	5.230	1.500	1.88	0.96	3.550	
60 x 60	5	6.5	3	5.802	4.55	27.5	55	1.660	19.600	31.20	8.090	1.840	2.32	1.18	4.520	
60 x 60	6	8	4	6.910	5.40	32.5	65	1.700	22.790	36.16	9.420	1.820	2.29	1.17	5.280	
65 x 65	5	8.5	3	6.367	5.00	30	60	1.770	25.300	40.10	10.500	1.990	2.51	1.28	5.350	
65 x 65	6	8.5	4	7.527	5.91	35.5	71	1.810	29.400	46.60	12.200	1.980	2.49	1.27	6.260	
65 x 65	8	8.5	6	9.761	7.66	46	92	1.880	36.800	58.30	15.300	1.940	2.44	1.25	7.960	
70 x 70	6	8.5	4	8.127	6.38	38.5	77	1.930	37.100	58.90	15.300	2.140	2.69	1.37	7.330	
75 x 75	6	8.5	4	8.727	6.85	41	82	2.060	46.100	73.20	19.000	2.300	2.90	1.48	8.470	
80 x 80	6	8.5	4	9.230	7.32	43.9	87.8	2.180	56.400	89.60	23.200	2.460	3.10	1.58	9.700	
90 x 90	7	10	5	12.220	9.59	57.6	115.2	2.460	93.000	148.00	38.300	2.760	3.48	1.77	14.200	
90 x 90	10	10	7	17.000	13.30	80	160	2.570	125.000	199.00	51.700	2.710	3.42	1.74	19.500	
100 x 100	7	10	5	13.620	10.70	64	128	2.710	129.000	205.00	53.200	3.080	3.88	1.98	17.700	
100 x 100	10	10	7	19.000	14.90	89.5	179	2.820	175.000	278.00	72.000	3.040	3.83	1.95	24.400	
120 x 120	8	12	5	18.760	14.70	88	176	3.240	258.000	410.00	106.000	3.710	4.67	2.38	29.500	
120 x 120	11	13	6.5	25.370	19.90	119.5	239	3.300	340.000	541.00	140.000	3.660	4.62	2.35	39.360	
120 x 120	12	13	6.5	27.540	21.60	130	260	3.400	367.000	583.00	151.000	3.650	4.60	2.35	42.680	
130 x 130	9	12	6	22.740	17.90	107.4	214.8	3.530	366.000	583.00	150.000	4.010	5.06	2.57	38.700	
130 x 130	12	12	8.5	29.760	23.40	140.5	281	3.640	467.000	743.00	192.000	3.960	5.00	2.54	49.900	
150 x 150	12	14	7	34.770	27.30	164	328	4.140	740.000	1,180.00	304.000	4.610	5.82	2.96	68.100	
150 x 150	15	14	10	42.740	33.60	202	404	4.240	888.000	1,410.00	365.000	4.560	5.75	2.92	82.600	
150 x 150	19	14	10	53.380	41.90	251.5	503	4.400	1,090.000	1,730.00	451.000	4.520	5.69	2.91	103.000	
175 x 175	12	15	11	40.520	31.80	191	382	4.730	1,170.000	1,860.00	480.000	5.380	6.78	3.44	91.800	
175 x 175	15	15	11	50.210	39.40	236.5	473	4.850	1,440.000	2,290.00	589.000	5.350	6.75	3.48	114.000	
200 x 200	15	17	12	57.750	45.30	272	544	5.460	2,180.000	3,470.00	891.000	6.140	7.75	3.93	150.000	
200 x 200	20	17	12	76.000	59.70	358	716	5.670	2,820.000	4,490.00	1,160.000	6.090	7.68	3.90	197.000	
200 x 200	25	17	12	93.750	73.60	442	884	5.860	3,420.000	5,420.00	1,410.000	6.040	7.61	3.88	242.000	
250 x 250	25	24	12	119.400	93.70	562	1124	7.100	6,950.000	11,000.00	2,860.000	7.630	9.62	4.89	388.000	
250 x 250	35	24	18	162.600	128.00	768	1536	7.450	9,110.000	14,400.00	3,790.000	7.490	9.42	4.83	519.000	



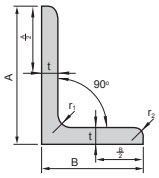


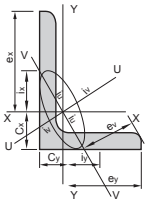
NOTE : Non standard sizes are available upon request and subject to minimum quantity

