شرکت ملی نفت ایران

شرکت پشتیبانی ساخت و تهیه کالای نفت تهران

آشنایی با گریتینگ

مدیریت پشتیبانی ساخت تجهیزات مکانیک، برق و ابزار دقیق

بسم الله الرحمن الرحیم

شرکت ملی نفت ایران

شرکت پشتیبانی

ساخت و تهیه

کالای نفت تهران

آشنایی با گریتینگ

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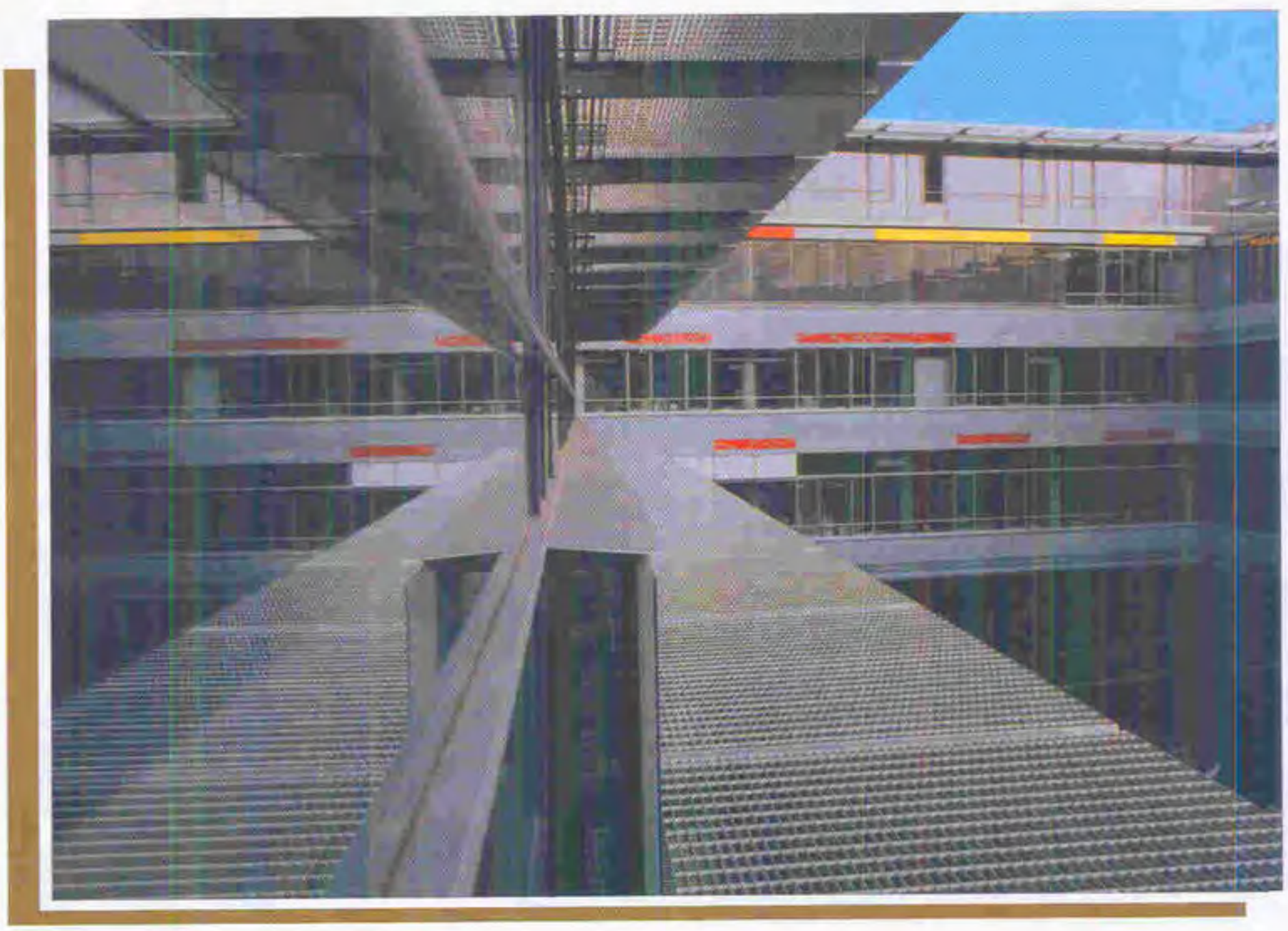
گریتینگ

جهت درک بهتر از این محصول، تعریف، ابعاد، مزایا و مواد اولیه به کار رفته درآن به شرح ذیل ارائه می گردد:

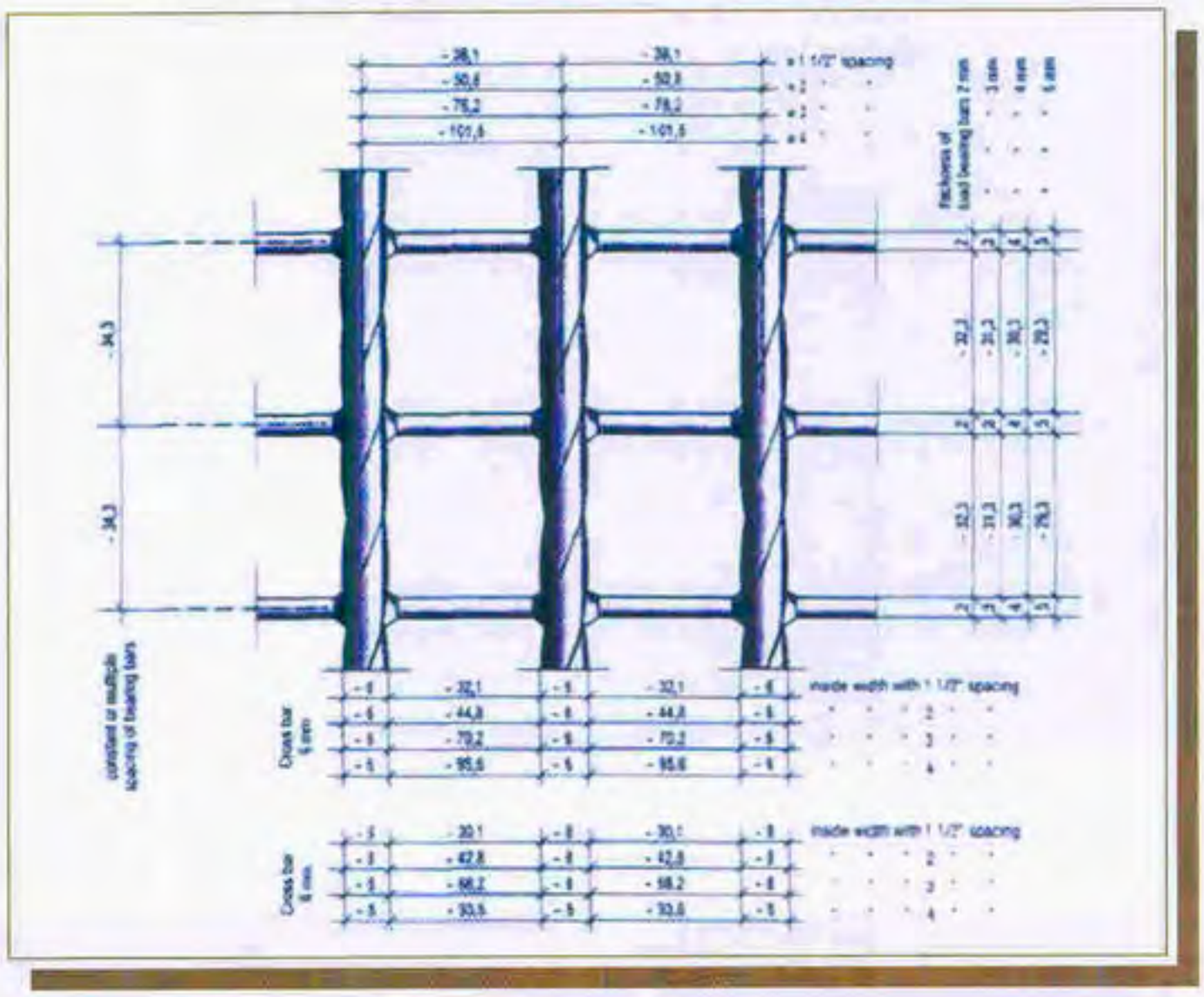
تعریف

گریتینگ عبارت است از صفحه‌ای مشبک که از اتصال صلب ذوبی تسمه و آرماتور فولادی عمود برهم ساخته شده و قدرت تحمل تاصد تن درهر مترمربع را دارد. این محصول به عنوان کف فولادی مشبک در مکان‌هایی که در دسترس بودن محفظه زیر آن (مانند پوشش آبراهها) و یا صرفه‌جویی در مصرف مواد فولادی ضمن حفظ استحکام زیاد (مانند پلکان و کف پلهای عابر پیاده و وسایط نقلیه) مدنظر باشد، مورد استفاده قرار می‌گیرد. این محصول در صنایع پتروشیمی، پالایشگاه‌های نفت و گاز، کارخانجات و صنعت ساختمان و ... کاربرد دارد.



