PT MULIA BERSAUDARA

SPECIALIZED IN GRATING AND ITS RELATED PRODUCTS






OFFICE AND WORKSHOP :

KAWASAN INDUSTRI JABABEKA I

JL. JABABEKA IIA BLOK CIIF. CIKARANG - BEKASI 17530 INDONESIA

PHONE: 62-21-8983 3902, FAX: 62-21-8983 3903

EMAIL: mulia.bersaudara@mb-grating.com

WEBSITE: www.mb-grating.com

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OUR COMPANY

PT. MULIA BERSAUDARA is an Indonesian company established on October 03, 2009. We are specialized in fabrication for Steel Grating and all its related products, such as flooring/walkway and its accessories, stair tread and its accessories, and Drain Cover.

Our product has been used for many type of indstrial, i.e. :

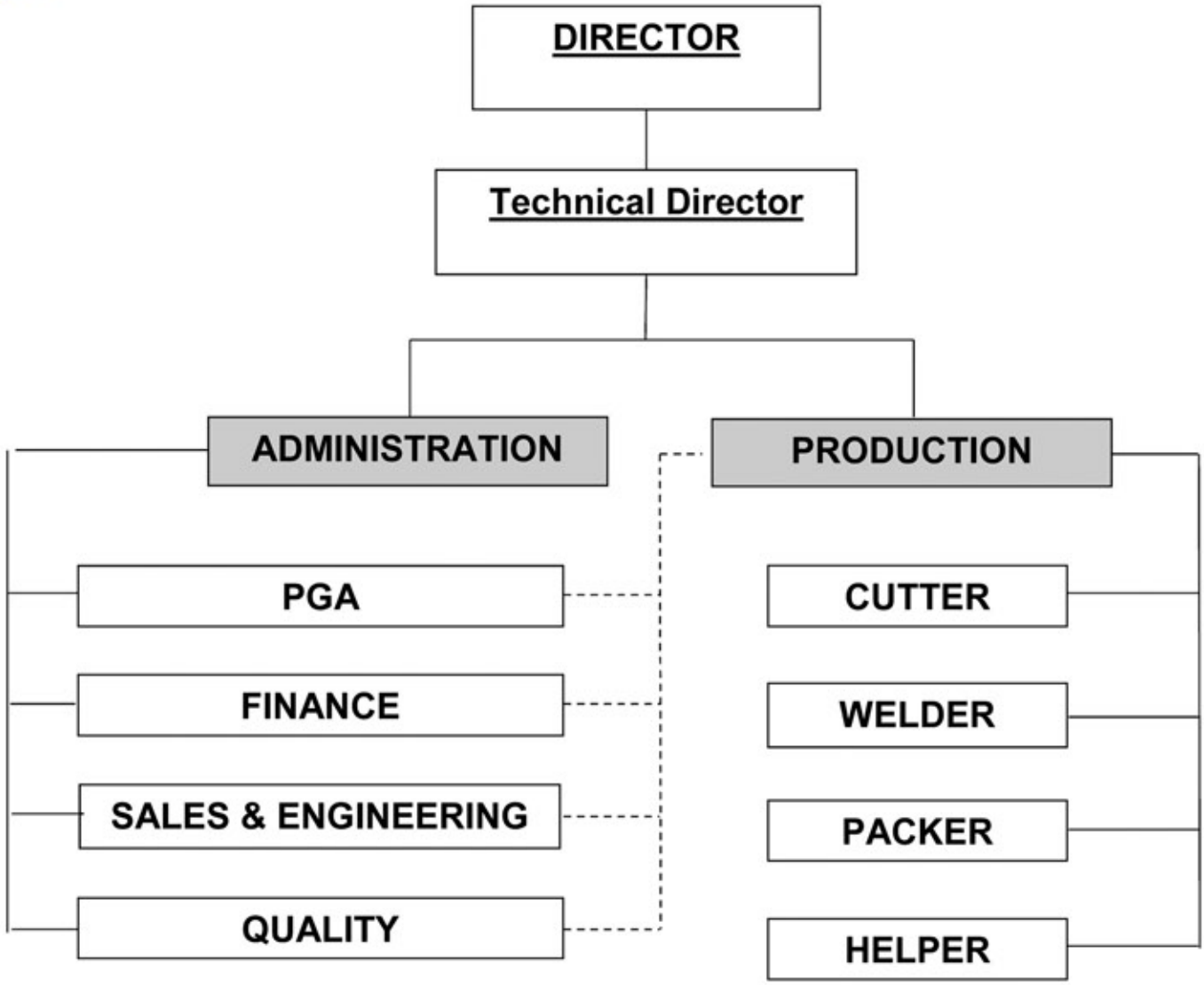
- Power Plant,
- Oil & Gas Industry, Onshore and Offshore,
- Petrochemical Industry,
- Coal Mining,
- Cement Plant,
- Airport & Airplane Maintenance Facility,
- Infrastructure, such as Railway Bridge,
- Residential Area,
- Commercial Area,
- And many other industries.

The company is managed by professional people with more than 20 years experience in the grating industry. And since 22 October 2018, PT. MULIA BERSAUDARA has been certified by ISO 9001-2015 by ISC Indonesia.

We commit to provide hight quality product at competitive price. Our company's number one goal is the TOTAL SATISFACTION OF OUR CUSTOMER.

ORGANIZATION STRUCTURE

PT MULIA BERSAUDARA



Note :

_____ = Command Line

---------- = Coordination Line

ISO 9001

ISC GLOBAL

ISO 9001:2015

Certificate of Registration

THIS IS TO CERTIFY THAT THE
QUALITY MANAGEMENT SYSTEM OF

PT. MULIA BERSAUDARA

KAWASAN INDUSTRI JABABEKA 1
JL. JABABEKA II A BLOK C 11 F
CIKARANG BEKASI
JAWA BARAT 17530
INDONESIA

Has been assessed and registered as complying with the requirements of the International Standard shown above for the following Scope. Further clarifications regarding the scope of this certificate and the applicability of ISO 9001:2015 requirements may be obtained by consulting the organisation.

Fabricator of Steel Grating and Associated Products

MEMBER OF MULTILATERAL RECOGNITION ARRANGEMENT IAF

JAS-ANZ

www.jas-anz.org/register

Tony Wilde
Group Chairman
ISC (Global), License #1150/2011 CC

Registration Number:	QAC/R62/0226
Registration Date:	22/Oct/2018
Expiry Date:	22/Oct/2021

ISC (Global), Building 11, 7th Floor, Bay Square, Business Bay, Dubai, UAE.

ISC GLOBAL

This certificate is valid until the Expiry Date on the condition that audits are conducted and paid for as per the Certification Agreement. Should this condition not be met, cancellation procedures will be initiated and the client will be removed from the JAS-ANZ register. This Certificate remains the property of International Standards Certifications (Global) FZ LLC and must be returned upon request. It must not be altered in any way. Intentional misuse of this certificate will result in cancellation without prior notification.

STANDARDS

REGION	MATERIAL STANDARD	MANUFACTURING / FABRICATION STANDARD	HOT DIP GALVANIZING STANDARD
USA	ASTM A36	ANSI/NAAMM-MBG 531	ASTM A 123
UK / EUROPE	BS 4360-43A	BS 4592	BS EN ISO 1470
AUSTRALIA	AS 3679	AS 1657	AS 1650
CHINA	GB 700	YB / T40001.1	GB / T13912

