SUGGESTION FOR USE OF UN-WELDED STRETCHED EXPANDED METAL GRATING FOR WALKWAY PURPOSE FOR YOUR UPCOMING PROJECT.

ASIAN STRECK METALS

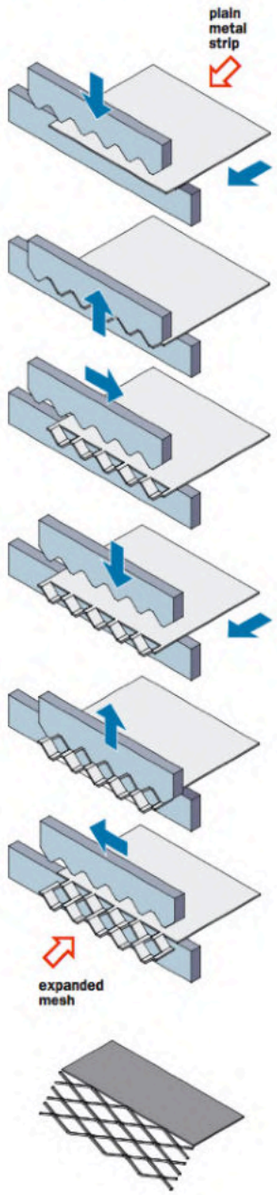
IF IT'S EXPANDED METALS IT'S ASM

- Estd. In 1962
- An ISO-9001-2018 Co.
- Plant & Machinery from Germany.
- 58 years of experience in the field of Expanded Metal.
- In-house technical & qualified team.
- Design & Panel Sizes can be customised as per requirement.

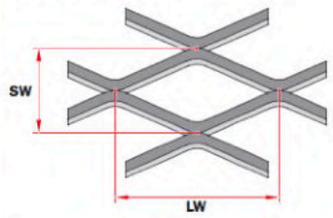
Process of Manufacturing Expanded Metal

Expanded mesh diagrams and characteristics

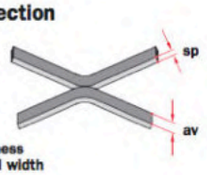
1 Expanding the metal



2 Mesh dimensions

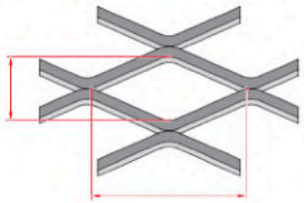


3 Mesh section

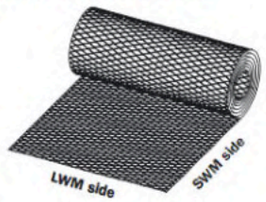


sp = t = thickness
av = w = strand width

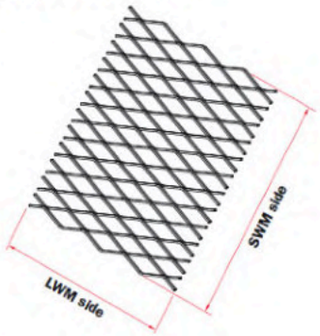
4 Dimensions of mesh opening



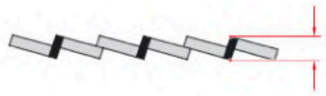
5 Roll of expanded mesh



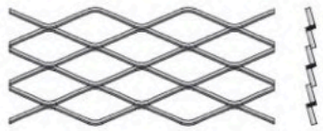
6 Sheet dimensions



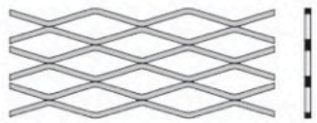
7 Final thickness of expanded meshes



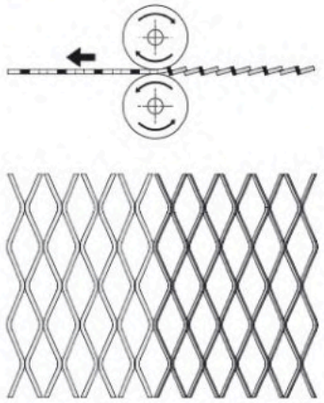
8 Expanded mesh, not flattened



9 Expanded mesh, flattened

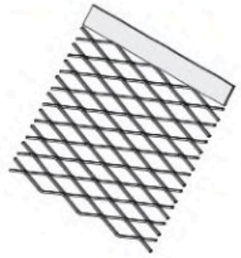


10 Flattening diagram

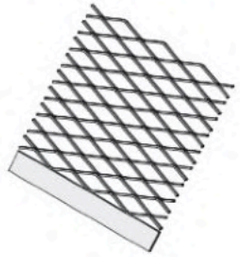


SPECIAL DETAILS ON REQUEST

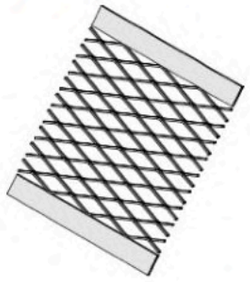
11 Plain edge at the beginning running parallel with LWM



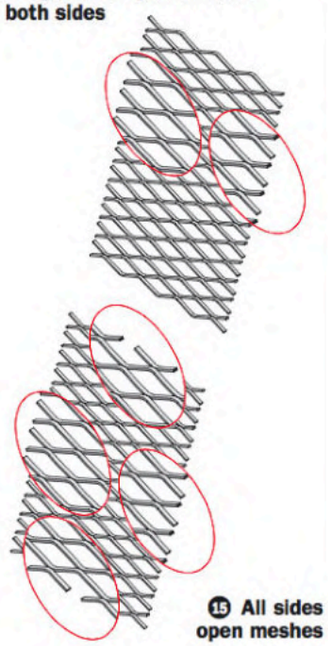
12 Plain edge at the end running parallel with LWM



13 Plain edges at the beginning and the end

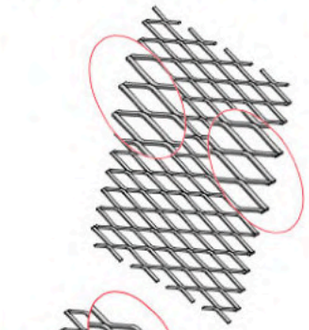


14 Length with open meshes both sides

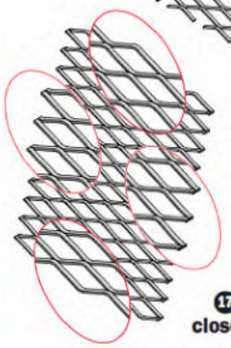


15 All sides open meshes

16 Length with closed meshes



17 All sides closed meshes



Our technicians are always ready to answer your queries.

SALIENT FEATURES OF EXPANDED METAL UN-WELDED GRATINGS

- Safer & Serrated Non-Skid Surface
- Light Weight yet Strong, made with our Joints or Welds
- High Load Capacity with Minimum Deflection
- Maintenance Free Open Design
- Fast & Easy to Install
- Reduces requirement of Structural Steel

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EXPANDED STRETCH METAL
SUNSCREEN FACADE & ARCHITECTURAL MESH

Theoretical Load Chart

CONCENTRATED LOAD	CLEAR SPAN OR GRATING WIDTH -mm-						
	580	760	890	1070	1250	1370	1500
-kg/m-	EXPAMENT WEIGHT -kg/m²-						
50 LPT	10	10	10	10	10	15	20
75 LPT	10	10	10	15	15	20	25
150 HPT	15	15	15	20	25	35	35
227 HPT	15	20	20	25	30	35	35
300 LEPT	15	20	25	30	35		
377 LEPT	20	25	25	35			
453 HDA	20	25	30				
530 HDA	20	30	35				
757 HDA	25	35					
907 HDA	30						
1207 HDA	35						

LEGEND:
LPT = Light Pedestrian Traffic ≤ 110 kg/m;
HPT = Heavy Pedestrian Traffic ≤ 250 kg/m;
LEPT = Light Equipment Pedestrian Traffic ≤ 400 kg/m;
HDA = Heavy Duty Applications ≤ 1500 kg/m;
U = Uniform load measured in kg/m²;
C = Concentrated load measured in kg/ml
THE DIMENSIONS ARE CALCULATED WITH A 1.67 SAFETY COEFFICIENT FOR PLAIN CARBOON STEEL TYPE S 235 JR+AR & ARE IN CONFORMITY WITH STAS 10101/1-1978 TECHNICAL WEIGHTS & PERMANENT LOADS.
THE SUPPORTED LOADS ARE TESTED BY *INCERC BUCHAREST* ON 16 JULY 2009 WITH TESTING REPORT NO. 597.

WEIGHT	CLEAR SPAN OR GRATING WIDTH -mm-				LOAD TYPE	DEFLECTION
-kg/m²-	610	910	1250	1500		-mm-
10	120	64	20	8	U (kg/m²)	6.35
10	474	189	88	26	C (kg/ml)	6.50
15	182	73	24	10	U (kg/m²)	5.59
15	556	246	110	33	C (kg/ml)	6.35
20	244	81	29	12	U (kg/m²)	6.22
20	653	333	150	40	C (kg/ml)	6.35
25	293	85	49	24	U (kg/m²)	6.10
25	803	460	210	80	C (kg/ml)	6.35
30	391	146	56	28	U (kg/m²)	5.59
30	1190	570	260	93	C (kg/ml)	6.10
35	522	195	81	48	U (kg/m²)	5.33
35	1387	686	313	160	C (kg/ml)	5.59



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Theoretical Load Chart

Allowable Load Bearing Capacities of M.S. Unwelded Expanded Gratings

Nominal Size of Mesh		Normal Strand Size		Weight in kgs per Sq.Mtr.of Gratings (approx.)		Span (mm) LW Or L							
						300 mm	500 mm	600 mm	750 mm	900 mm	1000 mm	1100 mm	1200 mm
SWM	LWM	Thickness (b)	Width (d)		Load	Kgs	Kgs	Kgs	Kgs	Kgs	Kgs	Kgs	Kgs
30	75	4	8	14	U	4927	1774	1232	788	547	443	366	308
					C	2464	887	616	394	274	222	183	154
30	75	4	6	11	U	2079	748	520	333	231	187	155	130
					C	1039	374	260	166	115	94	77	65
30	75	4	5	9	U	1203	433	301	192	134	108	89	75
					C	601	217	150	96	67	54	45	38
30	75	4	4	7	U	616	222	154	99	68	55	46	38
					C	308	111	77	49	34	28	23	19
42	115	4	8	11	U	3520	1267	880	563	391	317	262	220
					C	1760	634	440	282	196	158	131	110
42	115	4	6	8	U	1485	535	371	238	165	134	110	93
					C	742	267	186	119	82	67	55	46
42	115	4	5	7	U	859	309	215	137	95	77	64	54
					C	430	155	107	69	48	39	32	27
42	115	4	4	5.5	U	440	158	110	70	49	40	33	27
					C	220	79	55	35	24	20	16	14
25	62	4	8	15	U	5913	2129	1478	946	657	532	440	370
					C	2956	1064	739	473	328	266	220	185
25	62	4	8	12.5	U	2494	898	624	399	277	225	186	156
					C	1247	449	312	200	139	112	93	78
25	62	4	5	10.5	U	1444	520	361	231	160	130	107	90
					C	722	260	180	115	80	65	54	45
25	62	4	4	8	U	739	266	185	118	82	67	55	46
					C	370	133	92	59	41	33	27	23

For pedestrian traffic, the deflection of a floor panel under the design load shall not exceed 10mm or 1/200th of a span, whichever is lesser.
Where U = Uniform Load and C = Concentrated Load.
Tolerances : Expanded Metal Gratings have tolerances of ±10% in Weight and ±10% in Length.
Note : All values for the purpose of Load calculations are approximations and may vary in case of actual physical values.
1. Load capacities given in the table are for spanning in LW direction over clear spans, having every fourth strand welded to support
2. The beams are laid all across the length and secured with each other as if woven to form a single panel every strand is considered one beam. The beam when subjected to work has to withstand a) Turning b) Bending c) Shearing actions
3. Case discussed is a catwalk where travelling load and panel is a beam secured tight at ends to avoid deflection.
4. The axis of moment is the neutral axis of the section of strand.
5. Equivalent beam section represents: b= thickness of sheet in mm. & d= strand length in mm.
/= moment of inertia of such strand section = $bxd^3/12$

6. Deflection of beam: The maximum permissible deflection as accepted for comfortable walk is 8mm. Therefore deflection is also counted in panel fabrication. The formula for beams of uniform section fixed at ends and loaded is:
deflection - uniformly loaded = $w \times L^3 / 384 \times E \times I$ and deflection - loaded in centre = $w \times L^3 / 192 \times E \times I$
Where:
w = weight of a person weighing 100kg. and carrying a load of 100kg. totaling 200kg weight. L = Span of the Panel in mm, i.e length of panel.
E = Elongation of Steel = 29×10^6 Psi, as per American standard (Steel for bridges, buildings & structural purpose ASTM A7-61T, all shapes).
7. Expanded metal walkway gratings behave like a net, even when heavily loaded they can carry loads far in excess of the recommended data shown. The inherent properties of Expanded Metal walkway gratings provide maximum safety pursuant to complete failure.
Reference : Applied Mechanics (Strength & Elasticity of Materials) by David Allan Low. Machinery Handbook (26th edition) by Industrial Press Incorporation, New York by Eric Oberg, Franklin D Jones, Holbrook L. Norton & Henry H Ryffel.