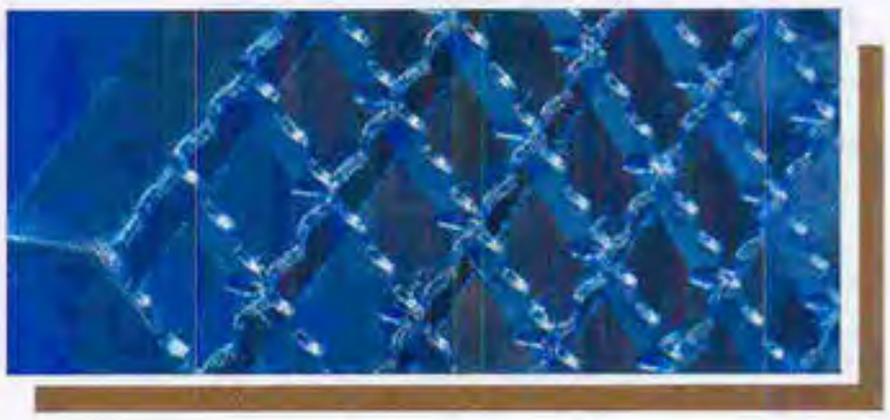
ابعاد گریتینگ

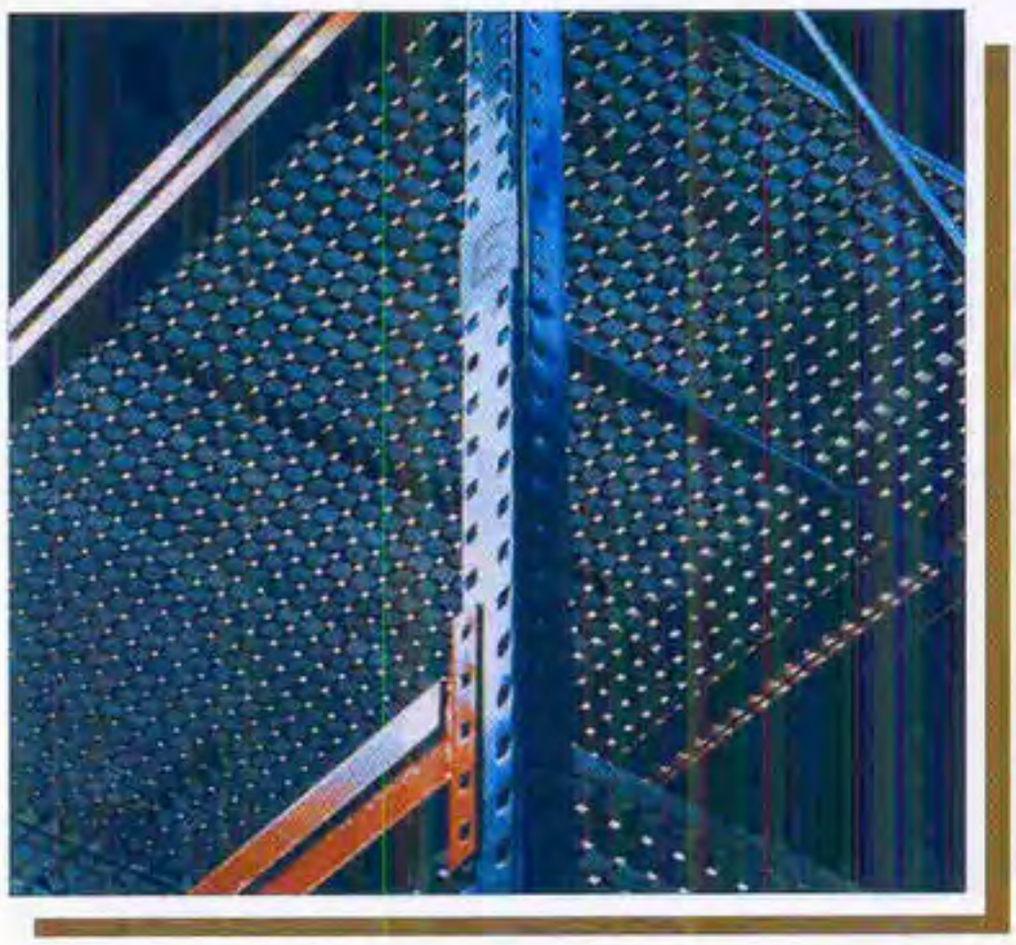
ابعاد گریتینگ استاندارد تولیدی این محصول در جدول شماره (۱) نشان داده شده است.



مزایا

با توجه به تکنولوژی ساخت که گریتینگ را به صورت محصولی یکه درمی‌آورد و طی آن تسمه و آرماتور در محل‌های اتصال ذوب می‌گردند لذا در مقابل فشار جانبی، عمودی، کششی و پیچشی مقاومت زیاد دارد. ضمنا با توجه به این که هیچ‌گونه پیچ‌ومهره و یا پرچی د ر آن استفاده نمی‌شود هیچگونه گرد و خاک یا مواد زائد در محل اتصال جمع نمی‌گردد.
مزیت دیگر این محصول تغییر فاصله‌های محل اتصال بر اساس سفارش مشتری برای تحمل فشارهای مختلف می‌باشد که اثر مستقیم در صرفه‌جویی هزینه خواهد داشت.