GLOSSARY / DEFINITION

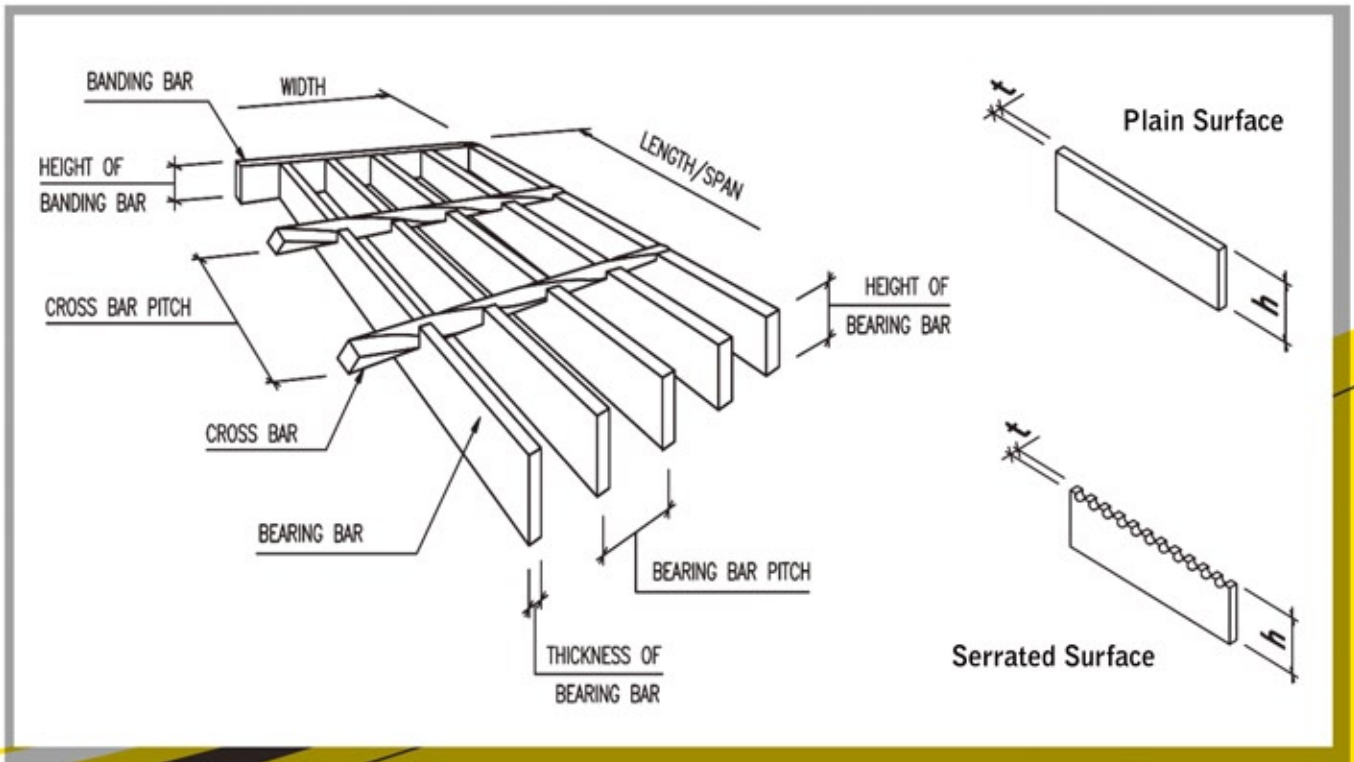
Forge weld Steel Grating:	An open grid assembly of steel bars. Which has load bearing bars and cross bars jointing at intersection by forged welding at regular spacing.
Load Bearing Bar:	Load carrying bars, made from flat bar and extending in the direction of the grat - ing span at regular spacing.
Cross Bar:	The connection bars, made from twisted steel bars, which extend perpendicular across the bearing bars, by forged welding at regular spacing.
Load Bearing Bar Pitch:	The distance center to center of the Load Bearing Bars.
Cross Bar Pitch:	The distance center to center of the Cross Bars.
Banding Bar:	A Flat welded to a side or end of a grating panel, or along the line of cutout, and extending neither above nor below the bearing bars. Load Carrying Banding Bar : A band used to transfer the load between bearing bars. Trim Band : A band which carries no load, but is used chiely to improve appear - ance.
Span of Grating:	The distance between points of grating support, or dimension of the bearing bars in this direction.
Width of Grating:	The overall dimension of a grating panel, perpendicular to the bearing bars (in line with the Cross Bar)
Toe Plate / Kickplate:	A Flat Bar attached lat against the outer edge of a grating to rear edge of a tread, and projecting above the top surface of grating or tread to form a lip or curb.
Serrated Grating:	Grating which has the top surfaces of the bearing bars notched.
Plain Grating:	Grating which has no notched at the top surfaces of the bearing bars.
Circular Cut Grating:	Rectangular grating which is cut into panels shaped as annular segments, for use in circular or annular are
Rectangular Cut Grating:	Common Rectangular grating for use in Rectangular Area.

FLOORING

MB's PRODUCT CODE

MB 32X5 30X100 P B G

- **G** — Surface Treatment
  - G = Hot Dip Galvanized
  - U = Untreated / Black Steel
- **B** — Fabricated Mode
  - B = Banded / Closed End
  - O = Open End
- **P** — Surface Mode
  - P = Plain
  - S = Serrated
- **30X100** — Pitch = Load Bar Pitch x Cross Bar Pitch
  - Load Bar Pitch = 30, 40 and 60 mm center to center
  - Cross Bar Pitch = 50 or 100 mm center to center
- **32X5** — Load Bearing Bar Size : LB Height x LB Thickness
- **MB** — Brand Name : MULIA BERSAUDARA GRATING



TOLERANCES - BEARING BARS

THICKNESS : ± 0.23 mm for all thickness

HEIGHT : ± 0.4 mm for 19 thru 44 mm height

FORGEWELD STEEL GRATING

TABLE OF LOADS AND DEFLECTIONS

LOAD BAR PITCH: 30 MM

Unit weight calculated in an untreated condition, the finished weight of fabricated grating increases +/- **12%,** due to the addition of banding bar & surface treatment

LOAD BAR SIZE	CROSS ROD PITCH (mm)	UNIT WEIGHT (Kg/m2)		EFFECTIVE SPAN (mm)												
				300	450	600	750	900	1050	1200	1500	1800	2100	2400	2700	3000	3300
25 x 3	100	22.8	U	157	70	39	25	17	13	10	6	4	3	2			
	50	25.7	D	0.64	1.45	2.57	4.02	5.80	7.88	10.30	16.09	23.17	31.53	41.18			
25 x 4.5	100	32.9	U	238	106	59	38	26	19	15	9	6	5	3			
	50	35.8	D	0.64	1.45	2.57	4.02	5.79	7.88	10.30	16.09	23.17	31.53	41.18			
25 x 5	100	36.2	U	262	115	65	42	29	21	16	10	7	5	4			
	50	39	D	0.64	1.45	2.57	4.02	5.79	7.88	10.30	16.09	23.17	31.53	41.18			
30 x 3	100	27.2	U	233	103	58	37	25.9	19	14.5	9.3	6.5	4.8	3.6	2.9		
	50	30.14	D	0.51	1.15	2	3.19	4.6	6.2	8	12.7	18	25	32.5	41		
32 x 3	100	28.4	U	257	114	64	41	28	21	16	10	7	5	4	3		
	50	31.3	D	0.50	1.13	2.01	3.14	4.52	6.16	8.04	12.57	18.10	24.63	32.18	40.72		
35 x 3	100	30.99	U	317	178	79	50	35	26	20	14	9	6.5	5	4		
	50	33.96	D	0.44	0.78	1.75	2.74	3.94	5.36	7	10	15.76	21.45	28.02	35.46		
30 x 5	100	43.2	U	389	172	97	62	43	31.8	24.3	15.6	10.8	7.9	6.1	4.8		
	50	46.4	D	0.51	1.15	2	3.1	4.6	6.2	8.1	12.5	18	25	32.5	41		
32 x 4.5	100	41.3	U	390	173	97	62	43	31	24	15	10	8	6	4		
	50	44.2	D	0.50	1.13	2.01	3.14	4.52	6.16	8.04	12.57	18.10	24.63	32.18	40.72		
32 x 5	100	45.5	U	429	190	107	68	47	35	26	17	11	8	6	5		
	50	48.4	D	0.50	1.13	2.01	3.14	4.52	6.16	8.04	12.57	18.10	24.63	32.18	40.72		
40 x 3	100	34.9	U	402	179	100	64	44	33	25	16	11	8	6	5	4	
	50	37.7	D	0.40	0.90	1.61	2.51	3.62	4.93	6.44	10.05	14.48	19.71	25.74	32.58	40.22	
35 x 5	100	49.6	U	519	230	129	83	57	42	32	20	14	10	8	6		
	50	52.5	D	0.46	1.03	1.84	2.87	4.14	5.63	7.35	11.49	16.55	22.52	29.42	37.23		
38 x 4.5	100	48,5	U	550	244	137	88	61	44	34	22	15	11	8	6		
	50	51.4	D	0.42	0.95	1.69	2.65	3.81	5.19	6.77	10.58	15.24	20.74	27.09	34.29		
38 x 5	100	53.6	U	611	271	152	97	67	49	38	24	16	12	9	7	6	
	50	56.5	D	0.42	0.95	1.69	2.65	3.81	5.19	6.77	10.58	15.24	20.74	27.09	34.29	42.34	
40 x 5	100	56.2	U	671	298	167	107	74	54	41	26	18	13	10	8	6	
	50	59.0	D	0.40	0.90	1.61	2.51	3.62	4.93	6.44	10.05	14.48	19.71	25.74	32.58	40.22	
45 x 5	100	62.9	U	849	377	212	135	94	69	52	33	23	17	13	10	8	6
	50	65.7	D	0.34	0.80	1.43	2.23	3.22	4.38	5.72	8.94	12.87	17.52	22.88	28.96	35.75	43.26
50 x 5	100	69.6	U	1048	465	261	167	116	85	65	41	28	21	16	12	10	8
	50	72.4	D	0.32	0.72	1.29	2.01	2.90	3.94	5.15	8.04	11.58	15.77	20.59	26.06	32.18	38.93
65 x 5	100	89.6	U	1771	787	442	283	196	144	110	70	48	35	27	21	17	14
	50	92.4	D	0.25	0.56	0.99	1.55	2.23	3.03	3.96	6.19	8.91	12.13	15.84	20.25	24.75	29.95
75 x 6	100	123	U	2197	1296	729	466	324	238	182	116	81	59	45	36	29	24
	50	126	D	0.2	0.46	0.82	1.28	1.84	2.5	3.27	5.11	7.35	10	13.07	16.55	20.43	29.42

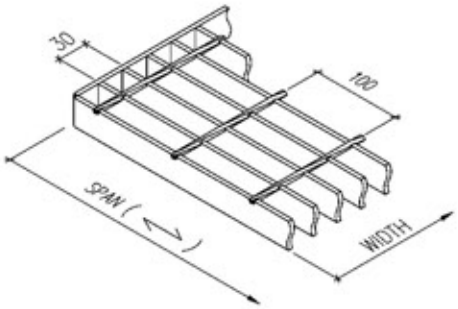
NOTE:

Spans to the left of the heavy line have a deflection of less than 5 mm for a 4 kPa uniformly distributed load, which is a limiting deflection for pedestrian comfort.