Economy Comparison Chart of Expanded Metal Grating with Chequered Plate and Bar Grating

Chequered Plates

Thickness	Weight per Sq. Metre
05 mm	45 Kg.
06 mm	53 Kg.
07 mm	61 Kg.
08 mm	69 Kg.
10 mm	85 Kg.

Bar Grating

Bar Spacing	Bearing Bar Size	Weight per Sq. Metre
100 x 30 mm	20 x 03 mm	20 Kg.
100 x 30 mm	20 x 05 mm	28 Kg.
100 x 30 mm	25 x 03 mm	25 Kg.
100 x 30 mm	25 x 05 mm	36 Kg.
50 x 30 mm	20 x 03 mm	24 Kg.
50 x 30 mm	20 x 05 mm	31 Kg.
50 x 30 mm	25 x 03 mm	29 Kg.
50 x 30 mm	25 x 05 mm	40 Kg.

Expanded Metal Grating

Sr. No.	Mesh Size SWM x LWM	Strand Size Width x Thickness	Weight per Sq. Mtr.
1.	42 x 115	8 x 4 mm	11 Kg.
2.	30 x 75	8 x 4 mm	14 Kg.
3.	25 x 62	8 x 4 mm	15 Kg.

(In above Mesh Sizes, Max. Width of Strand has been considered).

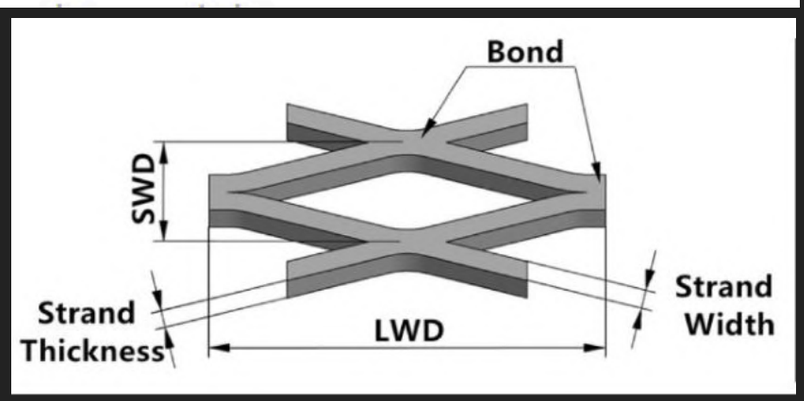
SUGGESTED GRATING DESIGN

CODE-ASM-08

WEIGHT PER SQM OF GRATING - 14.8 KGS/M^2 approx.

Standard Size - Width 1250mm x Length 3300mm

Tolerances: SWM & LWM - ±4mm, Strand Width - ±0.50mm
Sheet Thickness - ±0.25mm, Weight per M2 - ±10%,
Width of Sheet - ± 10mm, Length of Sheet - ± 25mm



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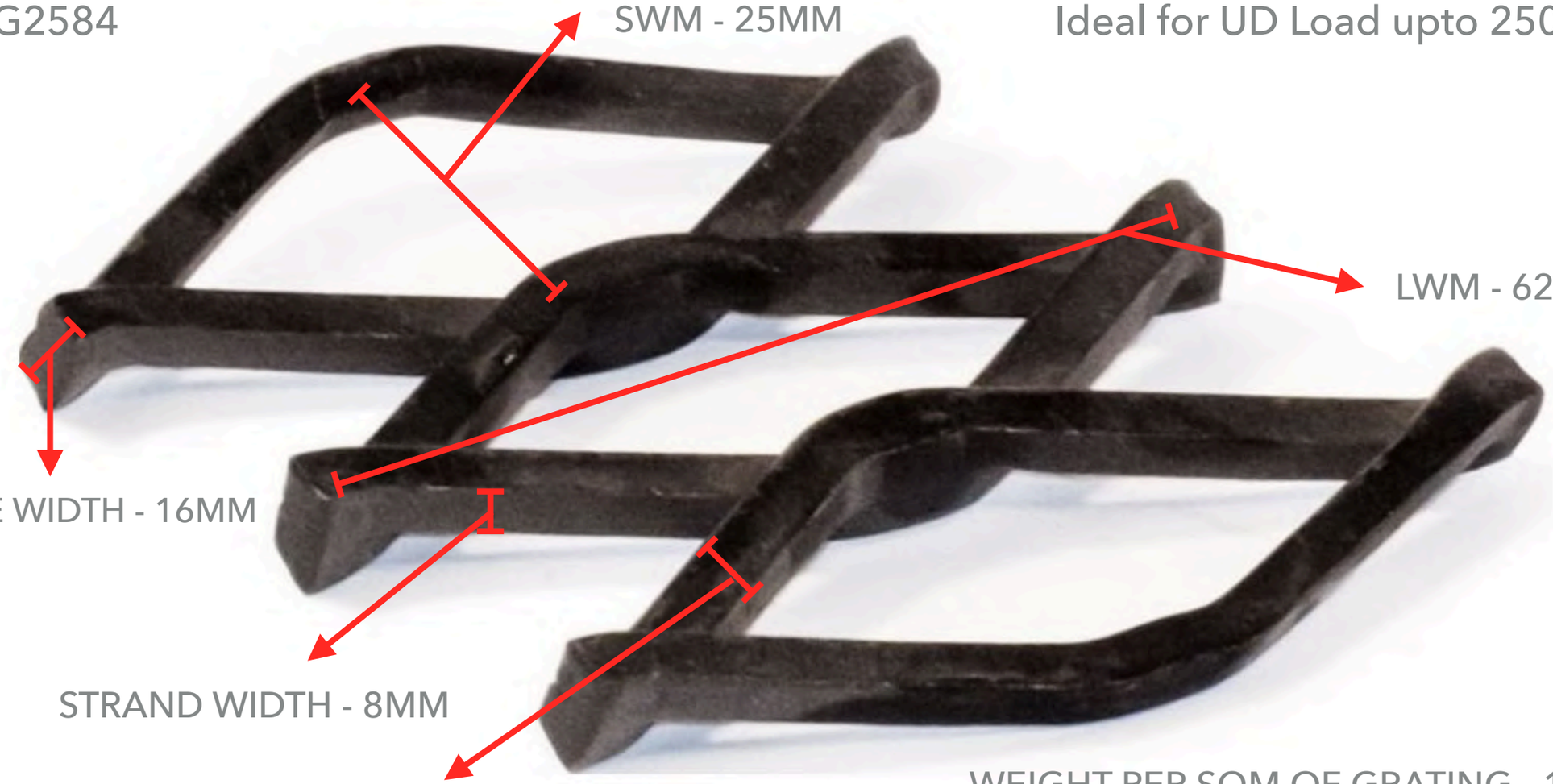
CODE-G2584

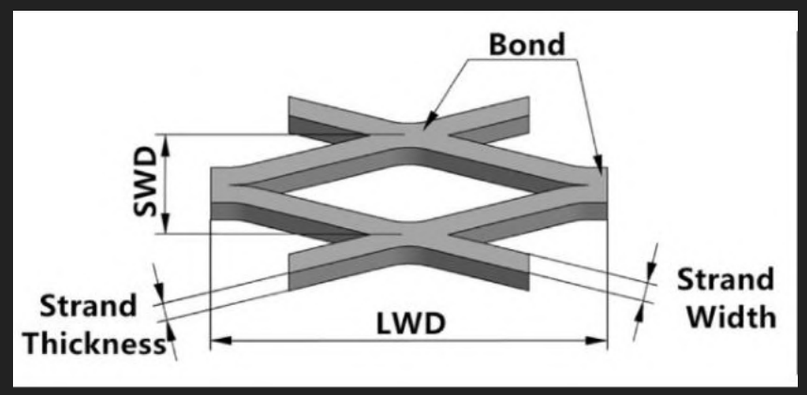


Ideal for UD Load upto 250 Kgs/M2

WEIGHT PER SQM OF GRATING - 15 KGS/M^2

Standard Size - Width 1250mm x Length 2500mm

Tolerances: SWM & LWM - ±4mm, Strand Width - ±0.50mm
Sheet Thickness - ±0.25mm, Weight per M2 - ±10%,
Width of Sheet - ± 10mm, Length of Sheet - ± 25mm



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CODE-G40105

SWM - 42MM

Ideal for UD Load unto 350 Kgs/M2

LWM - 115MM

KNUCKLE WIDTH - 20MM

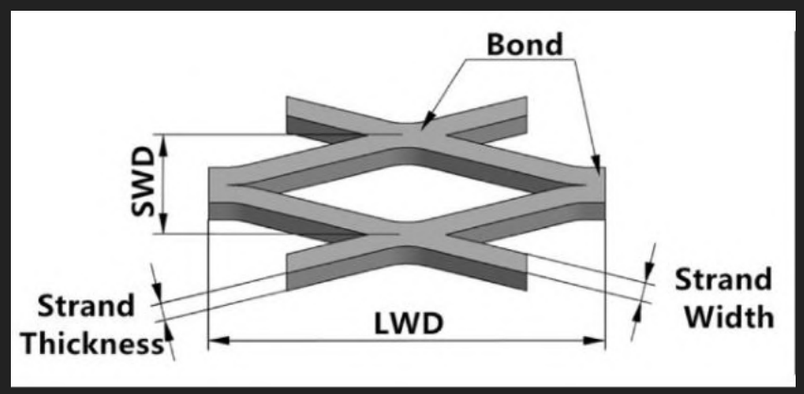
STRAND WIDTH - 10MM

SHEET THICKNESS - 5MM

WEIGHT PER SQM OF GRATING - 18.5 KGS/M^2

Standard Size - Width 1250mm x Length 2600mm

Tolerances: SWM & LWM - ±4mm, Strand Width - ±0.50mm
Sheet Thickness - ±0.25mm, Weight per M2 - ±10%,
Width of Sheet - ± 10mm, Length of Sheet - ± 25mm