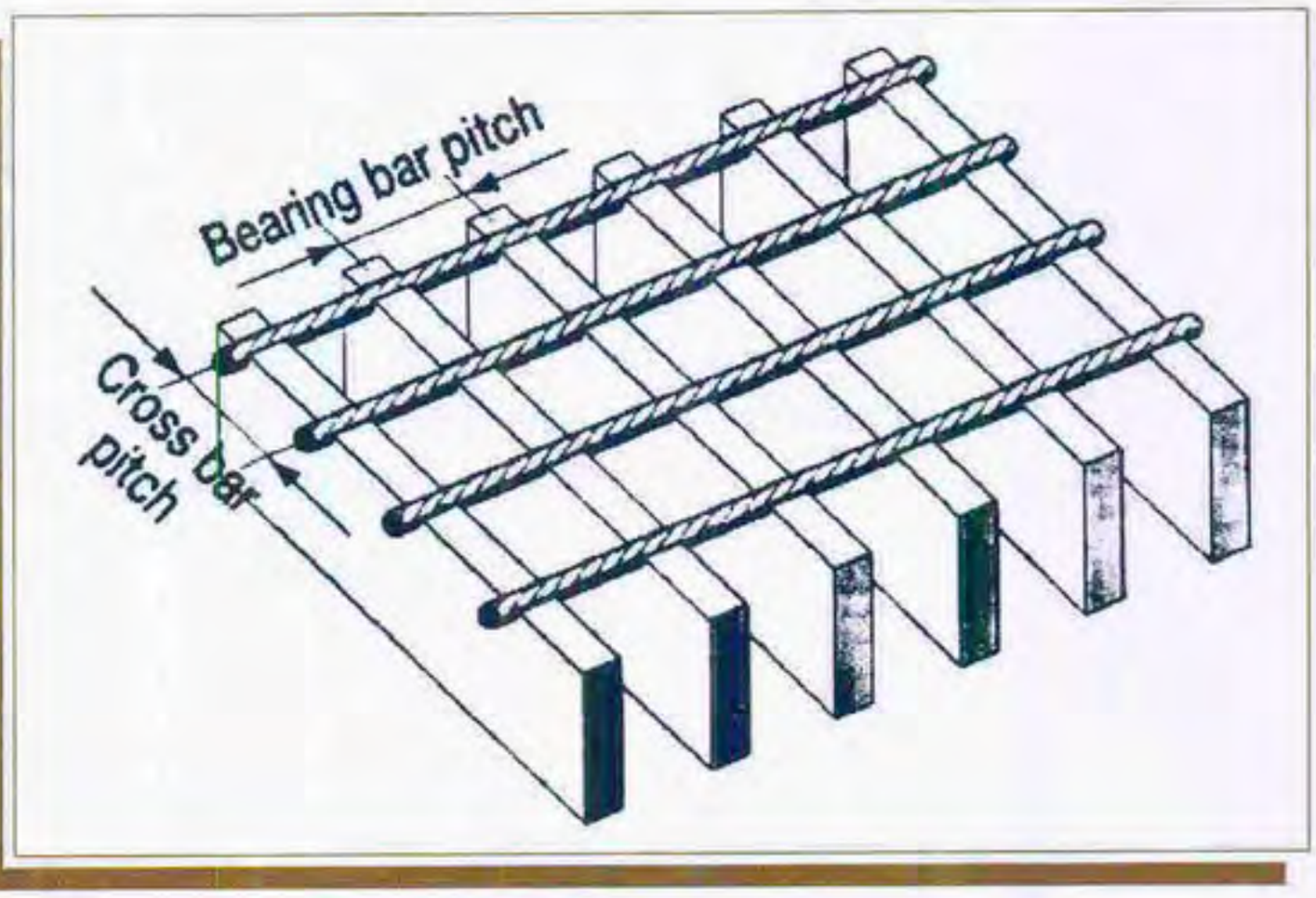


مواد اولیه

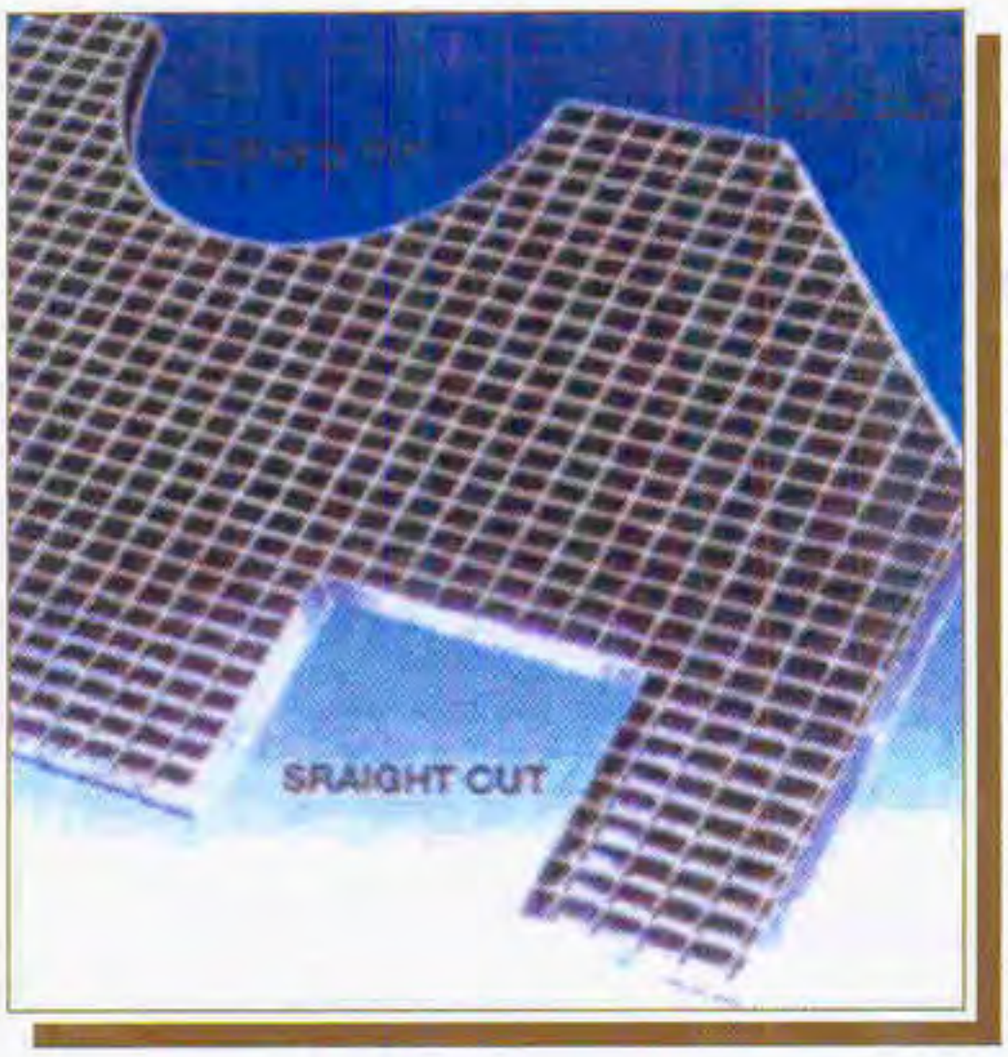
با توجه به ضرورت حمایت از صنایع داخلی، گریتینگ‌های تولیدی با استفاده از فولادهای تولیدی صنایع فولاد کشور و بر اساس درخواست مشتریان تهیه خواهد شد. چنانچه سفارشی برای گریتینگ با فولادهای مخصوص Stainless Steel وجود داشته باشد فولاد آن از خارج از کشور تهیه خواهد شد.

روش تولید گریتینگ

پس از برش ورق‌های فولادی به صورت تسمه و پیچش آرماتور آن را وارد خط تولید کرده و با به کارگیری ماشین‌آلات Forge Welding که برای ذوب جوش تسمه و آرماتور به هم فشار ۱۰۰ تن و برق فشار قوی 2000 KVA استفاده می‌کند، به هم جوش می‌شوند.



عکس زیر نمونه‌ای از کارخانه تولید گریتینگ می‌باشد.

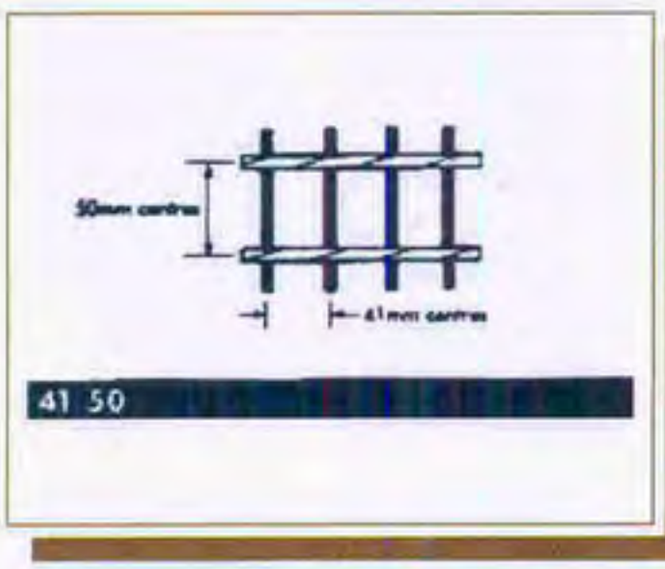


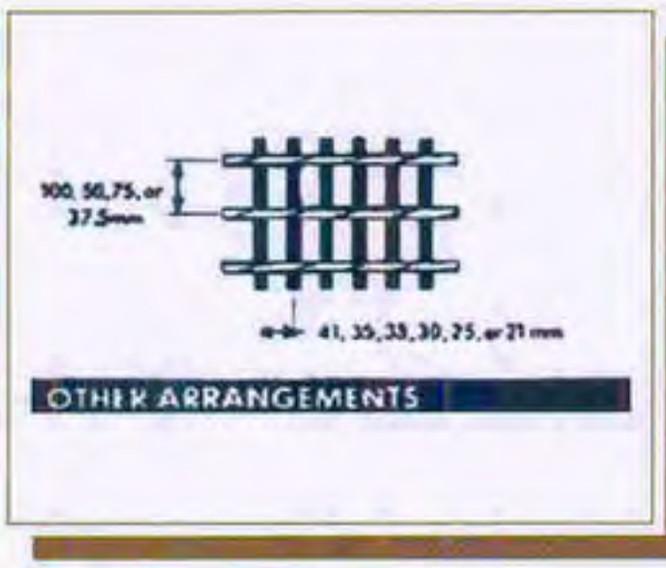
گریتینگ در ابعاد ۱/۵ متر عرض به طور مداوم تولید می‌شود و به طول ۶ متر برش خورده و به صورت ورقه‌های مشبک جهت آماده‌سازی سفارشات مخصوص در انبار نگهداری می‌شود.

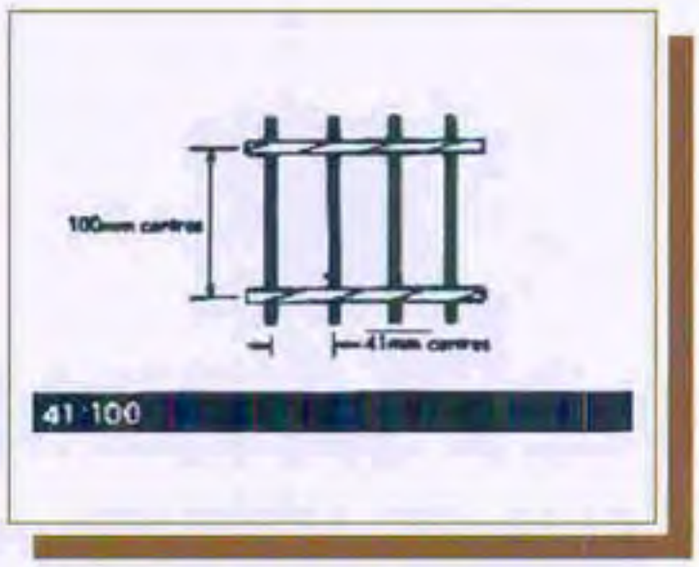
در مرحله بعد پس از دریافت مشخصات درخواستی مشتری، گریتینگ به ابعاد و اشکال درخواستی برش خورده و به روش غوطه‌وری در دیگ‌های گالوانیزاسیون جهت جلوگیری از زنگ‌زدگی و پوسیدگی گالوانیزه می‌گردد.

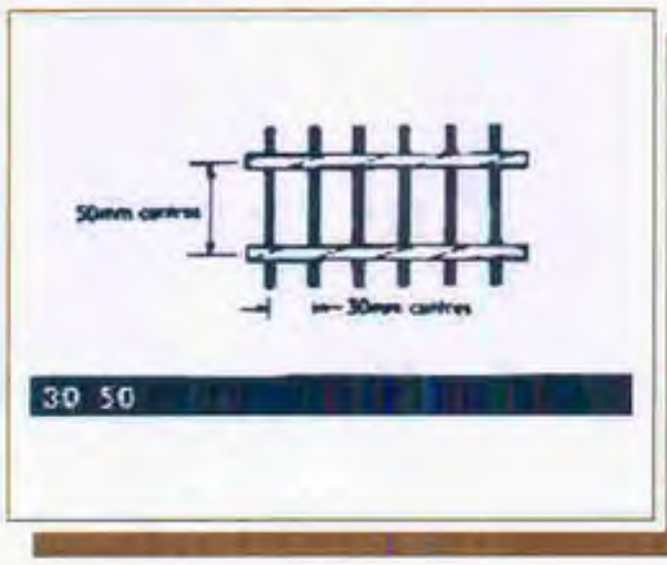
انواع ساختار ظاهری گریتینگ

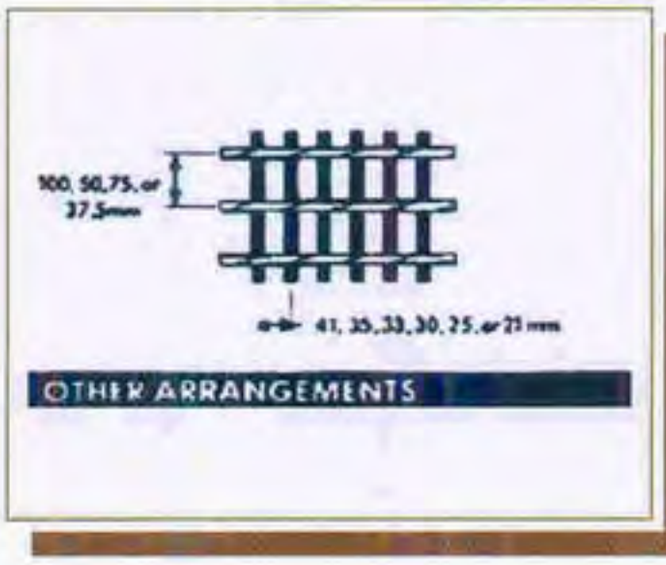
فواصل بین تسمه‌ها و آرماتورها براساس رعایت استانداردهای مربوط به صنایع مختلف و تحمل بارهای متفاوت بنابر درخواست مشتریان قابل تغییر می‌باشد.