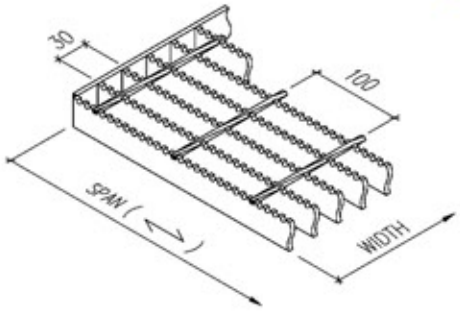
LOAD TABLE DATA

- U = Safe Superimposed uniformly distributed load in Kilopascals.
- D = Deflection in millimeters.
- Mass calculated with grating in an untreated condition.
- Load calculated in accordance with an allowable bending stress 171.6 MPa (0.66 Fy).
- Load bar are assumed simply supported and unserrated steel with Fy – 260 MPa.

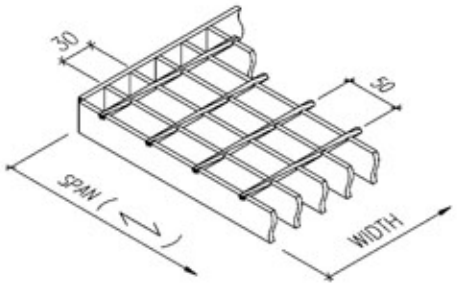
PLAIN – 30 X 100 mm Pitch



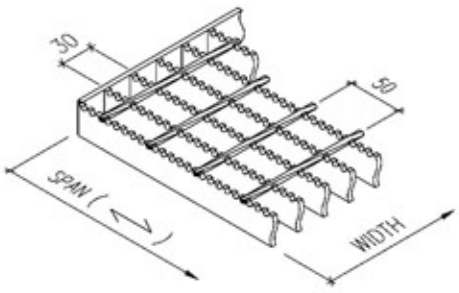
SERRATED – 30 X 100 mm Pitch



PLAIN – 30 X 50 mm Pitch



SERRATED – 30 X 50 mm Pitch



NOMINAL O/A DIMENSION OF BARS (in mm)

No of Bars	2	3	4	5	6	7	8	9	10	11	12
5 mm Load Bar	35	65	95	125	155	185	215	245	275	305	335

No of Bars	13	14	15	16	17	18	19	20	21	22	23
5 mm Load Bar	365	395	425	455	485	515	545	575	605	635	665

No of Bars	24	25	26	27	28	29	30	31	32	33	34
5 mm Load Bar	695	725	755	785	815	845	875	905	935	965	995

NOTE : - For 3 mm Load Bar subtract 2 mm from width.
- Width dimension can vary due to manufacturing process.

SERRATED CONVERSION FACTORS

Load Bar	25x3	25x4.5	25x5	30x3	30x5	32x3	32x4.5	32x5	35x4.5
Load	0.79	0.79	0.79	0.83	0.83	0.83	0.83	0.83	0.85
Deflection	1.12	1.12	1.12	1.09	1.09	1.09	1.09	1.09	1.08

Load Bar	35x5	38x4.5	38x5	40x3	40x5	45x5	50x5	65x5	75x6
Load	0.85	0.86	0.86	0.87	0.87	0.88	0.89	0.92	N/A
Deflection	1.08	1.07	1.07	1.07	1.07	1.07	1.06	1.04	N/A

FORGEWELD STEEL GRATING

TABLE OF LOADS AND DEFLECTIONS

LOAD BAR PITCH: 40 MM

Unit weight calculated in an untreated condition, the finished weight of fabricated grating increases +/- **14%,** due to the addition of banding bar & surface treatment

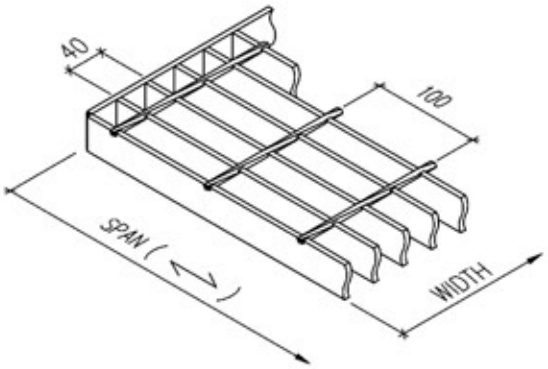
LOAD BAR SIZE (mm)	CROSS ROD PITCH (mm)	UNIT WEIGHT (Kg/m2)		EFFECTIVE SPAN (mm)													
				300	450	600	750	900	1050	1200	1500	1800	2100	2400	2700	3000	3300
25 x 3	100	17.5	U	119	53	30	19	13	10	7	5	3	2	2			
	50	20.4	D	0.64	1.44	2.57	4.02	5.79	7.88	10.29	16.08	23.16	31.53	41.18			
25 x 4.5	100	25.4	U	178	79	44	28	20	14	11	7	5	3	3			
	50	28.3	D	0.64	1.45	2.57	4.02	5.79	7.88	10.30	16.09	23.17	31.53	41.18			
25 x 5	100	27.4	U	198	88	49	31	22	16	12	8	5	4	3			
	50	30.2	D	0.64	1.44	2.57	4.02	5.79	7.88	10.29	16.08	23.16	31.53	41.18			
30 x 3	100	21.3	U	171	76	43	27.5	19	14	10.7	6.9	4.8	3.5	2.7	2		
	50	24.3	D	0.51	1.13	2.01	3.14	4.52	6.16	8.04	12.6	18.9	24.6	32.2	40.7		
32 x 3	100	21.7	U	195	87	49	31	21	16	12	8	5	4	3	2		
	50	24.5	D	0.50	1.13	2.01	3.14	4.52	6.16	8.04	12.56	18.9	24.63	32.17	40.72		
35 x 3	100	24.4	U	233	131	58	37	26	19	15	10	6.5	4.8	3.7	2.9		
	50	27.37	D	0.44	0.78	1.75	2.74	3.94	5.36	7	10.2	15.8	21.5	28	35.5		
30 x 5	100	32.4	U	286	105	59	38	26	19	14.8	9.5	6.6	4.8	3.7	2.9		
	50	35.4	D	0.51	1	1.8	2.9	4	5.6	7.4	11.5	16.6	22.6	29.5	37.4		
32 x 4.5	100	31.7	U	293	130	73	47	32	24	18	11	8	6	4	3		
	50	34.6	D	0.50	1.13	2.01	3.14	4.52	6.15	8.04	12.57	18.10	24.63	32.18	40.72		
32 x 5	100	34.2	U	325	144	81	52	36	26	20	13	9	6	5	4		
	50	37.1	D	0.50	1.13	2.01	3.14	4.52	6.15	8.04	12.56	18.09	26.43	32.17	40.72		
40 x 3	100	26.4	U	305	135	76	49	34	25	19	12	8	6	4	3	3	
	50	29.2	D	0.40	0.90	1.61	2.51	3.62	4.93	6.44	10.05	14.48	19.71	25.74	32.58	40.22	
35 x 5	100	37.9	U	389	173	97	62	43	31	24	15	10	8	6	4		
	50	40.8	D	0.46	1.03	1.84	2.87	4.14	5.63	7.35	11.49	16.55	22.52	29.42	37.23		
38 x 4.5	100	37.1	U	413	183	103	66	45	33	25	16	11	8	6	5		
	50	40.0	D	0.42	0.95	1.69	2.65	3.81	5.19	6.77	10.58	15.24	20.74	27.09	34.29		
38 x 5	100	40.9	U	458	204	114	73	51	37	28	18	12	9	7	5	4	
	50	43.8	D	0.42	0.95	1.69	2.65	3.81	5.19	6.77	10.58	15.24	20.74	27.09	34.29	42.34	
40 x 5	100	42.1	U	508	226	127	81	56	41	31	20	14	10	8	6	5	
	50	44.9	D	0.40	0.90	1.60	2.51	3.61	4.92	6.43	10.05	14.47	19.70	25.74	32.57	40.21	
45 x 5	100	47.0	U	643	286	160	102	71	52	40	25	17	13	10	7	6	5
	50	50.0	D	0.35	0.80	1.43	2.23	3.21	4.37	5.72	8.93	12.87	17.51	22.88	28.95	35.8	43.3
50 x 5	100	51.9	U	794	353	198	127	88	64	49	31	22	16	12	9	7	6
	50	54.7	D	0.32	0.72	1.28	2.01	2.89	3.94	5.14	8.04	11.6	15.8	20.6	26.1	32.2	38.9
65 x 5	100	66.6	U	1342	596	335	214	149	109	83	53	37	27	20	16	13	10
	50	69.4	D	0.25	0.56	0.99	1.55	2.23	3.03	3.96	6.19	8.91	12.1	15.8	20	24.8	30

NOTE :
Spans to the left of the heavy line have a deflection of less than 5 mm for a 4 kPa uniformly distributed load, which is a limiting deflection for pedestrian comfort.