SUGGESTED GRATING DESIGN

CODE-G30105

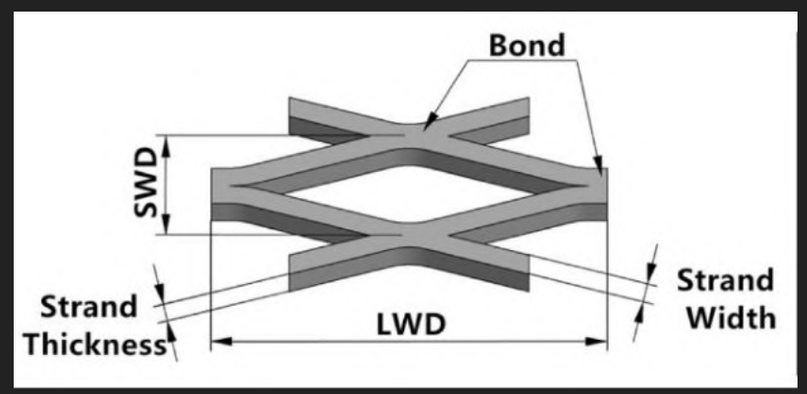
SWM - 32MM

Ideal for UD Load unto 500 Kgs/M2

WEIGHT PER SQM OF GRATING - 24 KGS/M^2

Standard Size - Width 1250mm x Length 2000mm

Tolerances: SWM & LWM - ±4mm, Strand Width - ±0.50mm
Sheet Thickness - ±0.25mm, Weight per M2 - ±10%,
Width of Sheet - ± 10mm, Length of Sheet - ± 25mm



SUGGESTED GRATING DESIGN

CODE-G2574

SWM - 27MM

Ideal for UD Load unto 150 Kgs/M2

LWM - 62MM

KNUCKLE WIDTH - 14MM

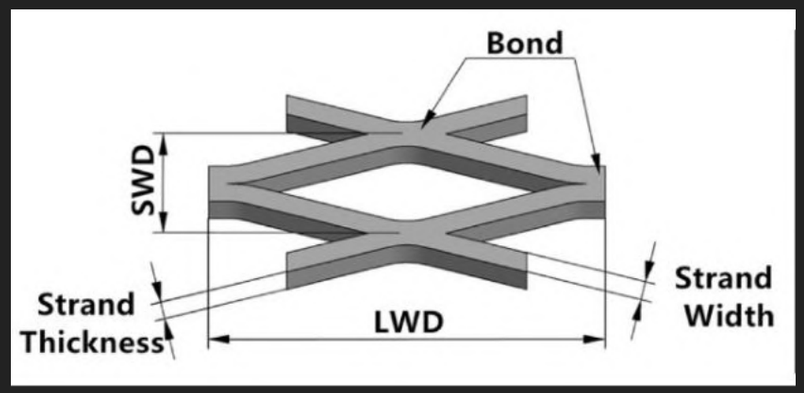
STRAND WIDTH - 7MM

SHEET THICKNESS - 4MM

WEIGHT PER SQM OF GRATING - 15.5 KGS/M^2

Standard Size - Width 1250mm x Length 2500mm

Tolerances: SWM & LWM - ±4mm, Strand Width - ±0.50mm
Sheet Thickness - ±0.25mm, Weight per M2 - ±10%,
Width of Sheet - ± 10mm, Length of Sheet - ± 25mm



PRE-FABRICATED GRATING PANEL

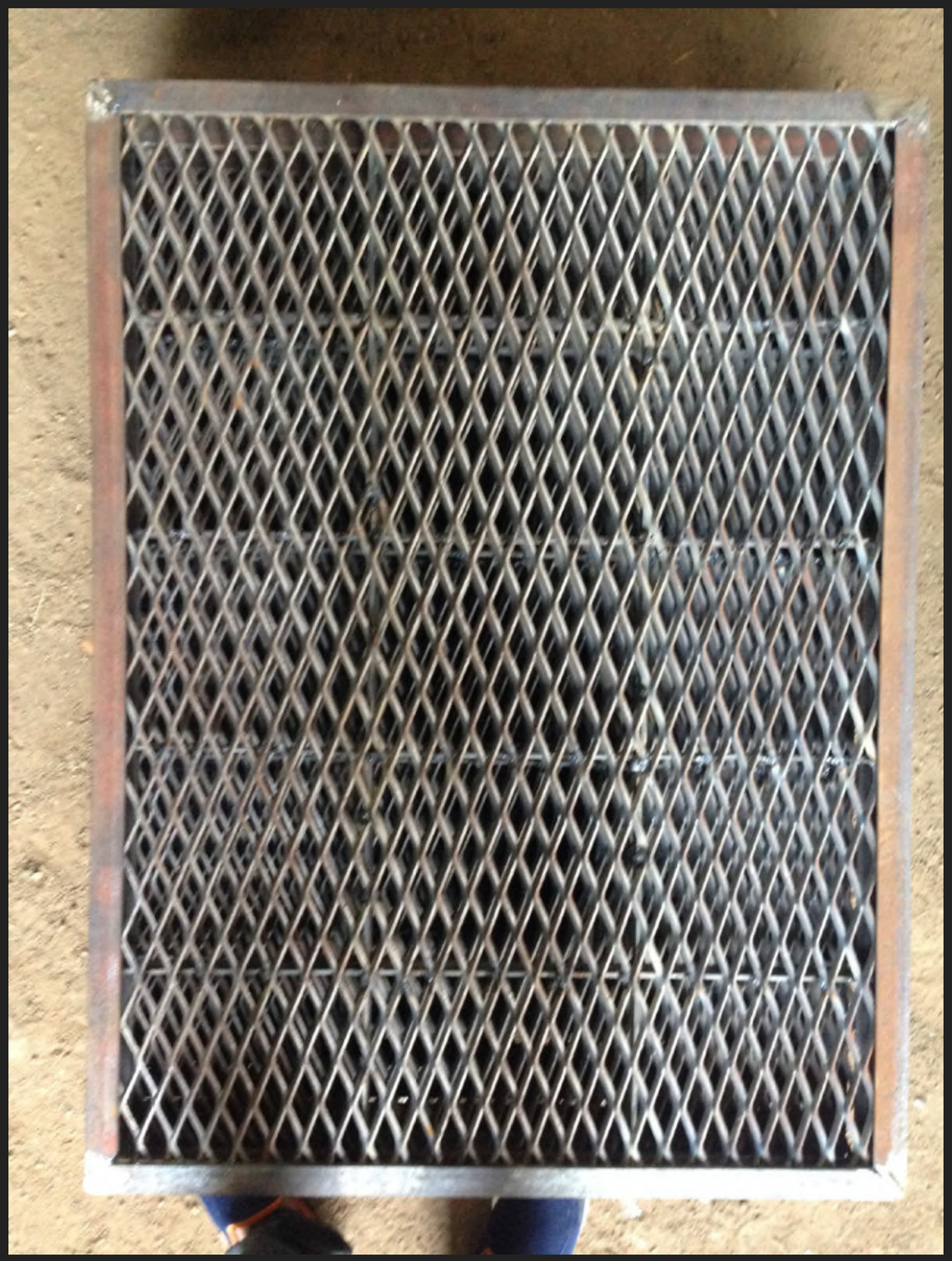
IN CASE SIDE & MIDDLE SUPPORT FOR PLATFORM NOT AVAILABLE THE WE CAN SUPPLY PRE-FABRICATED PANELS ALSO.

- Welded in Angle Frame of either 35mm x 35mm x 5mm or 25mm x 25mm or 4mm or any other size as required.
- Additional support strips welded across the frames to increase Load Bearingness.
- Overall weight still lighter than welded gratings & load bearing capacity is almost the same.
- Can be Hot Dip Galvanised or Coated with Red Oxide or supplied in Mill Finish.
- Framing may not be required if side & middle platform structure already fabricated thereby further saving in steel.

Images of Pre-Fabricated Grating Panels

Images of Pre-Fabricated Grating Panels

Images of Pre-Fabricated Grating Panels



Images of Pre-Fabricated Grating Panels

Our Gratings Conform to BS-4592 Part-0 & Part-2

BRITISH STANDARD

Industrial type flooring and stair treads –

Part 0: Common design requirements and recommendations for installation

ICS 91.060.30

BRITISH STANDARD

Industrial type flooring and stair treads –

Part 2: Expanded metal grating – Specification

ICS 91.060.30

Walkway Platform Load Requirement as per British Standard

When the walkway is usually subject to passage or crossing of several persons simultaneously, the minimum unobstructed width shall be 1 000 mm.

In all other cases, the minimum unobstructed width of a platform or walkway shall be 600 mm.

NOTE 2 If possible, the recommended minimum unobstructed width of a platform or walkway is 800 mm.

NOTE 3 Where a walkway forms part of an escape route, attention is drawn to the Building Regulations for England and Wales, Approved Document B *[1]; the* Building Regulations (Northern Ireland), Technical Booklet E *[2]; and the* Building Standards (Scotland) Regulations, Section 2 (Fire) *[3].*

The minimum headroom above the top surface of a platform or walkway shall be 2 100 mm.

5.2 Design loads and deflections

5.2.1 Design loads

Taking into account any design load implications due to plant, equipment or any other items placed on walkways (or cut-outs made in the walkways), the platform or walkway shall be designed to carry either the appropriate uniformly distributed load (UDL) or concentrated load, whichever produces the most onerous conditions of stress or deflection in the section (see Table 1).

NOTE Additional allowance should also be made for dynamic loads, if applicable.

Where a cut-out is required, the remaining area of the grating shall be able to carry the same load as the adjacent floor area.

The positions of concentrated loads shall either be those that produce the maximum stresses or, where deflection is the design criterion, those that produce the maximum deflection.

Table 1 **Platform and walkway minimum design loads**

Use of platform or walkway	UDL kN/m²	Concentrated load over an area of 300 mm × 300 mm [A] kN
Occasional access, e.g. for inspection or maintenance by one person	1.5	1.0
Light duty, e.g. regular one-way pedestrian traffic	3.0	1.0
General duty, e.g. regular two-way pedestrian traffic	5.0	1.0
Heavy duty, e.g. high density pedestrian traffic	7.5	1.0 [B]

[A] Where deflection is not the main design criterion, static concentrated loads should be considered to be applied in the positions that produce the maximum stresses. When dynamic concentrated loads (wheel loads) are used, they should also be considered to be applied in positions that produce the maximum stresses. In such cases, the permissible stresses can be increased by 10%, providing that a 25% increase is added to the unfactored load to allow for impact.

[B] A higher value might be required where heavy items or equipment are to be placed on the flooring.

NOTE Typical details of protective barriers are shown in Figure 1.

The top of the handrail shall be a minimum distance of 1 100 mm above the top of the floor.

5.4.2 Lateral loads

Handrails shall be able to withstand the minimum lateral design loads given in Table 2 at the design height specified in BS 6399-1:1996, Clause **10**.

Table 2 **Lateral loads for handrails**

Use of handrail	Load kN/m
Occasional access or light duty [A]	0.36
General duty [A]	0.36
Heavy duty [A]	0.74
Areas subject to crowd loading, over 3 m wide	3.00

[A] For definitions of duty level, see Table 1.

If there is any possibility of vehicular impact, the design shall be in accordance with BS 6180:1999, Annex A.

5.4.3 Joints

NOTE At right angled corners, a joint can be provided out-board of end stanchions.

Joints in continuous rails shall be positioned at points of minimum stress, and not more than 150 mm from the centre-line of a stanchion. They shall not be placed out-board of the end stanchions where there is a formed bend.

Joints shall not have any sharp edges or projections.

5.4.4 Stanchions

Stanchions shall not be mounted from toe plates, unless the toe plates are structural members.