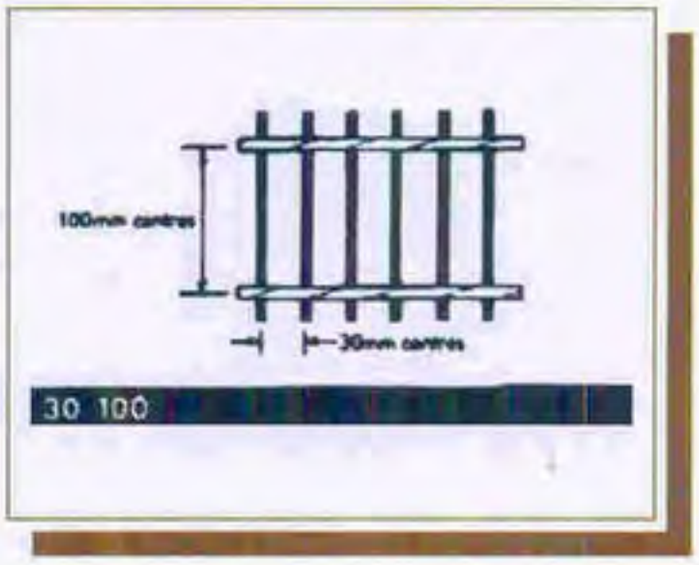






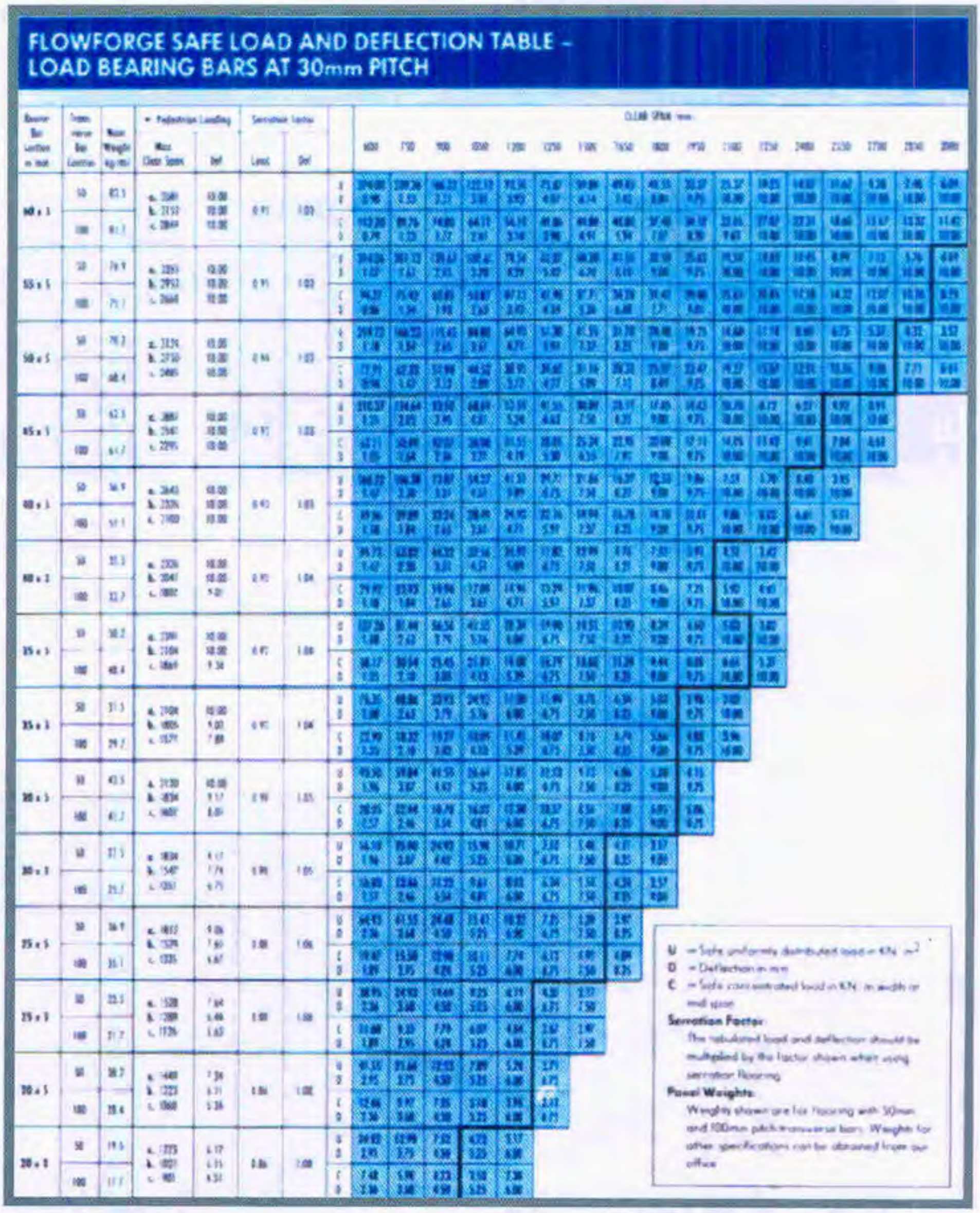






اطلاعات فنی انواع گریتینگ

جدول زیر نشان دهنده اطلاعات فنی انواع گریتینگ می‌باشد.



FLOWFORGE SAFE LOAD AND DEFLECTION TABLE - LOAD BEARING BARS AT 30mm PITCH

Serration Factor

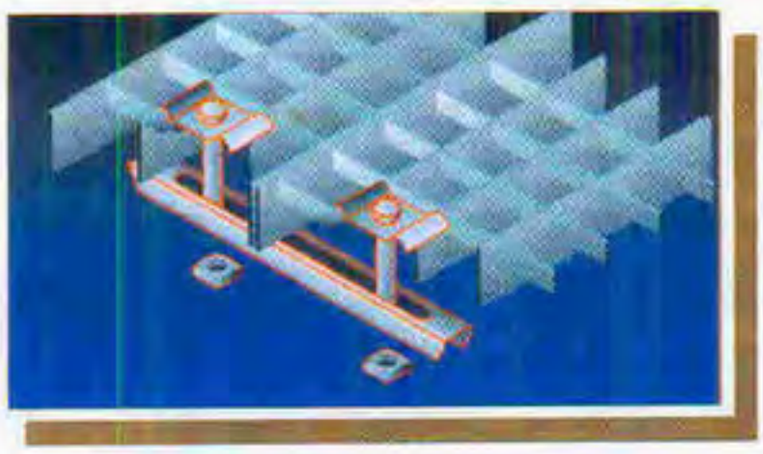
The tabulated load and deflection should be multiplied by the factor shown when using serrated flooring.

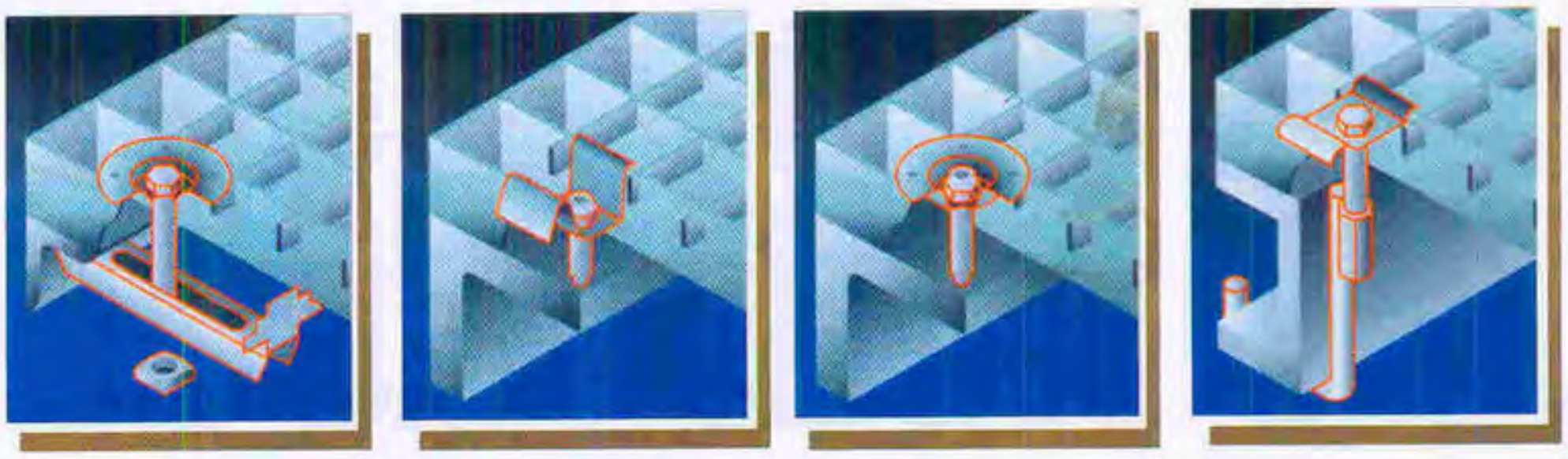
Panel Weights

Weights shown are for flooring with 50mm and 100mm pitch transverse bars. Weights for other specifications can be obtained from our office.