UNEQUAL ANGLE

Metric Size

STANDARD SECTIONAL DIMENSIONS					SECTION AREA	UNIT WEIGHT			INFORMATIVE REFERENCE											REMARKS
									CENTER OF GRAVITY		GEOMETRICAL MOMENT OF INERTIA				RADIUS OF GYRATION OF AREA				tan α	MODULUS OF SECTION	
H x B	t	r_1	r_2		A				C_x	C_y	I_x	I_y	Max I_u	Min I_v	i_x	i_y	Max i_u	Min i_v		Z_x	Z_y	
mm x mm	mm	mm	mm		cm^2	kg/m	kg/6m	kg/12m	cm	cm	cm^4	cm^4	cm^4	cm^4	cm	cm	cm	cm		cm^3	cm^3	
• 90 x 75	9	8.5	6		14.04	11.0	66.0	132.0	2.75	2.00	109	68.1	143	34.1	2.78	2.20	3.19	1.56	0.676	17.4	12.4	
•100 x 75	7	10	5		11.87	9.32	55.9	111.8	3.06	1.83	118	56.9	144	30.8	3.15	2.19	3.49	1.61	0.548	17.0	10.0	
•100 x 75	10	10	7		16.50	13.0	78.0	156.0	3.17	1.94	159	76.1	194	41.3	3.11	2.15	3.43	1.58	0.543	23.3	13.7	
125 x 75	7	10	5		13.62	10.7	64.2	128.4	4.10	1.64	219	60.4	243	36.4	4.01	2.11	4.23	1.64	0.362	26.1	10.3	
125 x 75	10	10	7		19.00	14.9	89.4	178.8	4.22	1.75	299	80.8	330	49.0	3.96	2.06	4.17	1.61	0.357	36.1	14.1	
125 x 75	13	10	7		24.31	19.1	114.6	229.2	4.35	1.87	376	101	415	61.9	3.93	2.04	4.13	1.60	0.352	46.1	17.9	
125 x 90	10	10	7		20.50	16.1	96.6	193.2	3.95	2.22	318	138	380	76.2	3.94	2.59	4.30	1.93	0.505	37.2	20.3	
125 x 90	13	10	7		26.26	20.6	123.6	247.2	4.07	2.34	401	173	477	96.3	3.91	2.57	4.26	1.91	0.501	47.5	25.9	
150 x 90	9	12	6		20.94	16.4	98.4	196.8	4.95	1.99	485	133	537	80.4	4.81	2.52	5.06	1.96	0.361	48.2	19.0	
150 x 90	12	12	8.5		27.36	21.5	129.0	258.0	5.07	2.10	619	167	685	102	4.76	2.47	5.00	1.93	0.357	62.3	24.3	
•150 x 100	9	12	6		21.84	17.1	102.6	205.2	4.76	2.30	502	181	579	104	4.79	2.88	5.15	2.18	0.439	49.1	23.5	
•150 x 100	12	12	8.5		28.56	22.4	134.4	268.8	4.88	2.41	642	228	738	132	4.74	2.83	5.09	2.15	0.435	63.4	30.1	
•150 x 100	15	12	8.5		35.25	27.7	166.2	332.4	5.00	2.53	782	276	897	161	4.71	2.80	5.04	2.14	0.431	78.2	37.0	





NOTE : Non standard sizes are available upon request and subject to minimum quantity

• Not Available

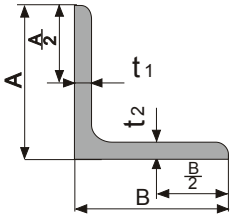
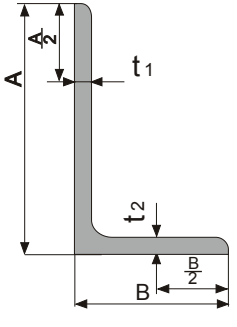
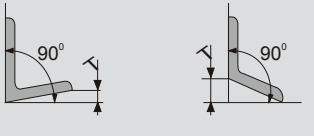
MECHANICAL PROPERTIES

Metric Size

CLASSIFICA TION	YIELD POINT N/mm²		TENSILE STRENGTH N/mm²	ELONGA TION %		
	Thickness (mm)			Thickness (mm)		
	⩽16	> 16		⩽5	5 to 16	> 16
JIS G 3101 SS400	245	235	400 - 510	21	17	21
JIS G 3101 SS540	400	390	min 540	16	13	17
JIS G 3101 SS490	285	275	490-610	19	15	19
JIS G 3106 SV400 A,B,C	245	235	400-510	23	18	22
JIS G 3106 SV490 A,B,C	325	315	490-610	22	17	21
JIS G 3106 SVS490 YA, YB	365	355	490-610	19	15	19
JIS G 3106 SV520 B,C	365	355	520-640	19	15	19
JIS G 3106 SV570	460	450	570-720	19	19	26