5.4.5 Clear spaces

NOTE If possible, the clear space behind the top rail should be at least 100 mm.

There shall be a clear space of at least 75 mm behind the top rail, to allow the rail to be used as a hand-rail.

5.4.6 Safety gates

Hazardous areas, such as the gap in handrails at the head of a ladder, shall be protected by a self-closing gate. This gate shall provide protection equal to that required for the surrounding guarding, i.e., consisting of a handrail, at least one intermediate or knee rail, a toe plate and a handrail standard. It shall close gently but securely and be designed to swing only into the landing.

Hold-open devices shall not be fitted.

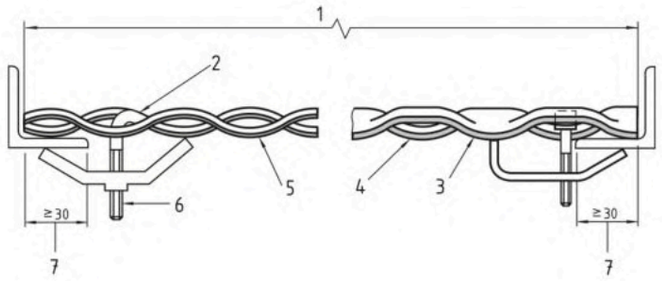
5.4.7 Infill

NOTE In producing the design, environmental conditions should be taken into account.

Where additional protection is required (for example, machine guarding), non-combustible infill shall be provided.

Fixing & Welding of Gratings as per British Standard

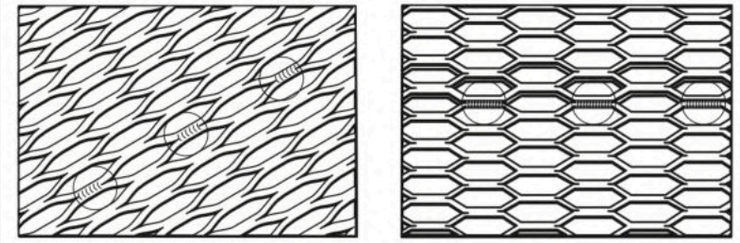
Figure A.4 **Fixing gratings using clips or hook bolts**



Key

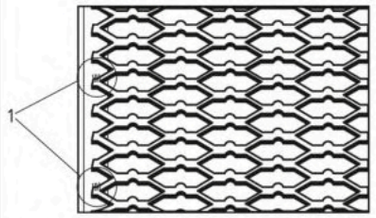
1 Walkway width (LW)
2 Hook bolt over joint
3 Long knuckle grating
4 Curved edge down
5 Regular knuckle grating
6 Hook bolt and clamp
7 Overlap = 30 mm

Figure A.5 **Fixing grating panels by welding**



a) Grating panels joined by butt weld

b) Grating panels joined by overlap and weld

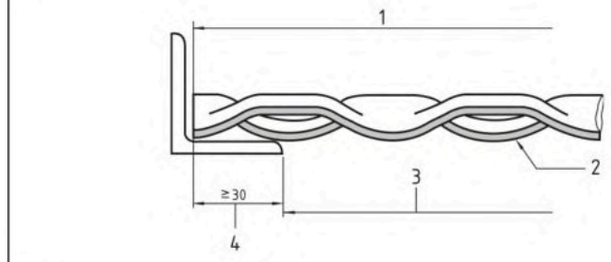


c) Welding grating panels to structural supports

Key

1 Weld each fourth stag

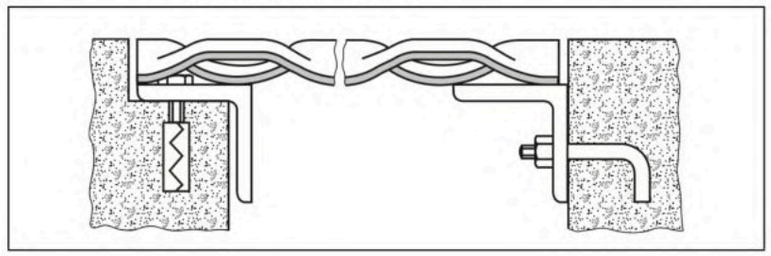
Figure A.2 **Positioning of grating panels**



Key

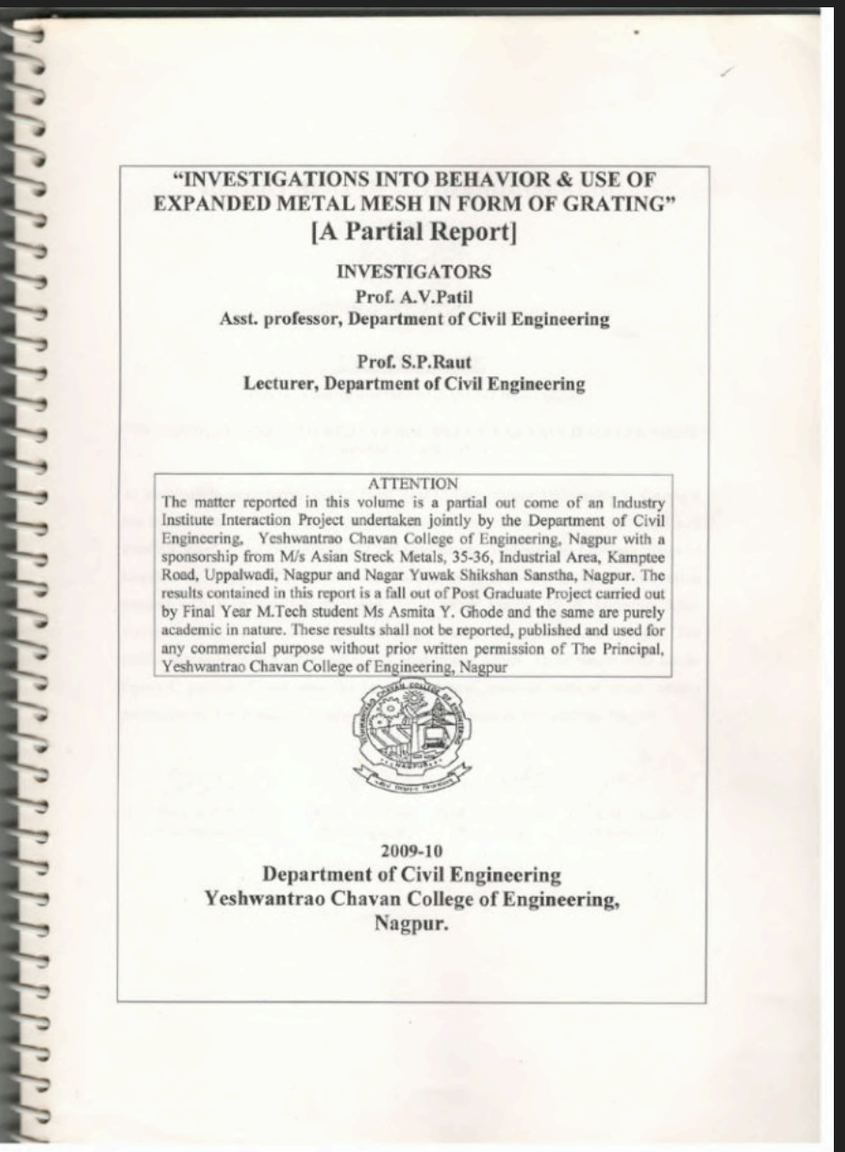
1 Walkway width (LW)
2 Curved edge down
3 Walkway clear span
4 Overlap = 30 mm

Figure A.3 **Structural supports**



PRACTICAL PHYSICAL TESTING OF EXPANDED METAL GRATINGS TO MEASURE DEFLECTION & ITS LOAD RESULT

Practical Report of Investigation & Project done by Civil Engineering Department of Yeshwantrao Chavan College of Engineering



"INVESTIGATIONS INTO BEHAVIOR & USE OF EXPANDED METAL MESH IN FORM OF GRATING"

[A Partial Report]

INVESTIGATORS

Prof. A.V.Patil
Asst. professor, Department of Civil Engineering

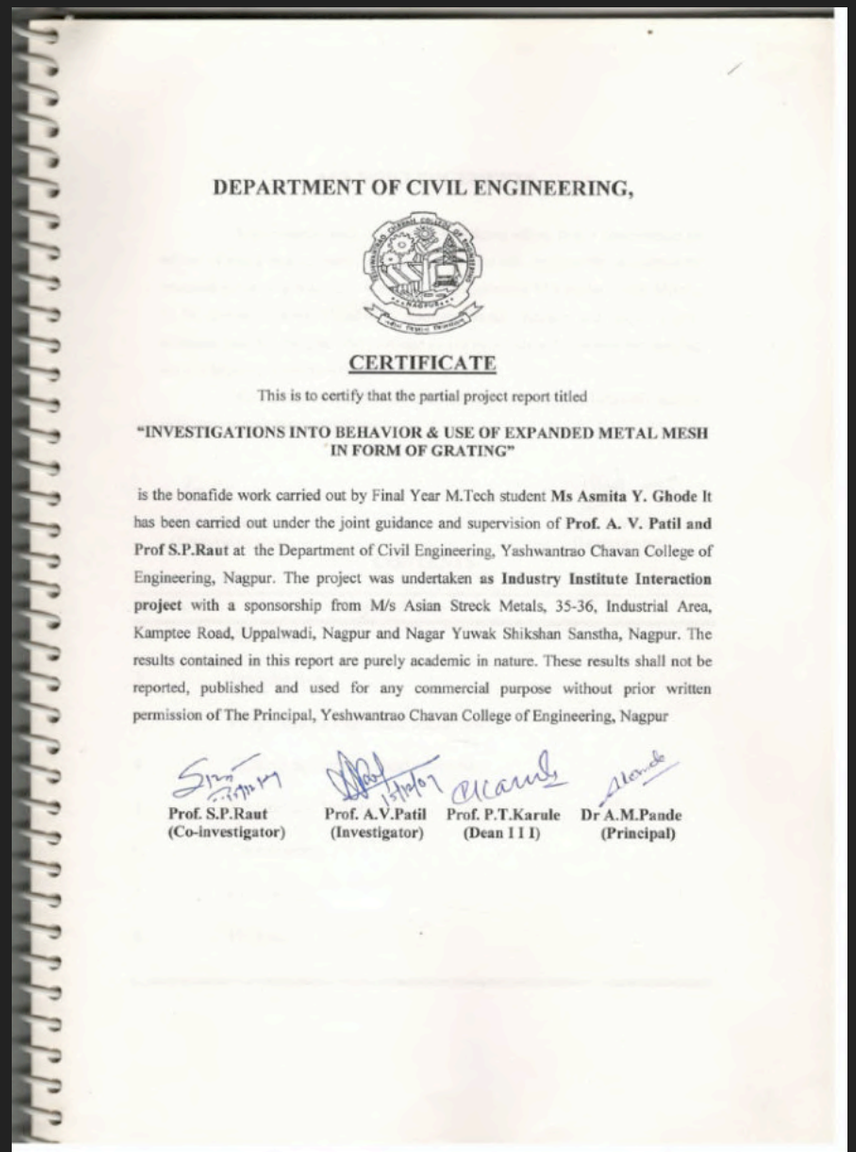
Prof. S.P.Raut
Lecturer, Department of Civil Engineering

ATTENTION

The matter reported in this volume is a partial out come of an Industry Institute Interaction Project undertaken jointly by the Department of Civil Engineering, Yeshwantrao Chavan College of Engineering, Nagpur with a sponsorship from M/s Asian Streck Metals, 35-36, Industrial Area, Kamptee Road, Uppalwadi, Nagpur and Nagar Yuwak Shikshan Sanstha, Nagpur. The results contained in this report is a fall out of Post Graduate Project carried out by Final Year M.Tech student Ms Asmita Y. Ghode and the same are purely academic in nature. These results shall not be reported, published and used for any commercial purpose without prior written permission of The Principal, Yeshwantrao Chavan College of Engineering, Nagpur

2009-10

Department of Civil Engineering
Yeshwantrao Chavan College of Engineering,
Nagpur.