نحوه اتصال گریتینگ

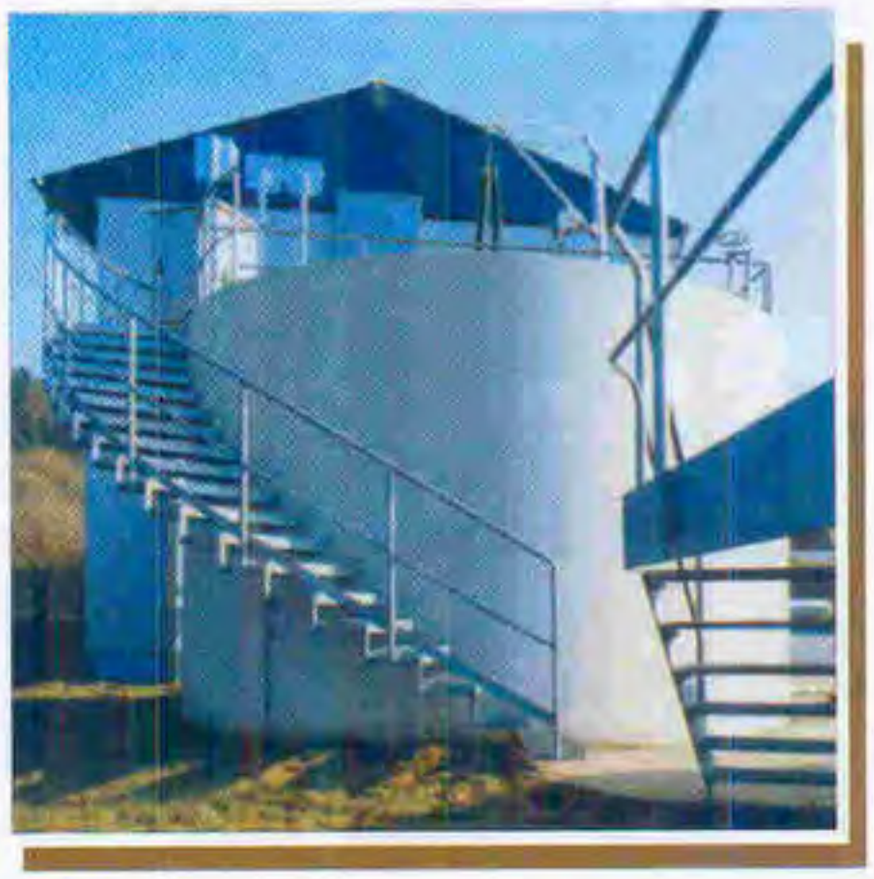
نحوه اتصال گریتینگ‌ها به یکدیگر ویا به سازه‌ها (همانطور که در این عکس‌ها نشان داده شده‌اند) با استفاده از پیچها و کلیپس‌های مخصوص صورت می‌گیرد.
براساس نوع گریتینگ و یا سازه نحوه اتصال متفاوت خواهد بود.

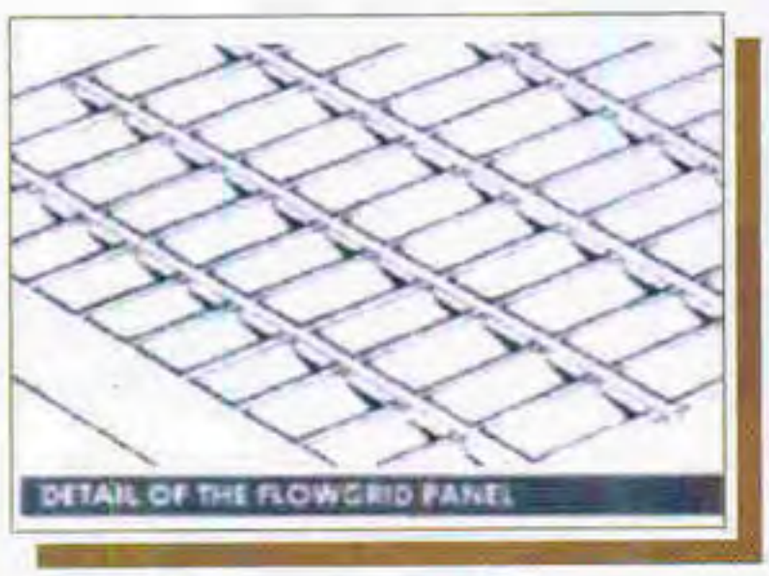


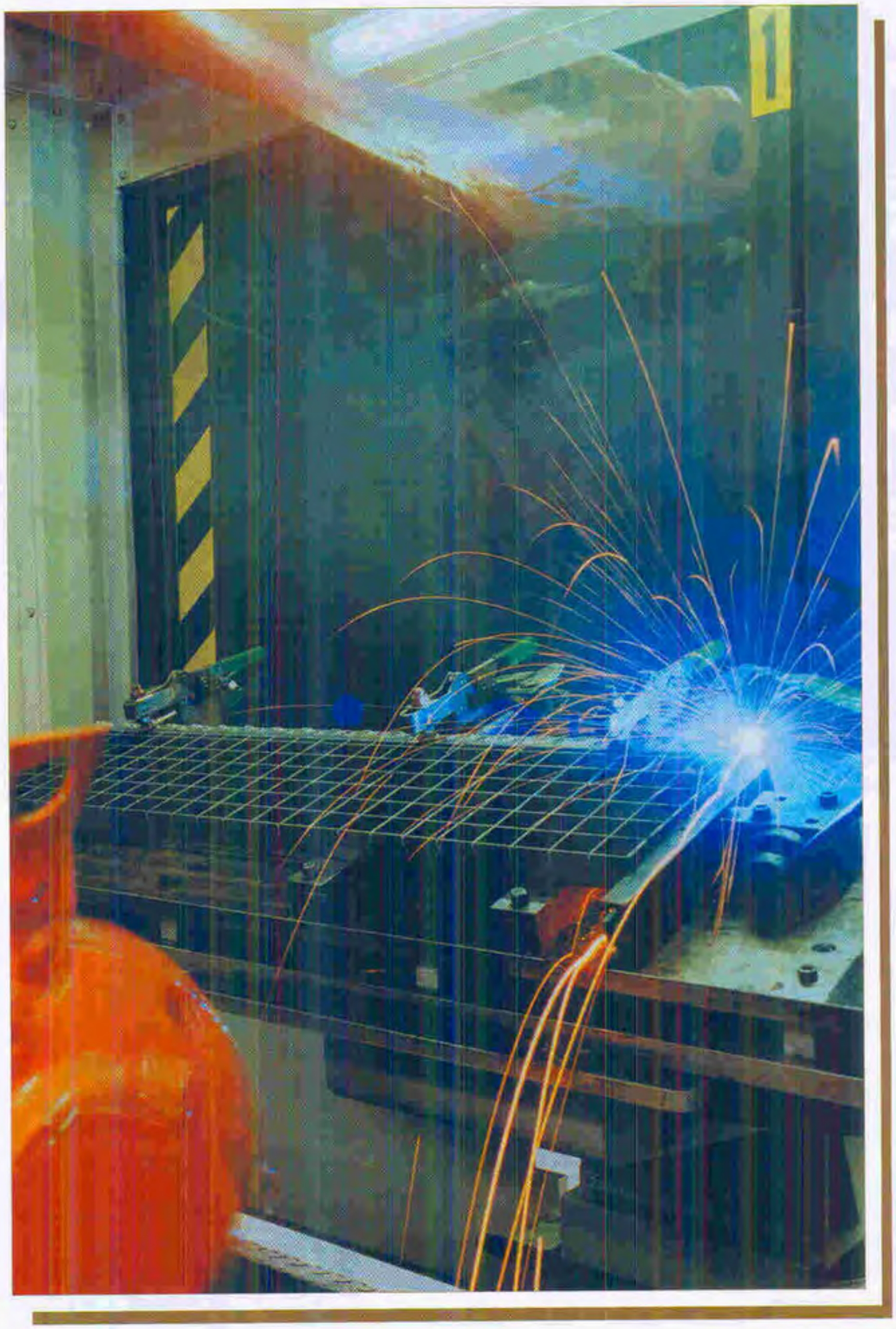


کاربری گریتینگ

مکان‌های استفاده از گریتینگ می‌تواند در کلیه صنایع به شرح زیر باشد:
۱ـ پلکان
۲ـ راهروهای زمینی و هوایی
۳ـ پوشش آبرفتی
۴ـ پوشش سطح پل‌های عابر پیاده و وسایط نقلیه سبک و سنگین
۵ـ کف سکوهای حفاری دریایی و خشکی
۶ـ زیر پوشش سقف‌های ساختمانی
عکسها و نقشه‌های زیر می‌تواند به عنوان نمونه استفاده از گریتینگ‌ها تلقی گردد.