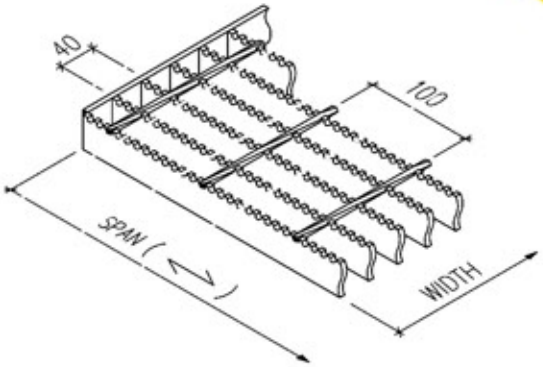
LOAD TABLE DATA

- U = Safe Superimposed uniformly distributed load in Kilopascals.
- D = Deflection in millimeters.
- Mass calculated with grating in an untreated condition.
- Load calculated in accordance with an allowable bending stress 171.6 MPa (0.66 Fy).
- Load bar are assumed simply supported and unserrated steel with Fy – 260 MPa.

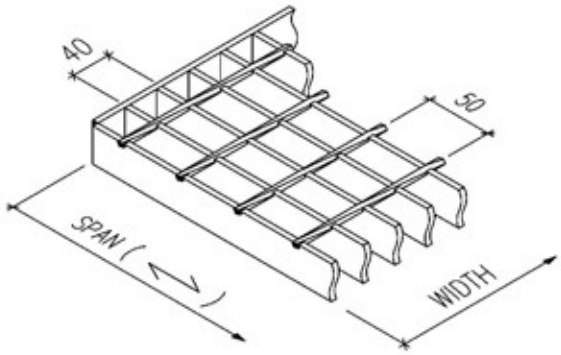
PLAIN – 40 X 100 mm Pitch



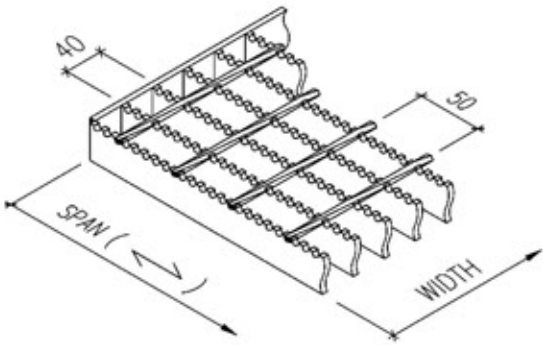
SERRATED – 40 X 100 mm Pitch



PLAIN – 40 X 50 mm Pitch



SERRATED – 40 X 50 mm Pitch



NOMINAL O/A DIMENSION OF BARS (in mm)

No of Bars	5	6	7	8	9	10	11	12	13	14	15
5 mm Load Bar	165	205	245	285	325	365	405	445	485	525	565

No of Bars	16	17	18	19	20	21	22	23	24	25	26
5 mm Load Bar	605	645	685	725	765	805	845	885	925	965	1005

NOTE : - For 3 mm Load Bar subtract 2 mm from width.
- Width dimension can vary due to manufacturing process.

SERRATED CONVERSION FACTORS

Load Bar	25x3	25x4.5	25x5	30x3	30x5	32x3	32x4.5	32x5	35x4.5
Load	0.79	0.79	0.79	0.83	0.83	0.83	0.83	0.83	0.85
Deflection	1.12	1.12	1.12	1.09	1.09	1.09	1.09	1.09	1.08

Load Bar	35x5	38x4.5	38x5	40x3	40x5	45x5	50x5	65x5	75x6
Load	0.85	0.86	0.86	0.87	0.87	0.88	0.89	0.92	N/A
Deflection	1.08	1.07	1.07	1.07	1.07	1.07	1.06	1.04	N/A

PT MULIA BERSAUDARA

FORGEWELD STEEL GRATING

TABLE OF LOADS AND DEFLECTIONS

LOAD BAR PITCH: 60 MM

Unit weight calculated in an untreated condition, the finished weight of fabricated grating increases +/- **16%,** due to the addition of banding bar & surface treatment

Load Bar Size (mm)	Rod Pitch (mm)	UNIT WEIGHT (Kg/m2)		EFFECTIVE SPAN (mm)													
				300	450	600	750	900	1050	1200	1500	1800	2100	2400	2700	3000	3300
20 x 5	50	19.0	U	81	36	20	13	9	6	5	3	2	1				
			D	0.80	1.81	3.21	5.02	7.23	9.85	12.87	20.10	28.95	39.41				
25 x 3	50	15.7	U	76	34	19	12	8	6	5	3	2	1	1			
			D	0.64	1.44	2.57	4.02	5.79	7.88	10.29	16.08	23.16	31.53	41.18			
25 x 4.5	50	20.8	U	119	53	30	19	13	10	7	5	3	2	2			
			D	0.64	1.45	2.57	4.02	5.79	7.88	10.30	16.09	23.17	31.53	41.18			
25 x 5	50	22.3	U	127	56	32	20	14	10	8	5	3	2	2			
			D	0.64	1.44	2.57	4.02	5.79	7.88	10.29	16.08	23.16	31.55	41.18			
30 x 3	50	18.7	U	116	52	29	19	13	9	7	4	3	2	1			
			D	0.51	1.15	2.04	3.19	4.6	6.26	8.17	12.77	18.39	25	32.7			
32 x 3	50	18.5	U	125	55	31	20	14	10	8	5	3	2	2	1		
			D	0.50	1.13	2.01	3.14	4.52	6.15	8.04	12.56	18.09	24.63	32.17	40.72		
35 x 3	50	20.8	U	159	89	39.7	25.41	17.65	12.97	9.93	6.8	4.4	3.2	2.5	2		
			D	0.44	0.78	1.75	2.74	3.94	5.36	7	10.23	15.76	21.45	28.02	35.46		
30 x 5	50	26.0	U	195	86	48	31	21	15	12	7	5	4	3	2		
			D	0.51	1.15	2.04	3.19	4.6	6.26	8.17	12.77	18.39	25	32.7	41.37		
32 x 4.5	50	25.0	U	195	87	49	31	21	16	12	8	5	4	3	2		
			D	0.50	1.13	2.01	3.14	4.52	6.16	8.04	12.57	18.10	24.63	32.18	40.72		
32 x 5	50	27.0	U	208	92	52	33	23	17	13	8	6	4	3	2		
			D	0.5	1.13	2.01	3.14	4.52	6.15	8.04	12.56	18.09	24.63	32.17	40.72		
40 x 3	50	21.7	U	195	87	49	31	21	16	12	8	5	4	3	2	2	
			D	0.40	0.90	1.60	2.51	3.62	4.92	6.43	10.05	14.47	19.70	25.74	32.57	40.21	
35 x 5	50	29.1	U	259	115	65	41	29	21	16	10	7	5	4	3		
			D	0.46	1.03	1.84	2.87	4.14	5.63	7.35	11.49	16.55	22.52	29.42	37.23		
38 x 4.5	50	28.6	U	275	122	69	44	30	22	17	11	7	5	4	3		
			D	0.42	0.95	1.69	2.65	3.81	5.19	6.77	10.58	15.24	20.74	27.09	34.29		
38 x 5	50	31.1	U	306	136	76	49	34	25	19	12	8	6	4	3	3	
			D	0.42	0.95	1.69	2.65	3.81	5.19	6.77	10.58	15.24	20.74	27.09	34.29	42.34	
40 x 5	50	32.3	U	325	144	81	52	36	26	20	13	9	6	5	4	3	
			D	0.40	0.90	1.60	2.51	3.62	4.92	6.43	10.05	14.47	19.70	25.74	32.57	40.21	
45 x 5	50	35.7	U	411	183	103	66	45	33	25	16	11	8	6	5	4	3
			D	0.35	0.80	1.43	2.23	3.21	4.37	5.72	8.93	12.87	17.51	22.88	28.95	35.75	43.25
50 x 5	50	39.0	U	508	226	127	81	56	41	31	20	14	10	8	6	5	4
			D	0.32	0.72	1.28	2.01	2.89	3.94	5.14	8.04	11.58	15.76	20.59	26.06	32.17	38.93
65 x 5	50	49.0	U	859	381	214	137	95	70	53	34	23	17	13	10	8	7
			D	0.24	0.55	0.99	1.54	2.22	3.03	3.96	6.18	8.91	12.12	15.84	20.04	24.75	29.94

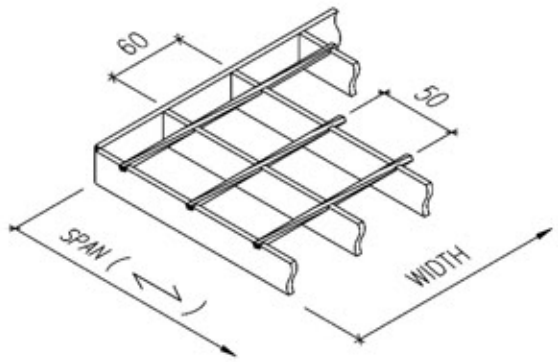
NOTE:

Spans to the left of the heavy line have a deflection of less than 5 mm for a 4 kPa uniformly distributed load, which is a limiting deflection for pedestrian comfort.