DEPARTMENT OF CIVIL ENGINEERING,

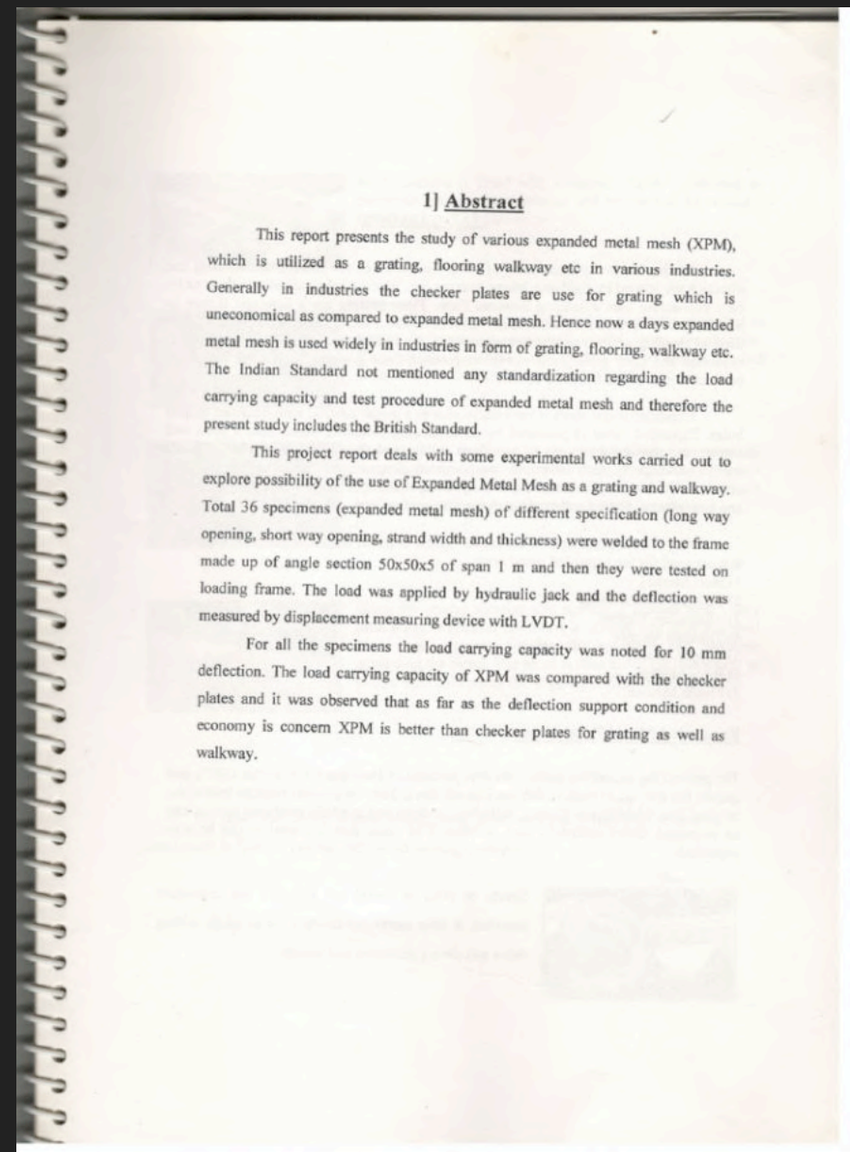
CERTIFICATE

This is to certify that the partial project report titled

"INVESTIGATIONS INTO BEHAVIOR & USE OF EXPANDED METAL MESH IN FORM OF GRATING"

is the bonafide work carried out by Final Year M.Tech student **Ms Asmita Y. Ghode** It has been carried out under the joint guidance and supervision of **Prof. A. V. Patil and Prof S.P.Raut** at the Department of Civil Engineering, Yashwantrao Chavan College of Engineering, Nagpur. The project was undertaken **as Industry Institute Interaction project** with a sponsorship from M/s Asian Streck Metals, 35-36, Industrial Area, Kamptee Road, Uppalwadi, Nagpur and Nagar Yuwak Shikshan Sanstha, Nagpur. The results contained in this report are purely academic in nature. These results shall not be reported, published and used for any commercial purpose without prior written permission of The Principal, Yeshwantrao Chavan College of Engineering, Nagpur

Prof. S.P.Raut	Prof. A.V.Patil	Prof. P.T.Karule	Dr A.M.Pande
(Co-investigator)	(Investigator)	(Dean I I I)	(Principal)



1] Abstract

This report presents the study of various expanded metal mesh (XPM), which is utilized as a grating, flooring walkway etc in various industries. Generally in industries the checker plates are use for grating which is uneconomical as compared to expanded metal mesh. Hence now a days expanded metal mesh is used widely in industries in form of grating, flooring, walkway etc. The Indian Standard not mentioned any standardization regarding the load carrying capacity and test procedure of expanded metal mesh and therefore the present study includes the British Standard.

This project report deals with some experimental works carried out to explore possibility of the use of Expanded Metal Mesh as a grating and walkway. Total 36 specimens (expanded metal mesh) of different specification (long way opening, short way opening, strand width and thickness) were welded to the frame made up of angle section 50x50x5 of span 1 m and then they were tested on loading frame. The load was applied by hydraulic jack and the deflection was measured by displacement measuring device with LVDT.

For all the specimens the load carrying capacity was noted for 10 mm deflection. The load carrying capacity of XPM was compared with the checker plates and it was observed that as far as the deflection support condition and economy is concern XPM is better than checker plates for grating as well as walkway.

PRACTICAL PHYSICAL TESTING OF EXPANDED METAL GRATINGS TO MEASURE DEFLECTION & ITS LOAD RESULT

Testing Equipment & Testing Procedure

3] Properties of Expanded Metal Mesh

Expanded Metal Mesh given by ASIAN STRECK METALS for testing

Type	Size in mm			
	SWO	LWO	Strand Width	Strand Thickness
A1	25	62	8	4
A2	25	62	6	4
B1	30	75	8	4
B2	30	75	6	4
C1	40	115	8	4
C2	40	115	6	4

Expanded Metal Mesh:-

Expanded mesh, made of superior quality steel sheets by incising and simultaneously expanding, has features of beautiful appearance, lightness in weight and good ventilation etc. Expanded mesh is widely used as isolation fences in industrial, building, household and so on. Packing: in rolls or in wooden pallet. It is also used in industrial flooring. Now in this experimental investigation we will try to used this expanded metal mesh in slab panel as reinforcement

Expanded metal is an extraordinarily versatile material – one with thousands of uses. It comes in four basic types, and it has four primary areas of application.

Basic types are raised (or standard), flattened, Gridwalk, and architectural (or decorative) meshes. The major areas of use are for enclosure, protection , support and decoration.

Expanded metal products are produced from solid sheets of plates of carbon , galvanized and stainless steel , as well as aluminum and a variety of alloys of copper, nickel , silver, titanium and other metals.

In an expanding process, the sheet or plate is simultaneously slit and stretched longitudinally – expanding the slits into diamond-shaped holes of uniform size, shape and regularity.

No metal is lost in the expanding process. Moreover, the final product is stronger per kilogram and lighter per metre than the original sheet or plate. The strands and knuckle of the diamond –shaped trusses form an angle to the original plane of the sheet, adding strength and rigidity.

Because it is made from a solid sheet of metal , it can never unravel. The slender metal strands forming the open diamonds permit light, heat, air, liquid and sound to pass through –yet present a virtually impenetrable barrier to intruders. Even if cut at one or more points , the remaining strand intersections continue to hold .

4] Testing Equipment and testing procedure

The expanded metal mesh given by Asian streck Metals were welded to the support. The size of the mesh was 1mX1m. Every fourth strand welded to the support of angle section 50X50X5 mm with a minimum landing of 25mm.

All the specimens were tested on loading frame. Load applied by hydraulic jack and the deflection measured by defection measuring device.

Loading Frame:

Loading frame is a useful equipment for any applied mechanics or a Structural laboratory. The loading frame is generally used for testing any structural member like beam, column, slab, brick walls or any such members under static loading. The load test are generally carried out to assess the behavior of structure under service conditions or to find limit capacity of structure at failure. The loading frame supplied Apple Fabricators Pvt. Ltd., has all these functional capabilities.

The basic arrangement of the frame is shown in fig.

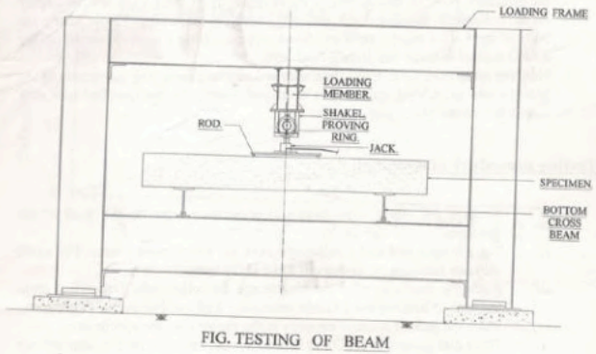


FIG. TESTING OF BEAM

The components of the frame are :

i) Four vertical members i.e. columns
ii) Four main longitudinal members two at top and two at bottom.
iii) Four cross members two at top and two at bottom
iv) Loading arm attached to top cross beams
v) Four braces two at top and two at bottom

Displacement Measuring Device:

1. Before connecting power to the indicator, verify whether the power source available matcher with the requirement of the indicator as mentioned on the rear panel. After verification, connect one end of the mains cable supplied, to the socket on the rear panel and the other end to the power source.
2. Connect the LVDT sensor cable to the SENSOR socket on the real panel. The Sl. No. of the LVDT and the displacement indicator should match with those on the front page of this manual for proper performance as claimed in the specifications.
3. Switch on power to the indicator and allow about 5 minutes for warm-up.
4. Fix the sensor suitably in the system where the measurement is to be made. It is to be noted that the LVDT plunger is at the core out position. This is to be done as follows. Keep the zero control in its midway position. With the LVDT plunger touching the reference point of measurement, move the body of the LVDT till the display on the indicator reads near about zero (say, within +/- 20 counts.) Now, clamp the body of the LVDT rigidly onto any fixed support. Using a screwdriver adjust the ZERO control to make the display read zero.
5. Now the setup is ready to make displacement measurement. Any movement of the plunger into the LVDT (core in) is displayed directly in the specified unit as + displacement and vice versa.

Testing procedure of specimen

i) Arrange the lower cross beams at a distance equal to the span of the specimen.
ii) Put a hinged end and a roller end over the lower cross beams. The exact distance between the centers of these is the span.
iii) Place the specimen over the hinged and the roller ends. Depending upon the type of loading use suitable arrangement of loading over the specimen.
iv) Place the jack of suitable capacity at the center over the specimen.
v) Place dial gauges or LVDT at locations where maximum displacement are expected and note their initial reading. When the jack just abuts the loading arm and ton cross members are touching the longitudinal members, the set up is now ready for experimentation.