AN INTRODUCTION TO GRATING

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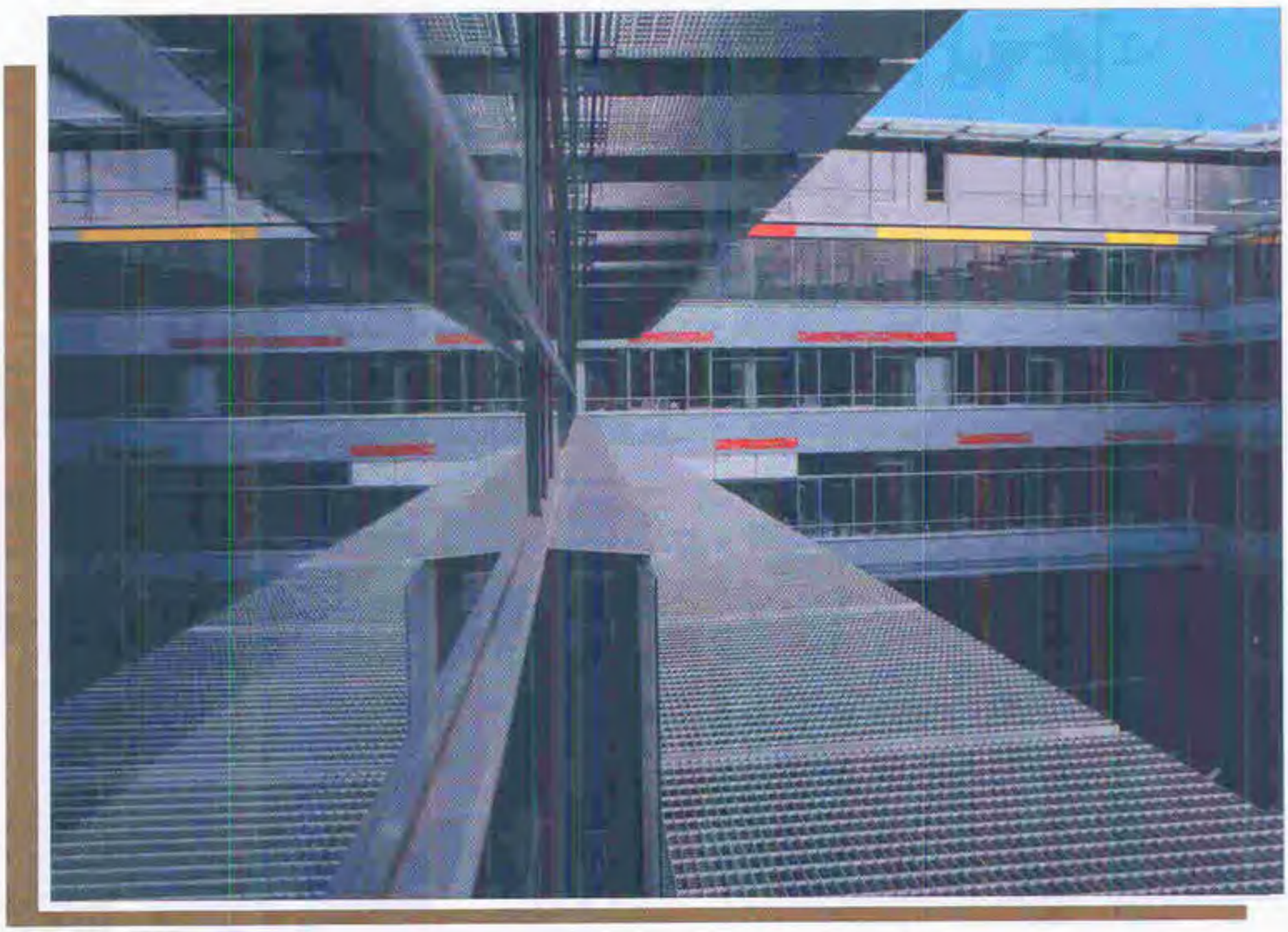
GRATINGS

In order to have a better appreciation of this product, definittion, dimensions, benefits and raw materials used are explained as follows:

Definition

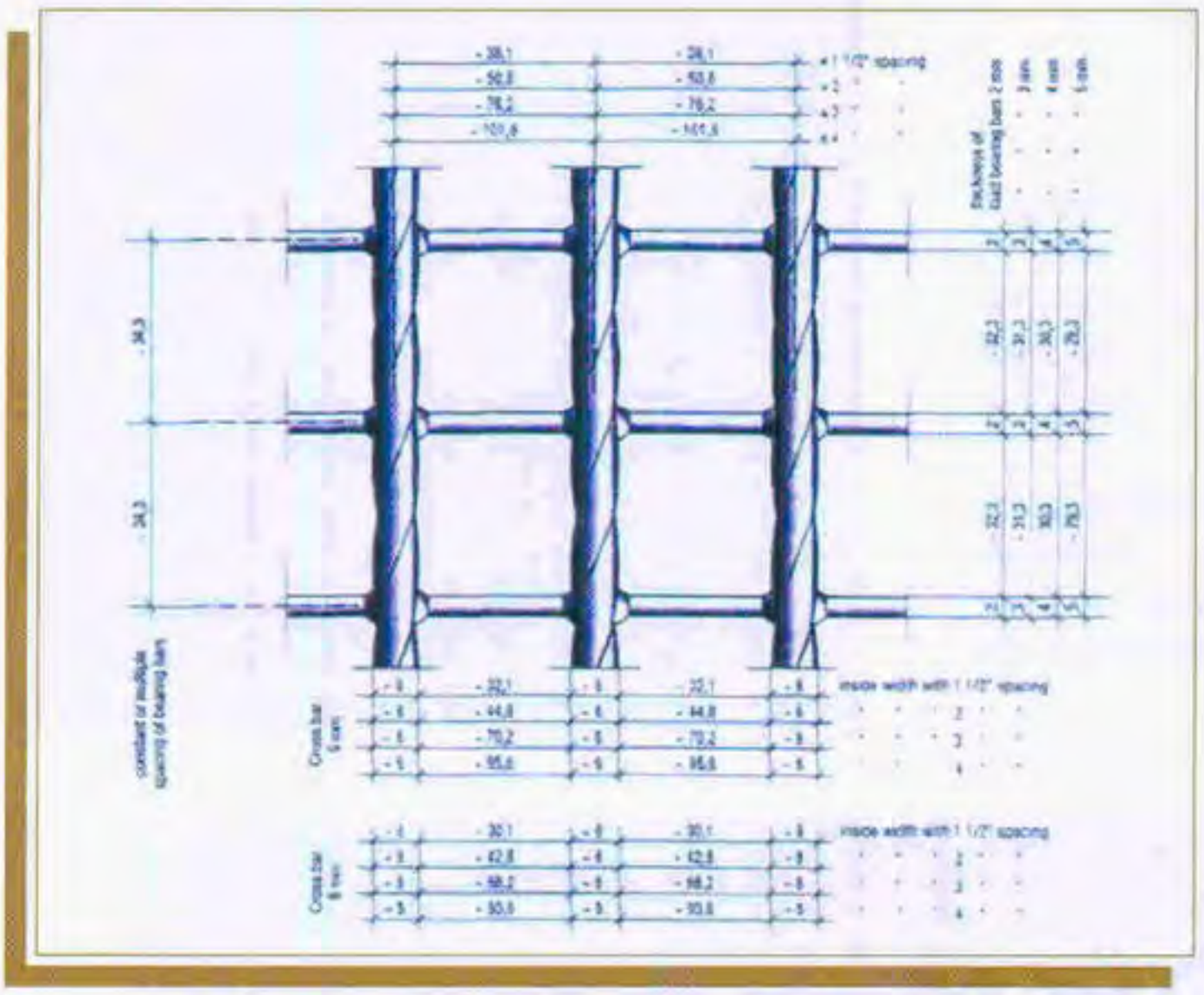
Gratings is constructed of load bearing bar in a wide range of depths and thickness and at various pitches, with square twisted traverse bars forge welded to the upper edges of the load bearing bars, under 100 tons pressure and 2,000 K.V.A.

Grating has variety of usage, including stair ways, sewage system, pedestrian overhead walks and automobile bridges mainly used in petrochemical, gas, oil and construction industries.



Dimensions

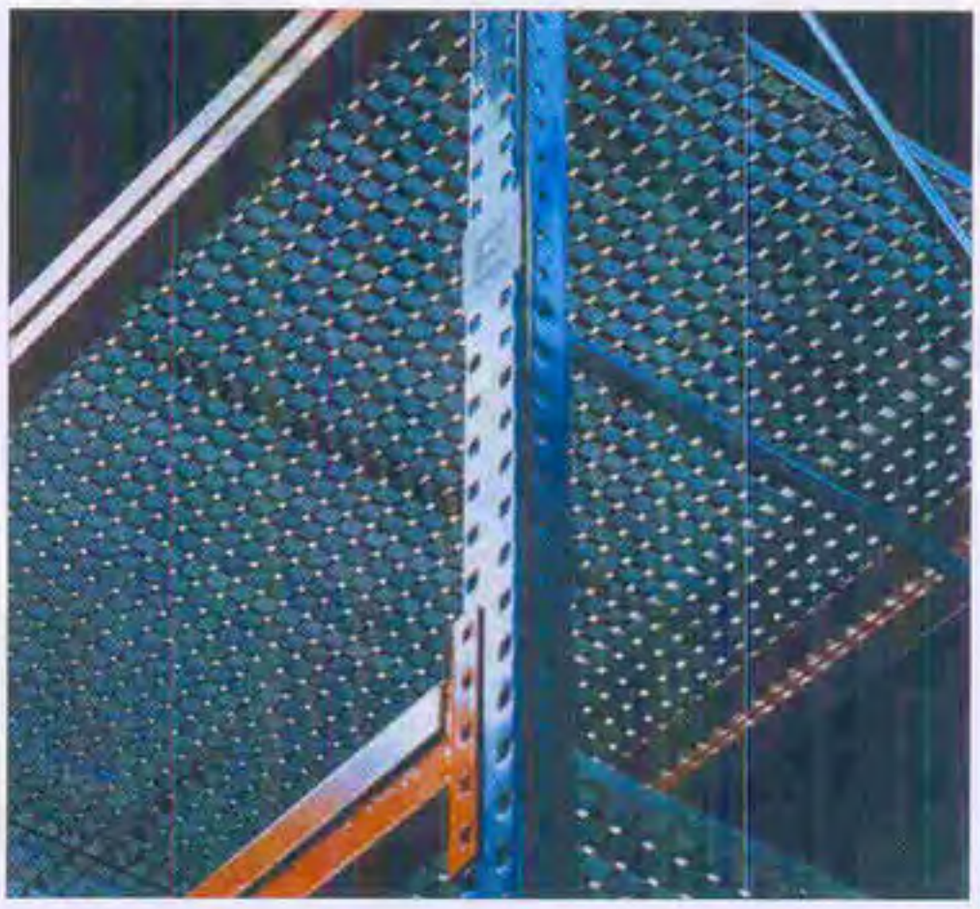
The combination of bearing bars and cross bars with different material cross sections results in wide variety of types and dimensions as listed in the following diagram.