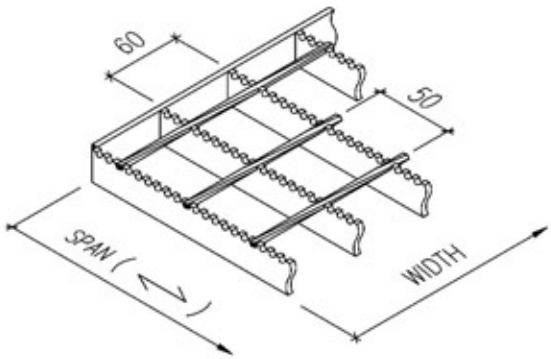
LOAD TABLE DATA

- U = Safe Superimposed uniformly distributed load in Kilopascals.
- D = Deflection in millimeters.
- Mass calculated with grating in an untreated condition.
- Load calculated in accordance with an allowable bending stress 171.6 MPa (0.66 Fy).
- Load bar are assumed simply supported and unserrated steel with Fy – 260 MPa.

PLAIN – 60 X 50 mm Pitch



SERRATED – 60 X 50 mm Pitch



NOMINAL O/A DIMENSION OF BARS (in mm)

No of Bars	3	4	5	6	7	8	9	10
5 mm Load Bar	125	185	245	305	365	425	485	545

No of Bars	11	12	13	14	15	16	17	18
5 mm Load Bar	605	665	725	785	845	905	965	1025

NOTE : - For 3 mm Load Bar subtract 2 mm from width.
- Width dimension can vary due to manufacturing process.

SERRATED CONVERSION FACTORS

Load Bar	25x3	25x4.5	25x5	30x3	30x5	32x3	32x4.5	32x5	35x4.5
Load	0.79	0.79	0.79	0.83	0.83	0.83	0.83	0.83	0.85
Deflection	1.12	1.12	1.12	1.09	1.09	1.09	1.09	1.09	1.08

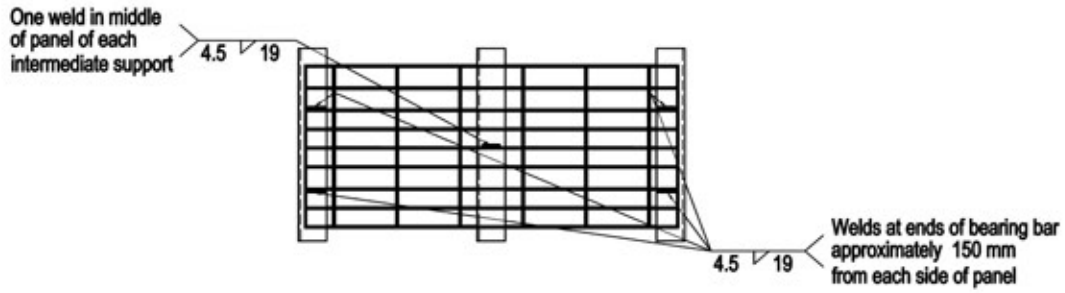
Load Bar	35x5	38x4.5	38x5	40x3	40x5	45x5	50x5	65x5	75x6
Load	0.85	0.86	0.86	0.87	0.87	0.88	0.89	0.92	N/A
Deflection	1.08	1.07	1.07	1.07	1.07	1.07	1.06	1.04	N/A

FLOORING ACCESSORIES
(FIXING CLIP/FASTENER)

All gratings are to be firmly fastened to their supports by positive means, there are some methods to fasten the grating to its support, i.e:

1 Welded Fastened *(in field by others)*

Recommended for all permanently installed gratings.



2 Saddle Top & Bottom Clips, Bolt & Nut *(Complete Set)*

This Type of Grating Clip is suitable to be used for removable area where have no vibration.

The MB complete set of grating clips consist of:

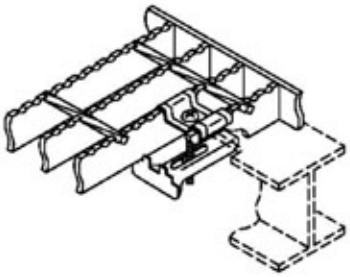
- Top Clip, available in "M" & "Universal" Type
- Bottom Clip and
- Slotted Round Head Bolt & Nut M8, available in:
  M8 x 60 mmL for grating height < 50 mm
  M8 x 75 mm L for grating height >= 50 mm

Our grating clip is designed to secure the grating to the supporting steel structure. And can be done quickly and safely by a man using only a screwdriver, working from the floor surface.

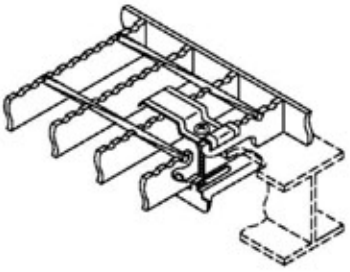
Grating Clip Installation Procedures :

a. Assembly the Clip/Fastener as shown
b. Pass Bottom Clip between Load Bars, allowing Top Clip to position over load bars.
c. Using Screwdriver, locate Bottom Clip under flange of supporting beam.
d. Lift Top Clip until the Nus locates in Bottom Clip and shoulders of Bottom Clip engage the load bar.
e. Thighten the Bolt with Screwdriver until Top and Bottom Clip secure grating to supporting beam as shown below.

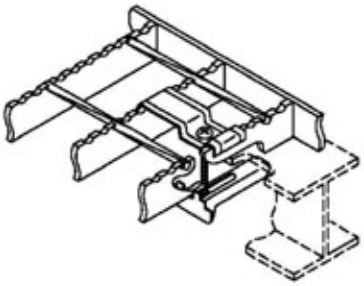
For 30mm LB Pitch



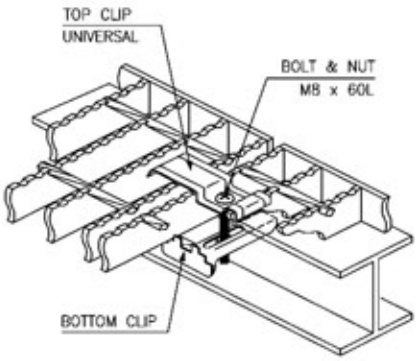
For 40mm LB Pitch



For 60mm LB Pitch

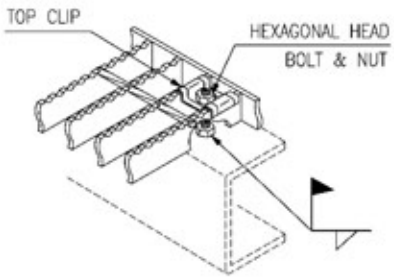


For Adjacent Panel use Universal Top Clip as shown:

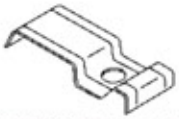


3 Welded with Saddle Top Type

This Type of Grating Clip is suitable to be used for removable area where have no vibration, where Bottom Clip cannot be used.



TOP M30 CLIP



TOP UNIVERSAL CLIP

HEXAGONAL HEAD BOLT M 8

NUT

ESTIMATED QTY OF REQUIRED CLIP

GRATING SPAN	QTY (SET)
0 ~ 1500 MM	4
1501 ~ 3000 MM	6
3001 ~ 4000 MM	8
4001 ~ 5000 MM	10
5001 ~ 6000 MM	12

PART OF CLIP

TOP "M" TYPE

TOP "UNIVERSAL" TYPE

STANDARD BOTTOM CLIP

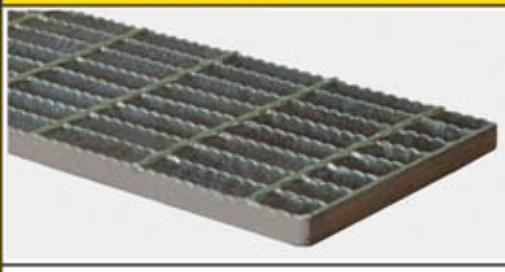
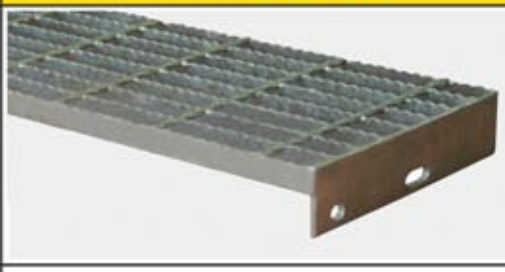
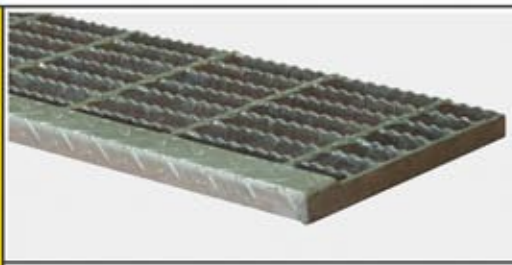
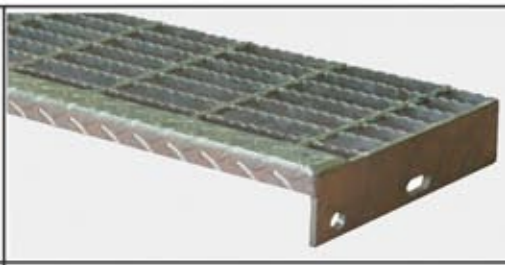
ROUND HEAD BOLT & NUT M8

STAIR TREAD

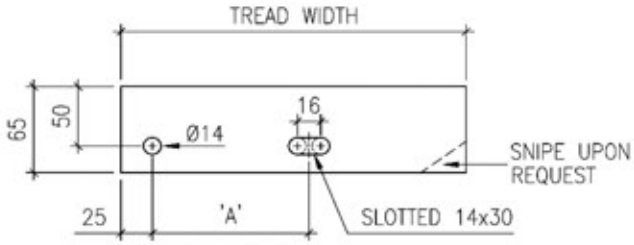
Stair Tread can be made from any type of steel gratings. It can be supplied with or without nonslip nosing. The nosing put on front is designated for visual safety and to sustain edge loads.