PRACTICAL PHYSICAL TESTING OF EXPANDED METAL GRATINGS TO MEASURE DEFLECTION & ITS LOAD RESULT

Result for Grating Sample of Mesh Size 25mm x 62mm x 8mm x 4mm

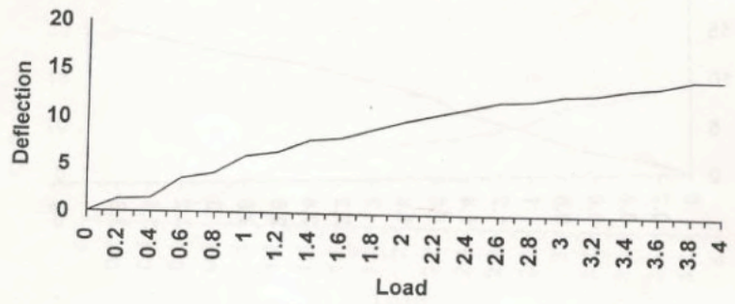
Specimen 1

5] Results and Graphs

Table: - Deflection in mm of specimen no.1 for Type A1 (25 X 62 X 8 X 4) expanded metal mesh for concentrated load at center.

Load in KN	Deflection in mm	Load in KN	Deflection in mm
0.2	1.26	2.2	10.44
0.4	1.38	2.4	11.27
0.6	3.56	2.6	11.88
0.8	4.18	2.8	12.01
1.0	5.94	3.0	12.6
1.2	6.44	3.2	12.8
1.4	7.59	3.4	13.33
1.6	7.91	3.6	13.61
1.8	8.92	3.8	14.31
2.0	9.74	4.0	14.31

Specimen No. 1Type A1 25 X 62 X 8 X 4

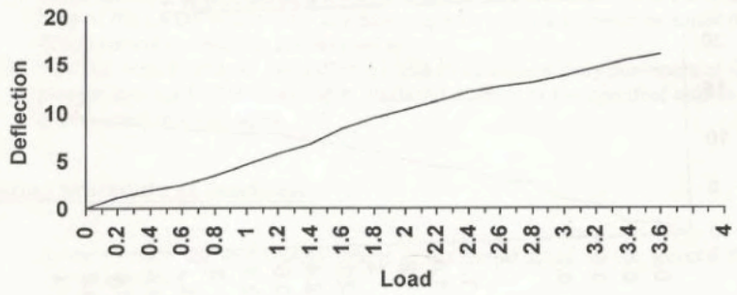


Specimen 2

Table: - Deflection in mm of specimen no.2 for Type A1 (25 X 62 X 8 X 4) expanded metal mesh for concentrated load at center.

Load in KN	Deflection in mm	Load in KN	Deflection in mm
0.2	1.2	2.2	11.06
0.4	1.9	2.4	12.05
0.6	2.41	2.6	12.5
0.8	3.4	2.8	13.03
1.0	4.6	3.0	13.71
1.2	5.61	3.2	14.57
1.4	6.67	3.4	15.5
1.6	8.24	3.6	15.97
1.8	9.3	3.8	-
2.0	10.25	4.0	-

Specimen No. 2Type A1 25 X 62 X 8 X 4

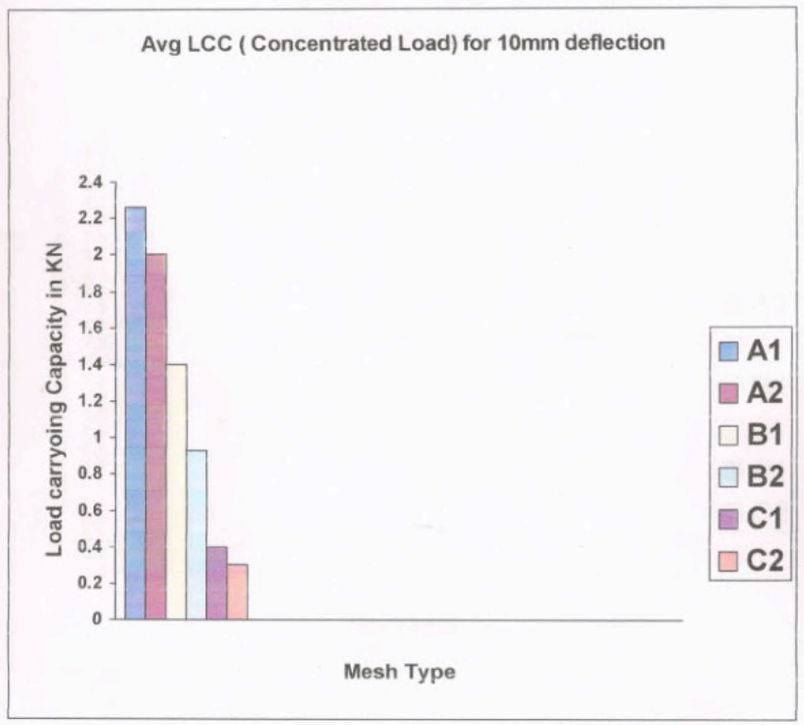


PRACTICAL PHYSICAL TESTING OF EXPANDED METAL GRATINGS TO MEASURE DEFLECTION & ITS LOAD RESULT

Concentrated Load

Table: - Avg. Load Carrying Capacity (Concentrated Load) for 10mm deflection

Sr No.	Mesh Type	Avg. LCC (Concentrated Load) for 10mm deflection
01	Type A1 25 X 62 X 8 X 4	2.26 KN
02	Type A2 25 X 62 X 6 X 4	2.0 KN
03	Type B1 30 X 75 X 8 X 4	1.4 KN
04	Type B2 30 X 75 X 6 X 4	0.93 KN
05	Type C1 40X 115 X 8 X 4	0.4 KN
06	Type C2 40X 115 X 6X 4	0.3 KN

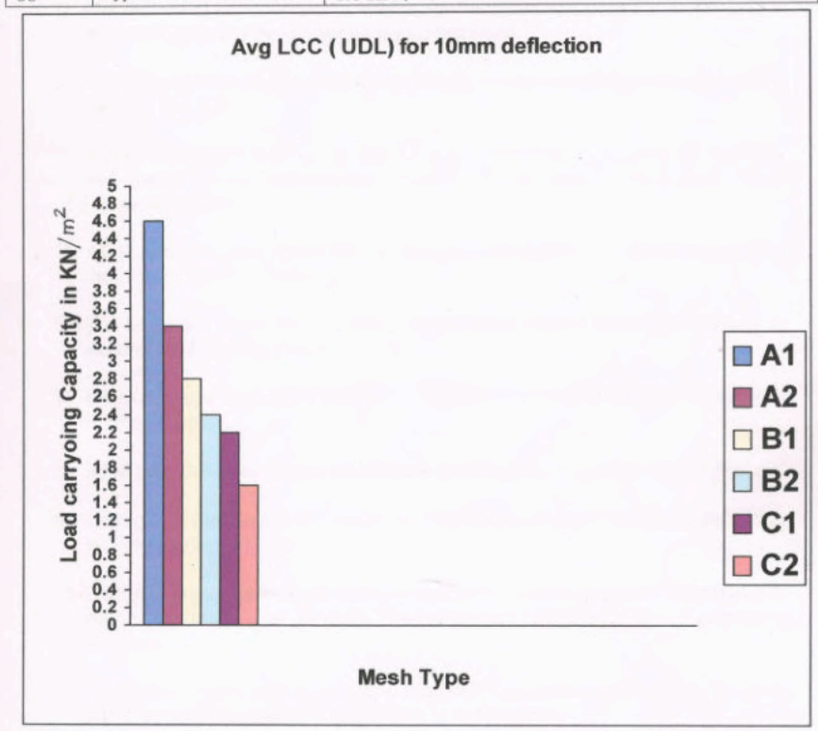


Results for 6 different designs of Gratings

Uniformly Distributed Load

Table: - Avg. Load Carrying Capacity (UDL) for 10mm deflection

Sr No.	Mesh Type	Avg. LCC (UDL) for 10mm deflection
01	Type A1 25 X 62 X 8 X 4	4.6 KN /m²
02	Type A2 25 X 62 X 6 X 4	3.4 KN /m²
03	Type B1 30 X 75 X 8 X 4	2.8 KN /m²
04	Type B2 30 X 75 X 6 X 4	2.4 KN /m²
05	Type C1 40X 115 X 8 X 4	2.2KN /m²
06	Type C2 40X 115 X 6X 4	1.6 KN /m²



Results for 6 different designs of Gratings

PRACTICAL PHYSICAL TESTING OF EXPANDED METAL GRATINGS TO MEASURE DEFLECTION & ITS LOAD RESULT

Actual Testing Photos

6] Conclusions

1) After testing of the various specimens, it is observed that the load carrying capacity of A1 type expanded metal mesh is about 2.26KN(concentrated load) for 10mm deflection and 4.6KN (udl) for 10mm deflection, which is greater than other types of mesh.

2) The deflection curve pattern is similar for the entire specimen i.e. as the load is increased gradually the deflection is also increased.

3) It is observed that up to 15mm deflection not a single specimen was failed, as the material is ductile.

4) It is recommended that the A1 and A2 type of meshes can be used for walkway and grating as the load carrying capacity for the same is more than 2.0KN (concentrated load).

5) All the meshes were tested for 1m span only and hence it is recommended that they can be test for various spans.

6) The Expanded Metal Mesh is being used in large scale in Industrial buildings in stead of steel checker plates.

7) Checker plates are heavier and accumulate dust on itself than XPM. It may also become slippery.

8) XPM provides more frictional resistance as compared to checker plates.

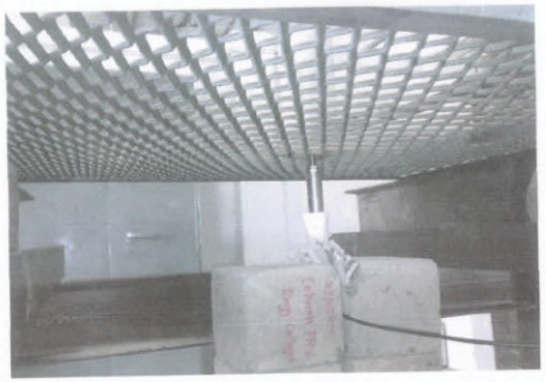
9) Owing to higher moment of inertia as compared to checker plated, the deflection in XPM platforms is less.

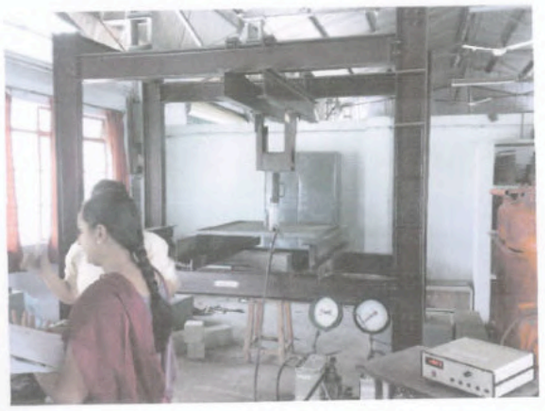
10) Owing to higher moment of inertia as compared to checker plated, the spacing of supporting structure can be more. Hence there is a reduction in cost of supporting structure.

11) There is an urgent need to go into testing and standardization of grating by using XPM, as no Indian standard is available in this regard.

12) Standardization of prefabricated XPM trades for industrial stairs can also be undertaken.