DIMENSIONAL TOLERANCE

Metric Size | JIS 3192 / TIS 1227-194

DIMENSION			TOLERANCE	REMARKS
Leg Length (A or B)	Under 50 in depth		± 1.5	
	50 or over to and excl. 100		± 2.0	
	100 or over to and excl. 200		± 3.0	
	200 or over		± 4.0	
Thickness t, t_1, t_2	For Leg Length A (B for T Section) or under 130 in depth	Under 6.3	± 0.6	
		6.3 or over to and excl.10	± 0.7	
		10 or over to and excl.16	± 0.8	
		16 or over	± 1.0	
	For Leg Length A (B for T Section) or under 130 or over in depth	Under 6.3	± 0.7	
		6.3 or over to and excl.10	± 0.8	
		10 or over to and excl.16	± 1.0	
		16 or over to and excl.25	± 1.2	
		25 or over	± 1.5	
Length	7m or under		+ 40 - 0	
	Over 7m		Add 5mm to the plus side tolerance given in the above column for every 1m. Increase in length or its fraction	
Out of Square (T)	I Section		2.0 % or under of width B	
	Sections excluding I and T sections		2.5 % or under of width of flange B (or leg length)	
Bend	I and T Sections		0.20% or under of length	To be applied to bend such as sweep and camber
	Sections excluding I and T sections		0.30% or under of length	

CHEMICAL COMPOSITION

According JIS G 3101, G 3106

SYMBOL OF GRADE	CHEMICAL COMPOSITION (%)					
		C	Si	Mn	P	S
SS 400, 490		—	—	—	0.050 max	0.050 max
SS 540		0.3 max	—	1.60 max	0.040 max	0.040 max
SM 400 A	50 mm or under in thickness over 50 mm, up to and incl. 200 mm in thickness	0.23 max 0.25 max	—	2.5 x c min (1)	0.035 max	0.035 max
SM 400 B	50 mm or under in thickness over 50 mm, up to and incl. 200 mm in thickness	0.20 max 0.22 max	0.35 max	0.60 -1.40	0.035 max	0.035 max
SM 400 C	100 mm or under in thickness	0.18 max	0.35 max	1.40 max	0.035 max	0.035 max
SM 490 A	50 mm or under in thickness over 50 mm, up to and incl. 200 mm in thickness	0.20 max 0.22 max	0.55 max	1.60 max	0.035 max	0.035 max
SM 490 B	50 mm or under in thickness over 50 mm, up to and incl. 200 mm in thickness	0.18 max 0.20 max	0.55 max	1.60 max	0.035 max	0.035 max
SM 490 C	100 mm or under in thickness	0.18 max	0.55 max	1.60 max	0.035 max	0.035 max
SM 490 YA SM 490 YB	100 mm or under in thickness	0.20 max	0.55 max	1.60 max	0.035 max	0.035 max
SM 520 B SM 520 C	100 mm or under in thickness	0.20 max	0.55 max	1.60 max	0.035 max	0.035 max
SM 570	100 mm or under in thickness	0.18 max	0.55 max	1.60 max	0.035 max	0.035 max

Note: (1) The value of carbon here in is the actual cast analysis value

CORRESPONDING SPECIFICATION

Metric Size

TYPE OF MA TERIAL	CLASSIFIED BY TENSILE STRENGTH		SPECIFICA TIONS			
	Tensile strength Class (N/mm ^{2})	Special specification	JIS	ASTM	BS 4360	DIN
General Structure	400	—	G 3101 SS 400	A 36	Gr. 43A	St 33
	490	—	G 3101 SS 490	—	Gr. 50A	St 50-2
Welded Structure	400	—	G 3106 SM 400A	A 572 Gr. 42	Gr. 43B	—
		Charpy impact test	G 3106 SM 400B,C	—	Gr. 43C	St 37-2 RSt 37-2
		Charpy impact test for low temperature	—	—	Gr. 43D	—
	490	—	G 3106 SM 490A	—	Gr. 43DD	—
		Charpy impact test	G 3106 SM 490B, C	—	—	—
	490 (High yield point)	—	G 3106 SM 490 YA	A 572 Gr. 42	Gr. 50B	—
		Charpy impact test	G 3106 SM 490 YB, SM 520 B, C	—	Gr. 50C	St 52-3
		Charpy impact test for low temperature	—	—	Gr. 50D	—