For installation to the Structure, it can be fixed by Welded or Bolted. For Bolted Fixing, the stair tread will be supplied complete with End Plate with Round & Sotted Hole for easy installation.

TYPE OF STAIR TREAD

NOSING TYPE	INSTALLATION MODE	
	WELDED FIXING	BOLTED FIXING
NO NOSING		
	T1	T2
CHEQUERED PLATE NOSING		
	T3	T4
ABRASIVE NOSING		
	T5	T6

STANDARD END PLATE DETAIL



End Plate 65x6 mm

BOLT DISTANCE

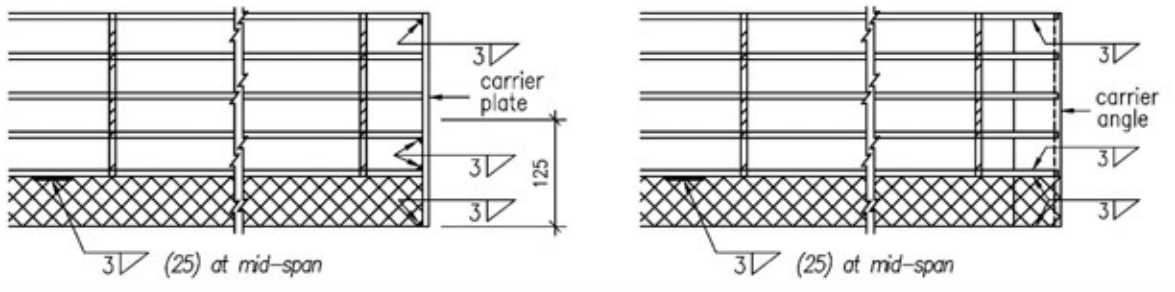
Tread Width (mm)	Dimension "A" (mm)
215	100
245	100
275	125
305	150

Compliance with AS 1657

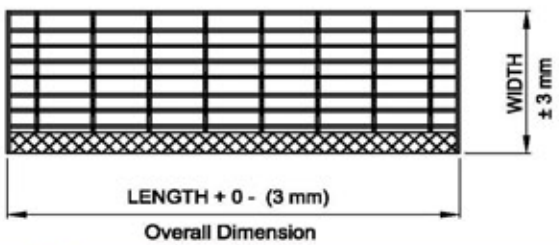
RECOMMENDED BEARING BAR SIZES FOR STAIR TREAD

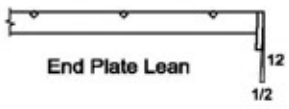
Bearing Bar Size (in mm) (@ 30 mm center to center)	Maximum Tread Lenghth/Span (in mm)	
	Plain	Serrated
25x3	700	600
25x5	700 - 1000	600 - 860
32x5	1000 - 1420	800 - 1270
38x5	1400 - 1670	1200 - 1600

STAIR TREAD WELDING STANDARD



STAIR TREAD TOLERANCES





FABRICATION WELDING :
End Plate and Banding Bar are welded on one side every Load Bar with a minimum of 3mm fillet weld.

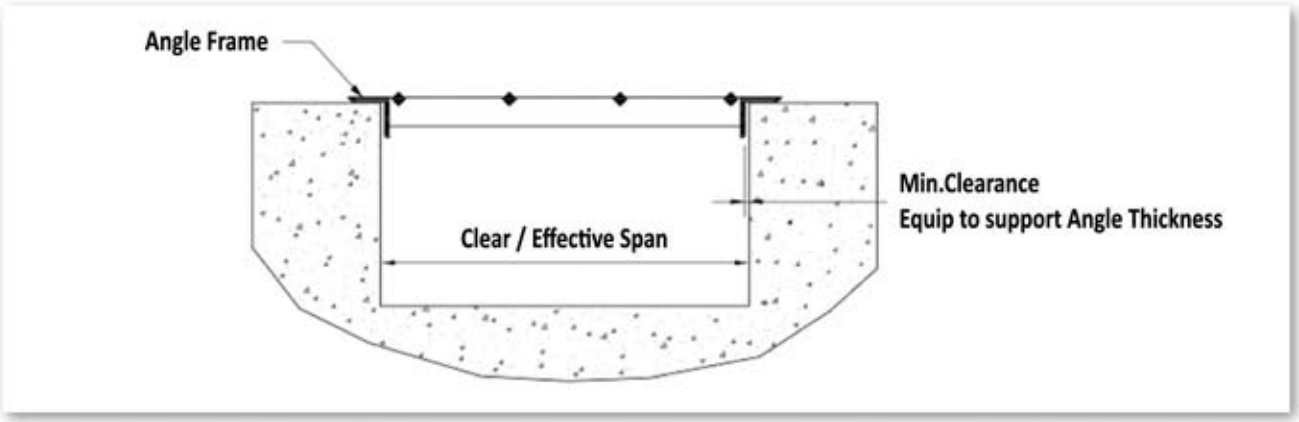
DRAIN COVER

Based on the shape of Ditch, Drain Cover can be classified into 2 type:

U Shape Ditch (DU) : The Drain Cover mounting to the Steel Angle, because the Concrete Ditch has no edge groove.

T Shape Ditch (DT) : The Drain Cover sitting on the Steel Angle Frame.

U Shape Ditch (DU): *The Drain Cover banded with Angle because the concrete has no groove on edges.*



Load Classification as per AS3996-1992

Class A : 10 kN

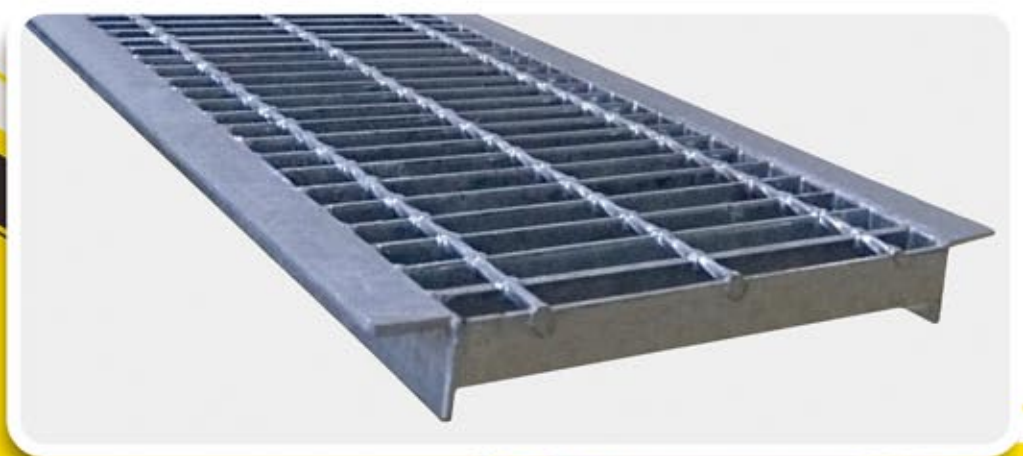
Class B : 80 Kn

Class C : 150 kN

Class D : 210 kN

As most precast concrete ditch has no groove, it would be very simple and economical to use this DU Drain Cover. Because this type of Drain Cover can just put on the concrete ditch. It is not necessary to groove the edge of the concrete.

This type of Drain Cover, DU, is only suitable for Pedestrian Load and Passenger Car.

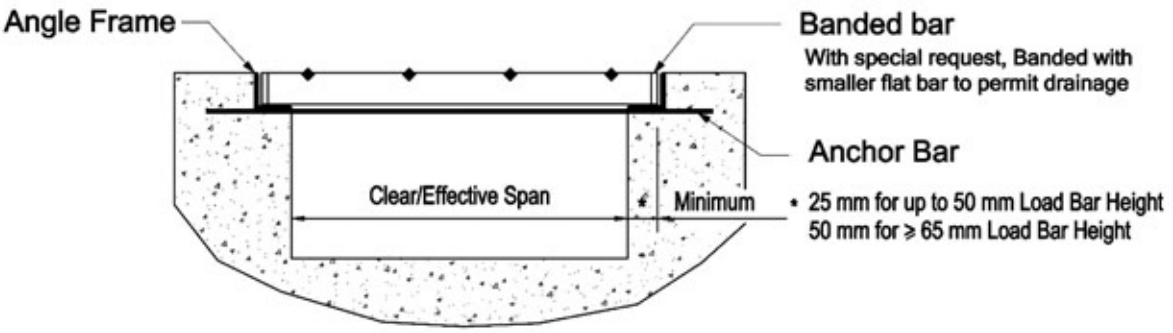


T Shape Ditch (DT):

the Drain Cover seating on the Steel Angle Frame

LOAD CLASSIFICATION :

Class	Load	Contact Area	Impact Factor
Passenger Car	2 T	150 x 150 mm	1.3
Small Truck	6 T	150 x 200 mm	1.3
Medium Truck	14 T	150 x 270mm	1.3
Heavy Truck	20 T	200 x 500 mm	1.3
Forklift	5 T - IF	140 x 165 mm	1.4