PHOTOS





Usage

Usage

Usage

Usage

Usage

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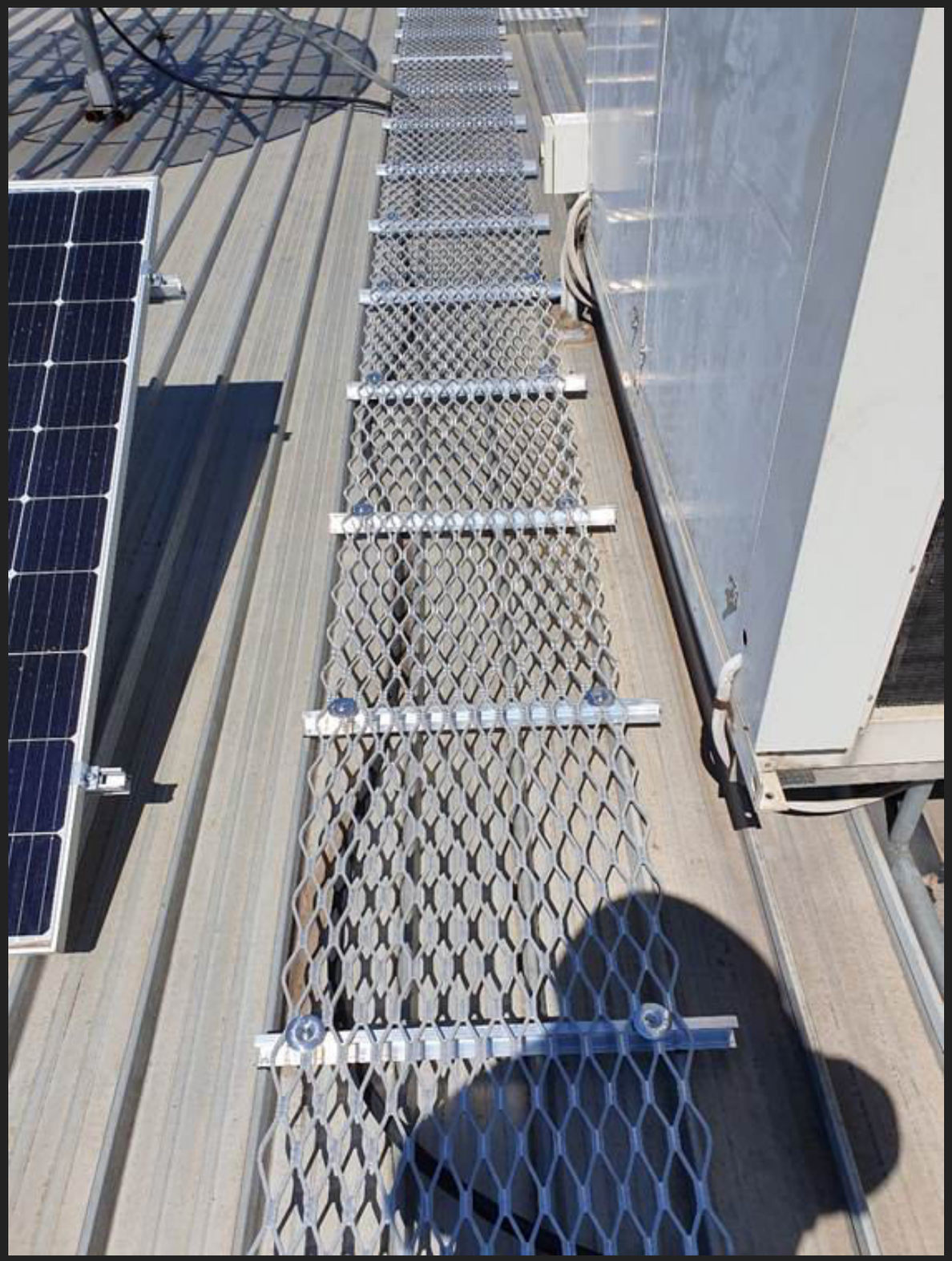
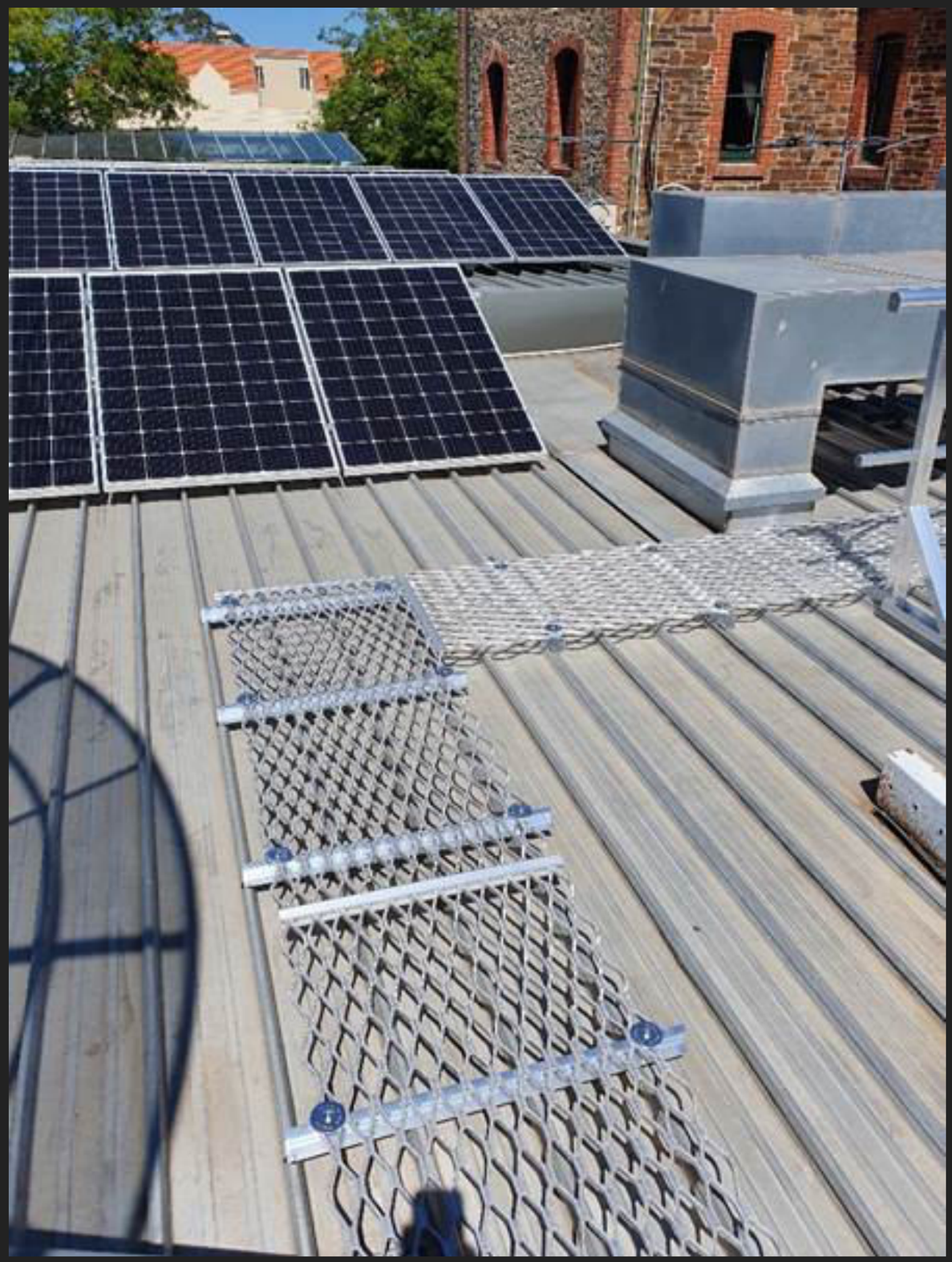
Usage