Benefits

Due to forge welding method, grating is a one-piece construction, whereby metal is fused onto metal to give maximum resistance to distortion, twisting and wear.

This means that considerable shaping can be done without reducing rigidity and strengths. Furthermore, grating has no rivet heads, acute angles or crevices to hold dirt or derbies which could aggravate.

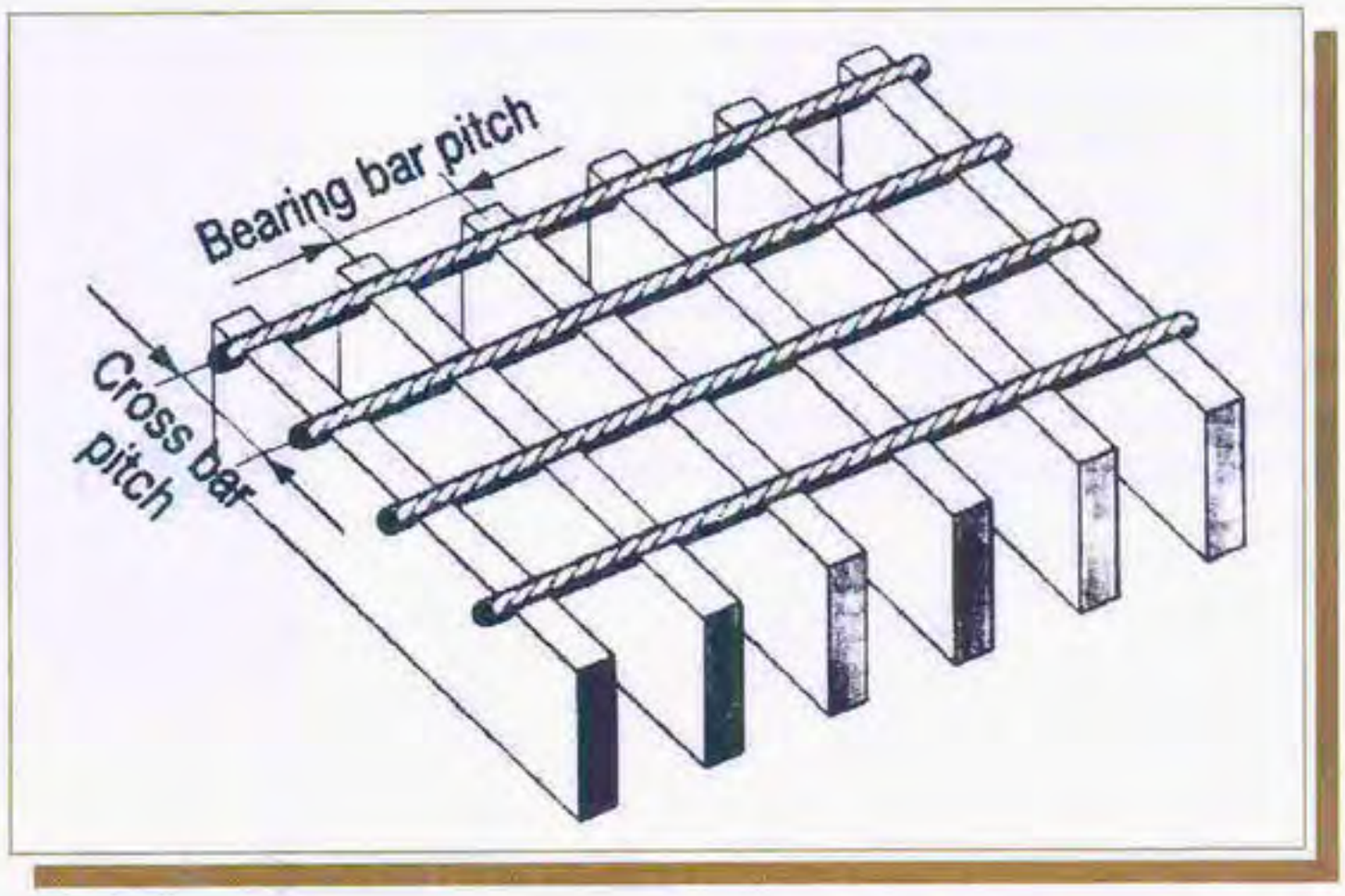


Raw Materials

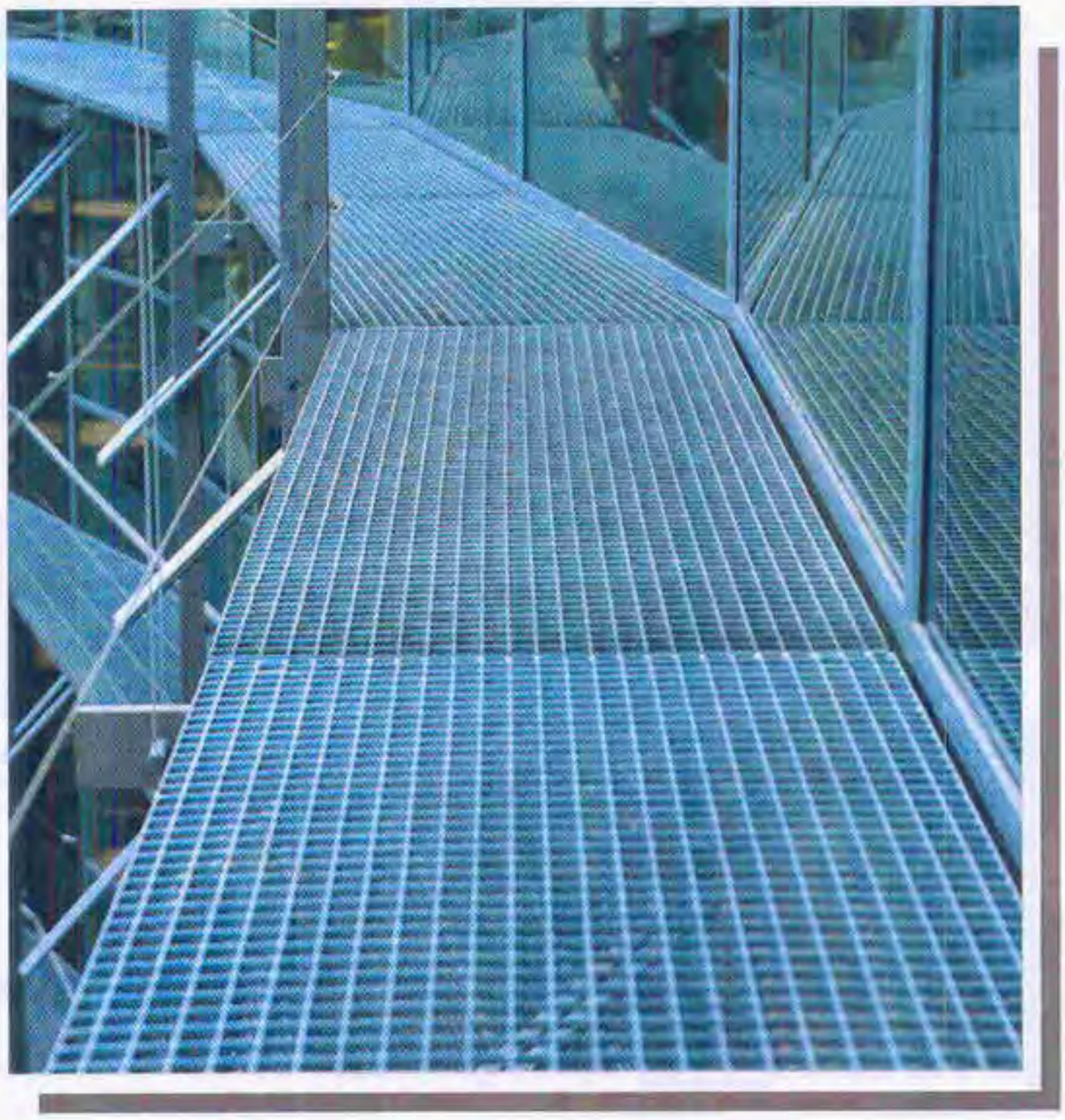
In due consideration of supporting local industries, all attempts shall be made to use steel products from Mobarakeh or Esfahan steel companies.
Should there be any request for stainless steel Grating, the raw material must be imported into Iran.