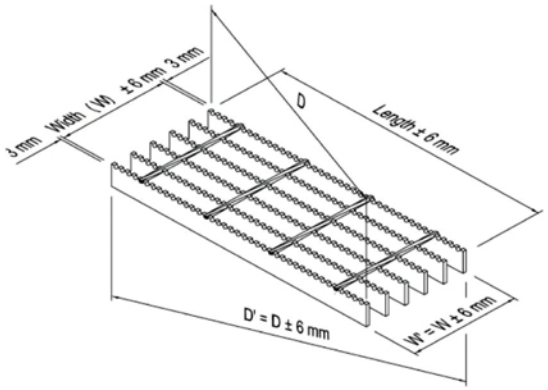


MB's Drain Cover Load Bearing Capacity							
Vehicle			Passenger Car	Small Truck	Medium Truck	Heavy Truck	Forklift
Estimated Load			2 T	6 T	14 T	20 T	5 T
Load Bar Size (mm)	Pitch LB x CB (mm	Angle Frame Size	Maximum Effective Span (mm)				
25 x 5	30x100	L30.30.3	375	-	-	-	-
32 x 5	30x100	L40.40.4	600	200	-	-	-
40 x 5	30x100	L50.50.5	900	350	200	-	175
50 x 5	30x100	L60.60.6	1300	500	300	200	250
65 x 5	30x100	L75.75.7	2300	800	400	300	390
75 x 6	30x100	L90.90.9	3600	1200	700	500	600

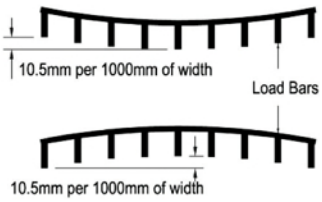
TOLERANCE & QUANTITY MEASUREMENT

MANUFACTURING TOLERANCES

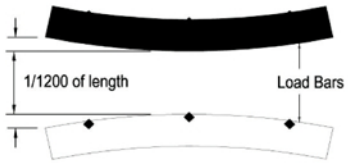
ALL DIMENSIONS ARE MAXIMUM ALLOWABLE TOLERANCES



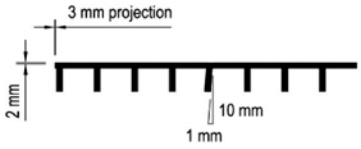
D & D' are overall diagonal dimensions
W & W' are overall dimension across the Load Bar at opposite ends of panel



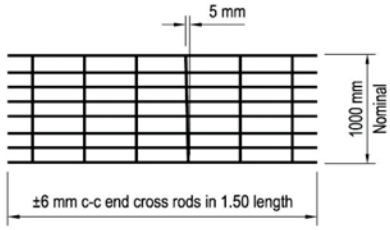
TRANSVERSE BOW
(before fastening to supports)



LONGITUDINAL BOW



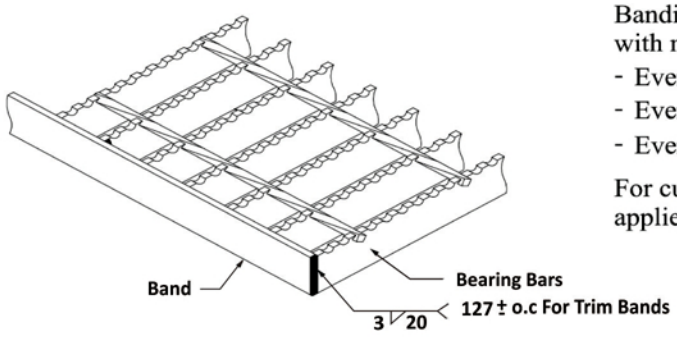
CROSS ROD LOCATION AND LOAD BAR LEAN



CROSS ROD ALIGNMENT AND SPACING

WELDING STANDARD

STANDARD TRIM BAND



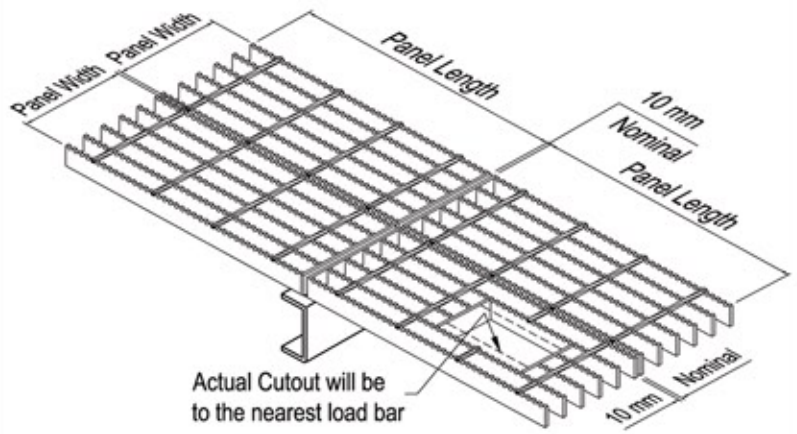
BANDING BAR / FABRICATION WELDING

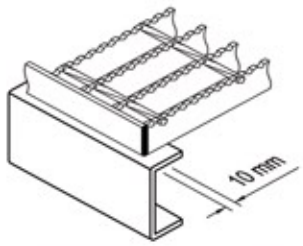
Banding bars and attachments are welded with minimum 3 mm fillet to one side of :

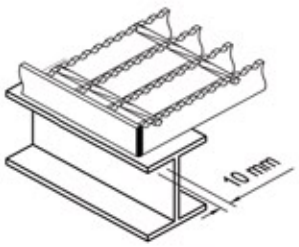
- Every 5th bar for 30 mm Load Bar Pitch
- Every 4th bar for 40 mm Load Bar Pitch
- Every 3th bar for 60 mm Load Bar Pitch

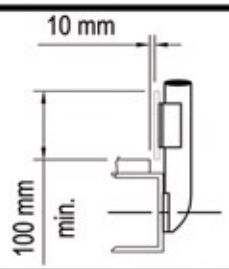
For cutout, splays or Kickplate, other welding is applied as appropriate or as requested

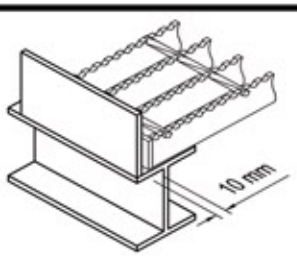
STANDARD INSTALLATION CLEARANCE

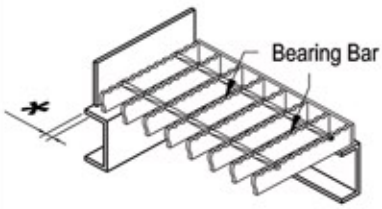


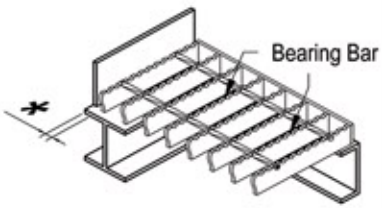


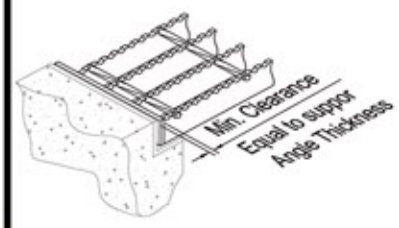


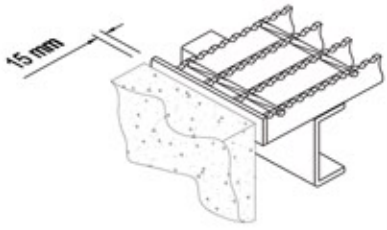








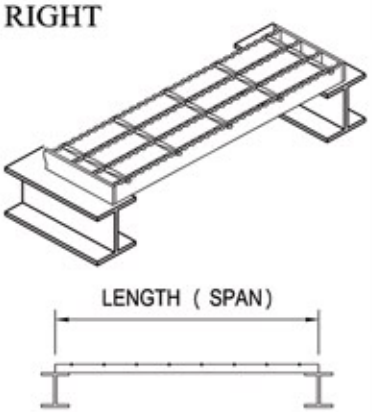




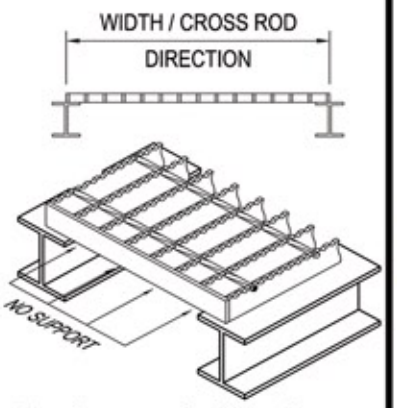
IMPORTANT

Direction of Load Bars (Span) is very importent. Please check carefully, because if not, the grating panel will collapse under load due to lack of support at both ends of load bars.