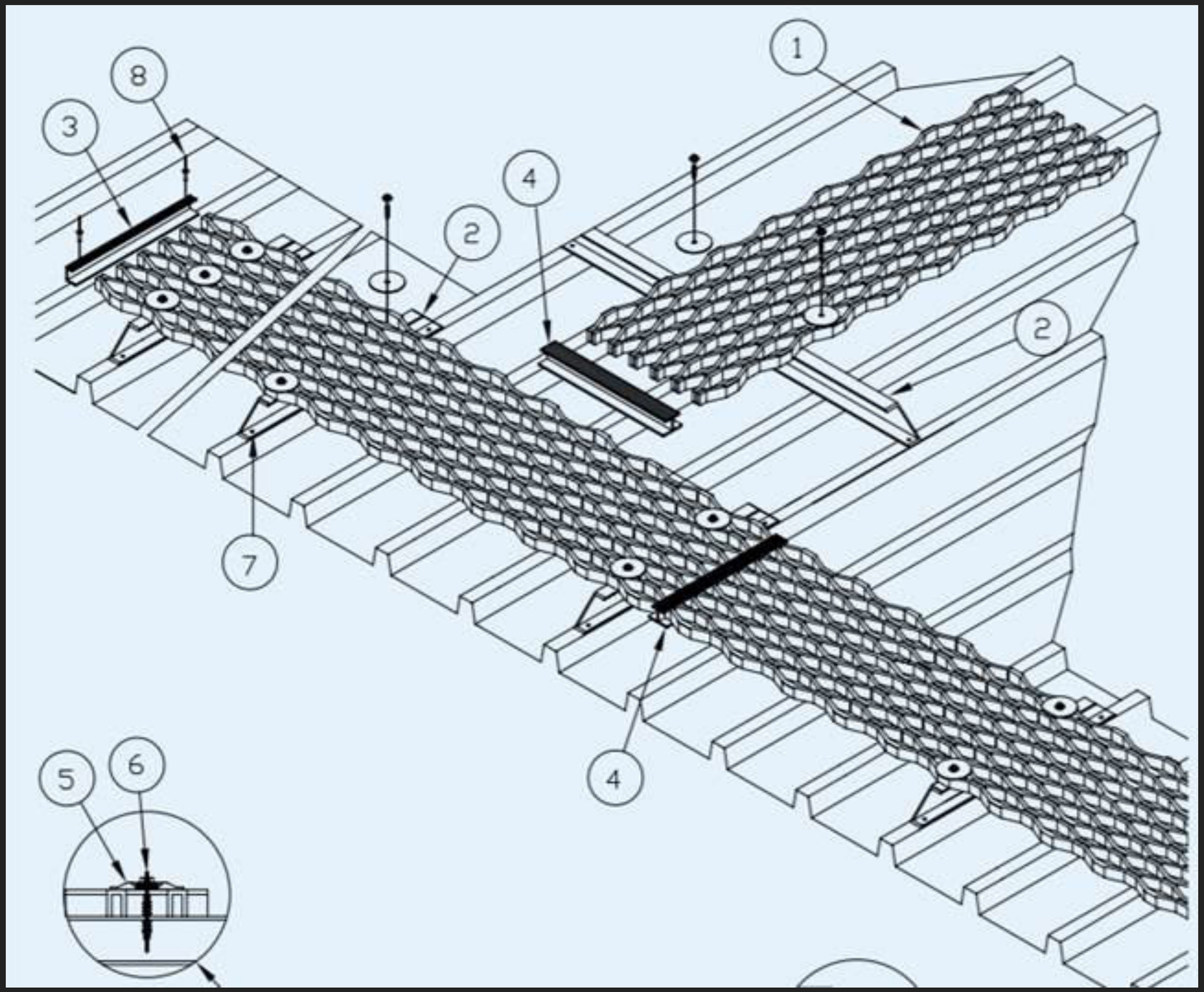
Solar Panel Maintainence Catwalk





Usage

Solar Panel Maintainence Catwalk

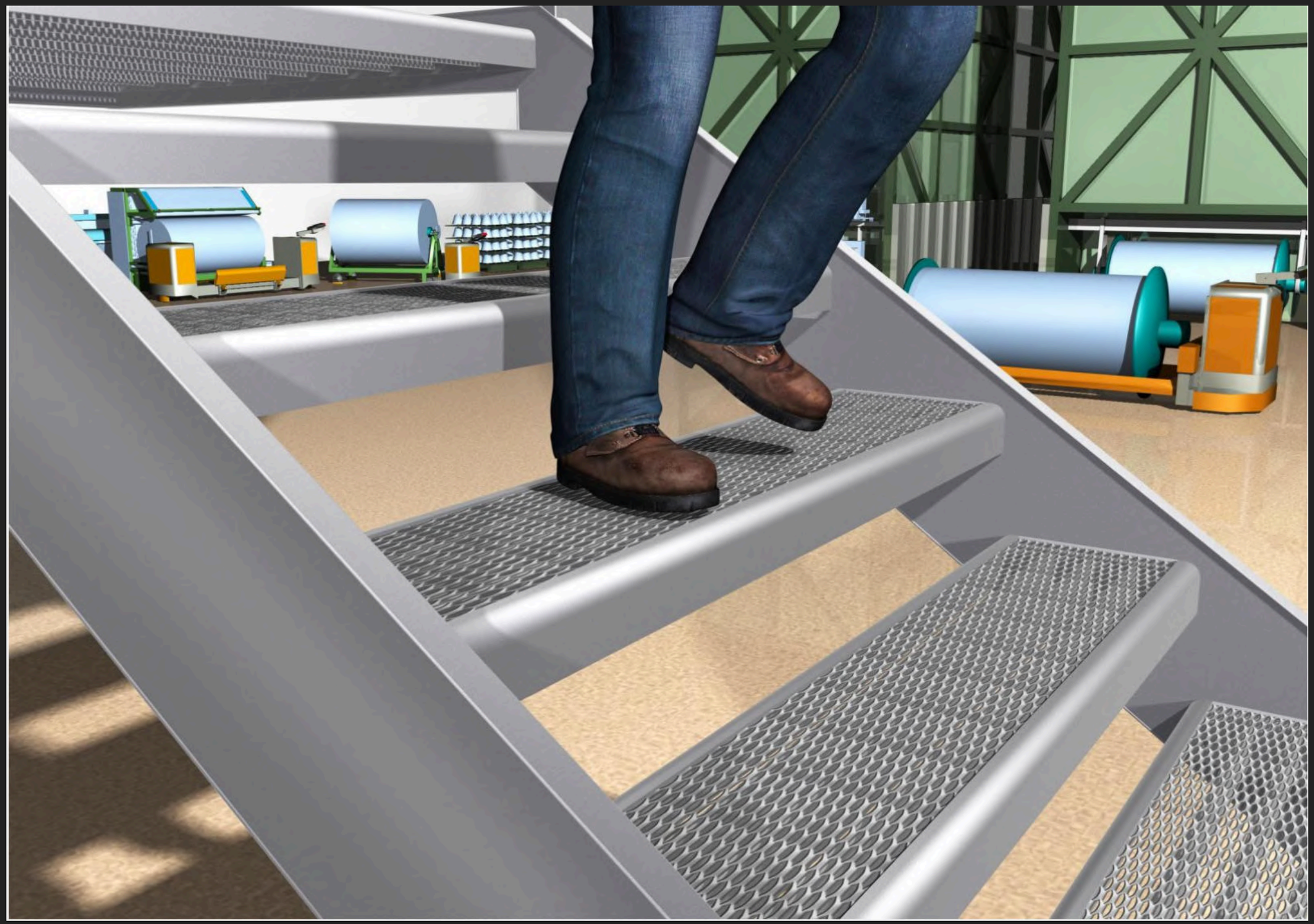


Usage

Solar Panel Maintainence Catwalk

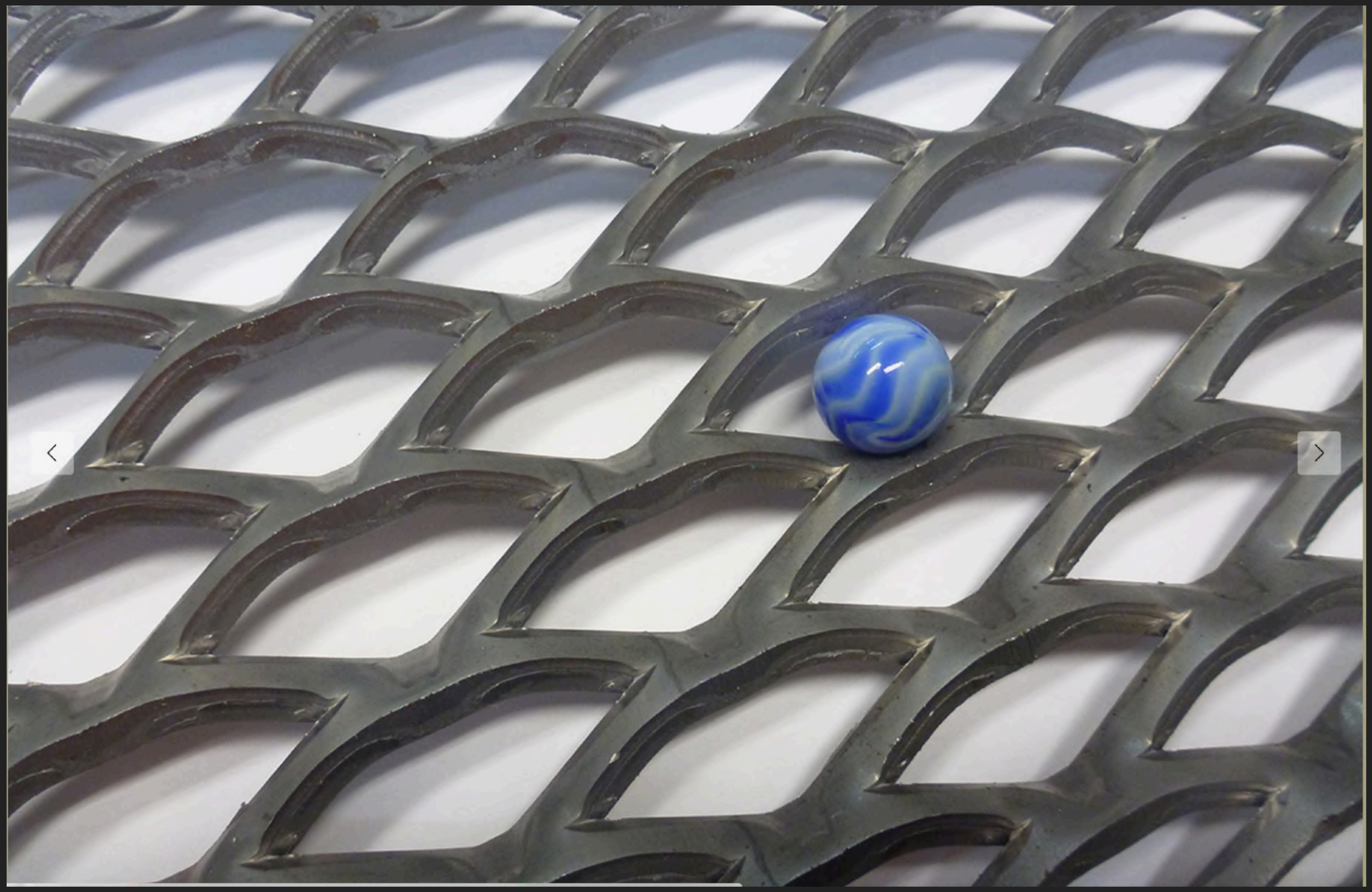
Usage

Stair Treads



Usage

Usage

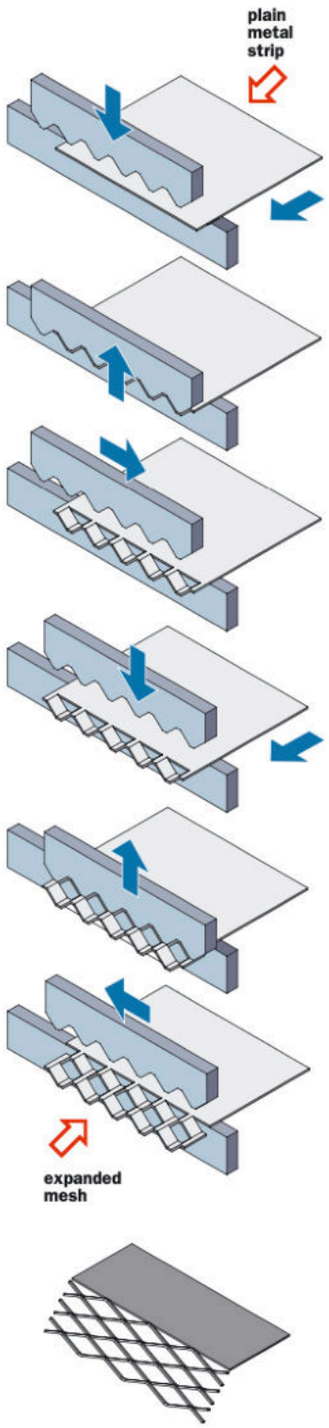


Usage

Usage

Contact Us for all your Walkway/ Catwalk Requirements

1 Expanding the metal

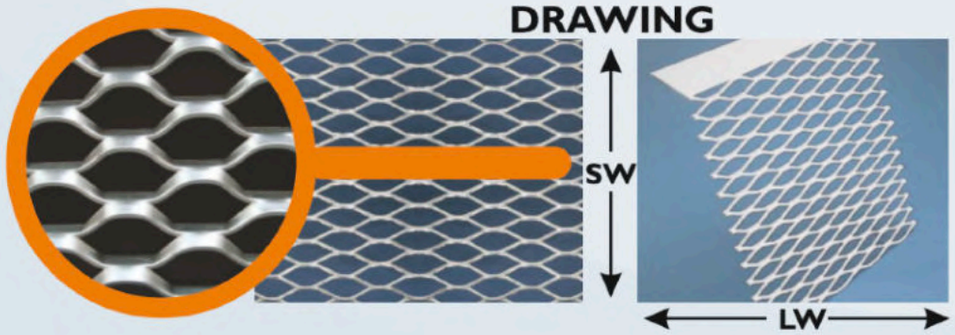


Our technicians are always ready to answer your queries.

Whatever is your Industrial Flooring Application,

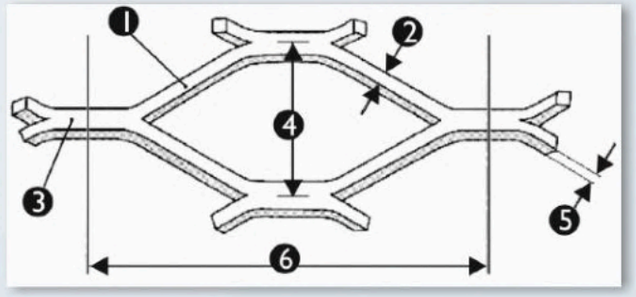
our Gratings are extensively used for making High Tension Tower & Oil Rig Walkways, Boilers and Industrial Machinery Platforms, Chemical Industries Platforms, Walkways & Catwalks, Bridges, Drainage Coverings, Staircases, Racks, Partitions, Industrial and Housing / Plot Fencing... for Indoor and Outdoor applications.

DRAWING



TERMINOLOGY

1 - Strand
2 - Strand Width
3 - Knuckle
4 - Short Way (SW)
5 - Strand Thickness
6 - Long Way (LW)



SALIENT FEATURES OF EXPANDED METAL UN-WELDED GRATINGS

1. Safer and Serrated Non-Skid Surface.
2. Light weight yet strong, one piece construction with No Cracks, Joints or Welds.
3. High load capacity, long life with minimum deflection.
4. Maintenance free open design.
5. Fast and Easy to install.
6. Economical as being light weight it reduces structural steel requirement.
7. Versatile in Application.

Expanded Metal also can be manufactured in heavy gauges for applications such as Walk-ways, ramps and cat walks of all types. Frequently, the heavier gratings and catwalks are used in industrial plants for flooring and stairs-treads.

Since 1962

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