RIGHT



WRONG

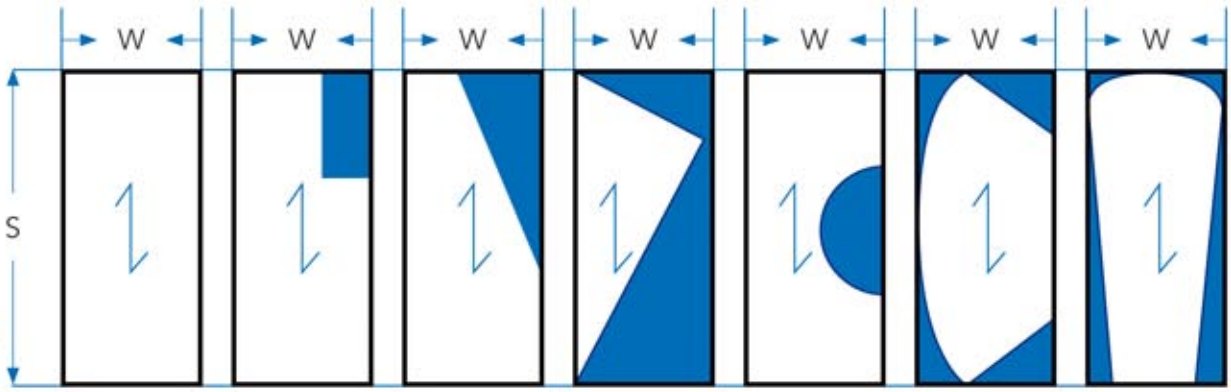


Grating panel will collapse under load due to lack support at both ends of load bars.

QUANTITY MEASUREMENTS / AREA CALCULATION

In accordance to ANSI/NAAMM MBG 531-00, Quantity Measurements for grating are calculated as follows:

1. Quantity Measurements for gratings ordered to specific dimensions without drawings, shall be based on span times width of each panel, with no deduction made for cutouts.
2. Final calculated grating quantities supplied based on drawings shall be on the bases of gross area measured center to center of supports, or back to back of supporting angles or channels, or overall dimensions of grating, whichever is larger, with no deduction for clearances. Allowances for cutouts shall be determined as follows:
   - **a)** Deductions in area for circular cutouts will be allowed only when the diameter of the cutout exceeds 1100 mm. The deduction allowance will be equal to 0.5 of the square of the diameter of the cutout.
   - **b)** Deductions in area for cutouts other than circular will be allowed only when the cutout area exceeds 1 m2.
   - **c)** No deductions will be allowed for any triangular segment or corners of gratings wasted in skew cuts.
   - **d)** For special applications, such as (but not limited to) containment areas in nuclear power plants, the final grating quantities shall be the total gross area of all the pieces furnished with no allowance for cutouts. See the following sketches:



Area = W x S (m2)

W : Width (mm

S : Span (mm)

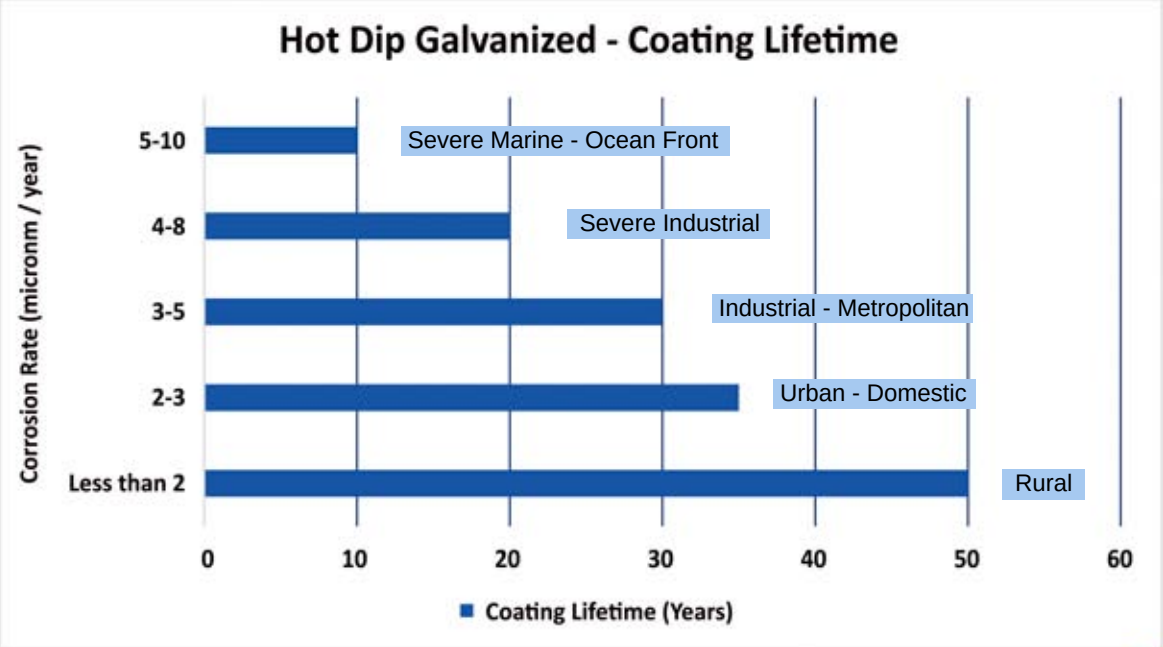
= Cutout

HOT DIP GALVANIZED

To protect against corrosion, the most suitable for surface treatment for Steel Grating is by Hot Dip Galvanized.

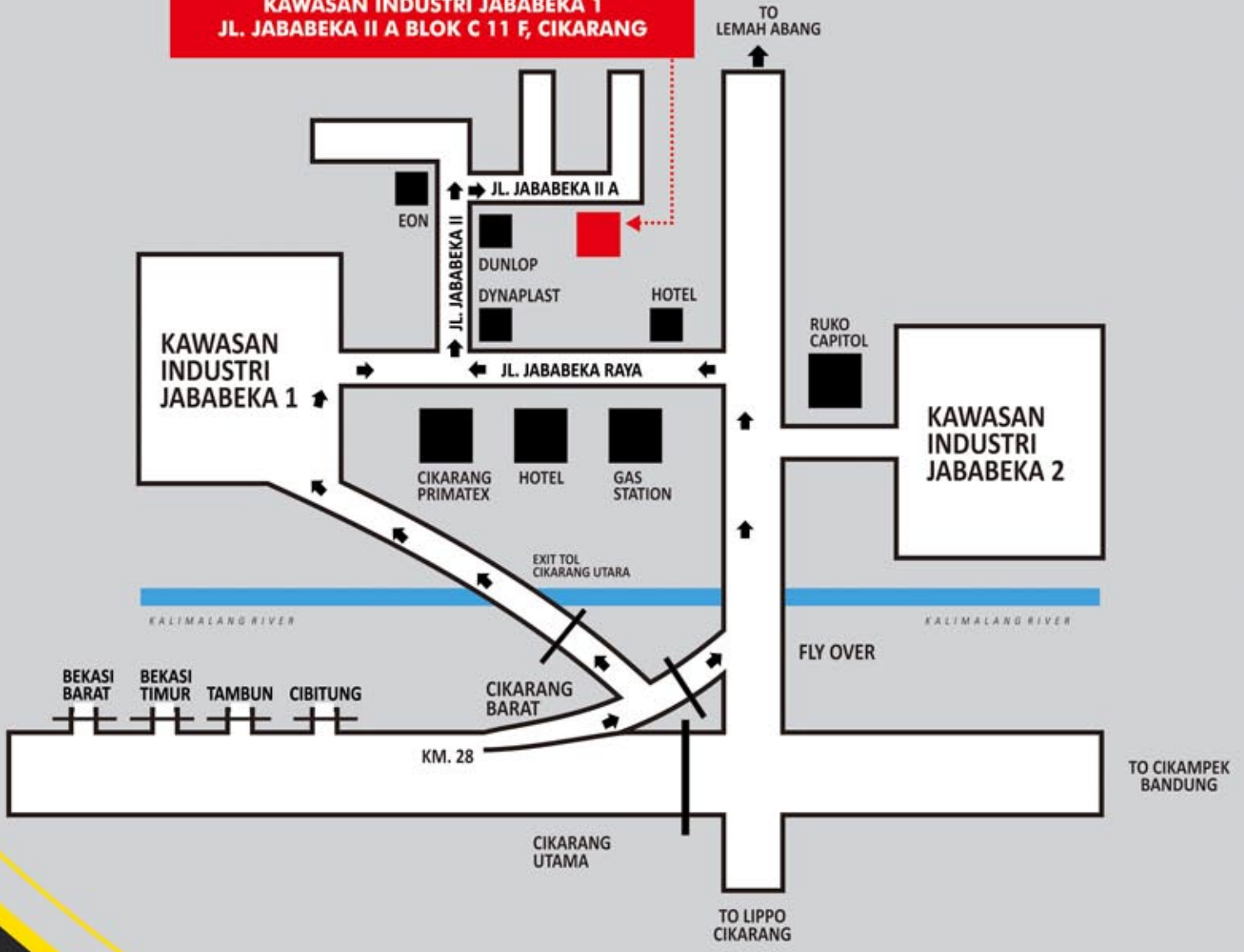
The Characteristics of Hot Dip Galvanized

- Corrosion resistant (the Galvanizing layer prevents rust for decades)
- Abrasion and Impact resistant (zinc alloy layers are harder than the base steel)
- Cathodic Protection (a slightly damage galvanized layer can still protect the exposed steel from corrosion).
- Envelope protection (all articles are immersed in a zinc bath giving a coating for all surface)



PT MULIA BERSAUDARA

KAWASAN INDUSTRI JABABEKA 1
JL. JABABEKA II A BLOK C 11 F, CIKARANG



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