Production process

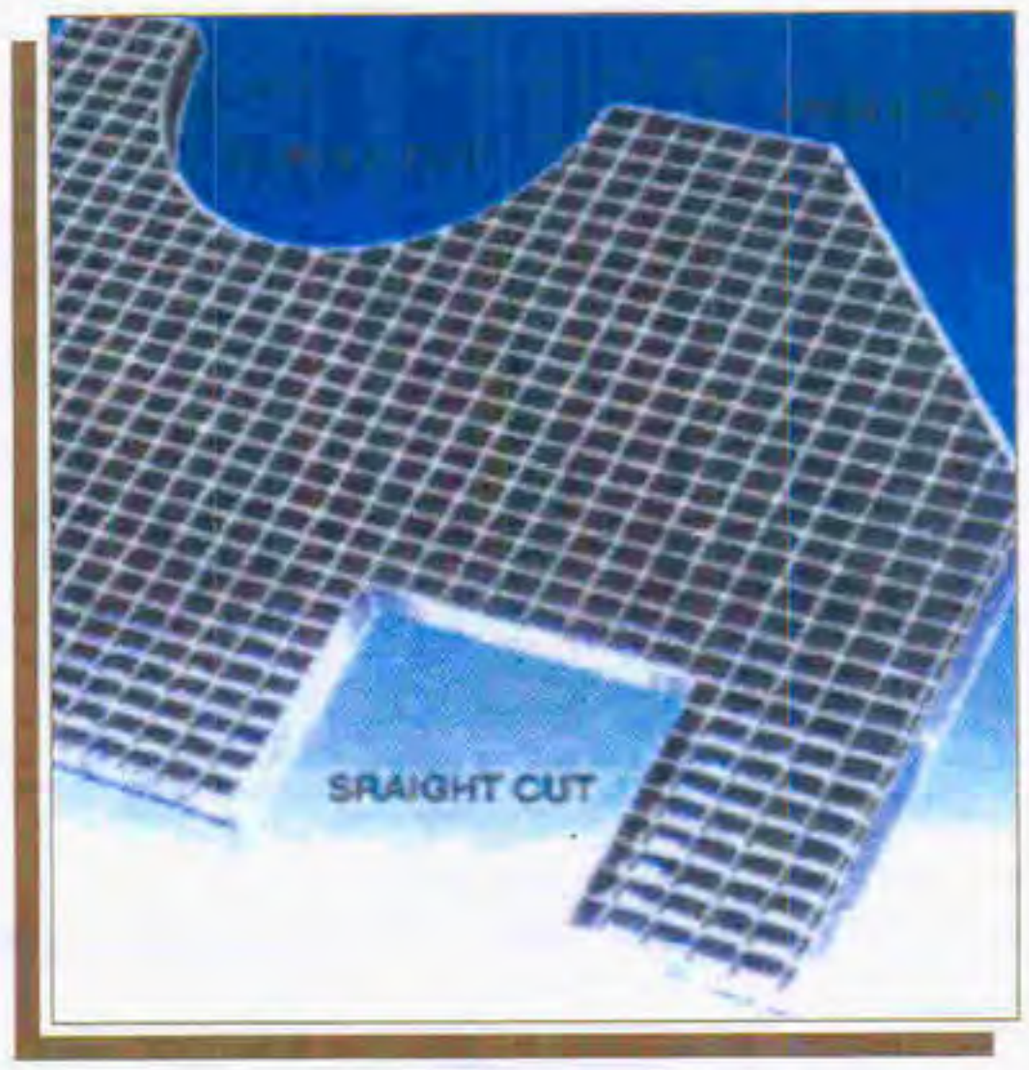
Upon cutting of steel sheets into steel straps and twisting of traverse bars the straps and steel bars are entered into the production line. An special machine called " flow forge welder" is used to forge weld the bars onto the straps at variety of locations, depending on customer orders.
This welding is done under 100 tons of pressure and 2000 K.V.A which results into melting of both straps and bars onto each others.



The following picture shows a typical "flow forge welding machine".

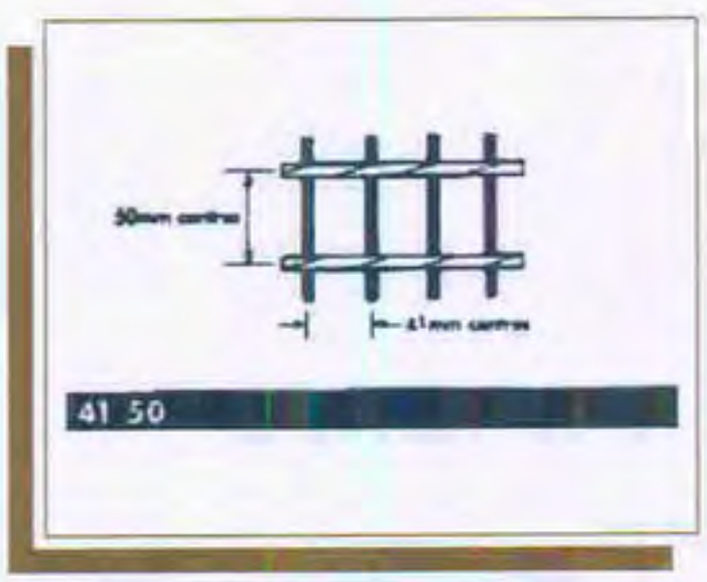


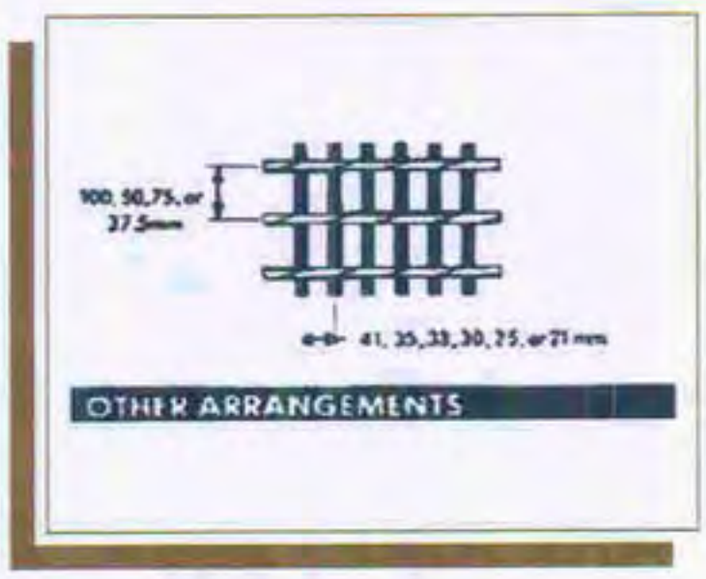
Through this process, gratings are continuously produced at the width of 1500 mm (1.5m) and are cut at the length of 6000 mm (6.0 m). these panels then are stored in warehouse awaiting customers special orders.
Upon receipt if an order, panels are cut to shapes and size required and finally are taken to the galvanizing plant for galvanization plant for galvanization prior to shipping to customers.

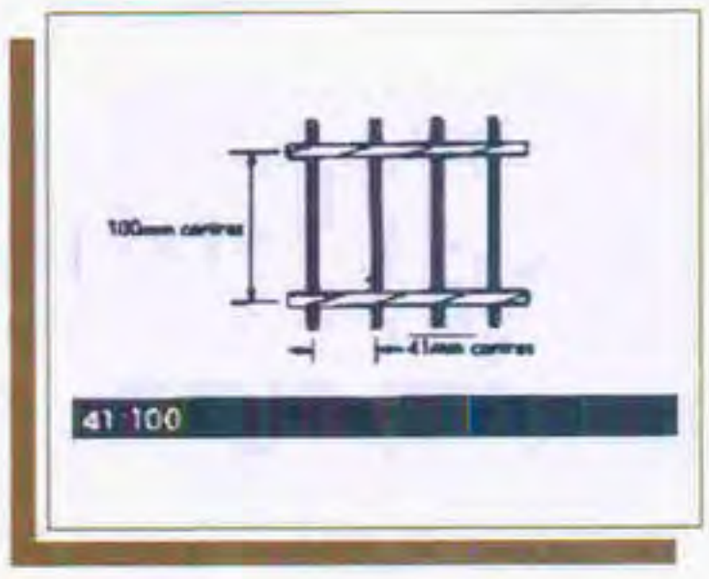


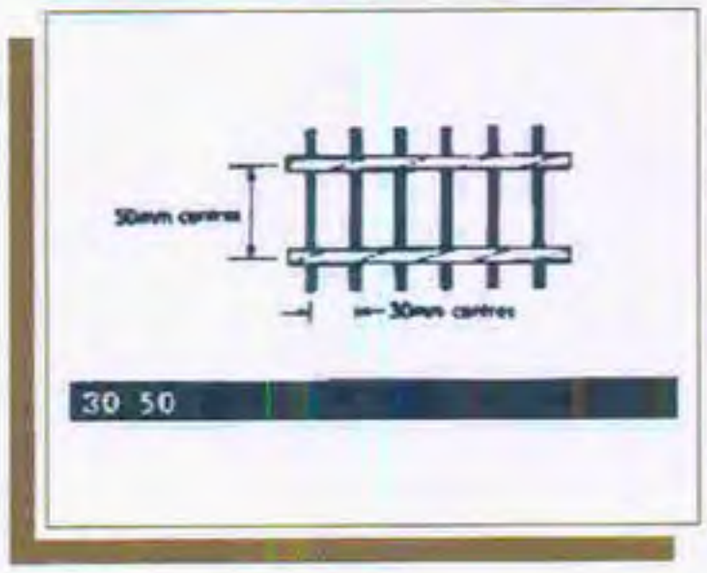
Bar Arrangements

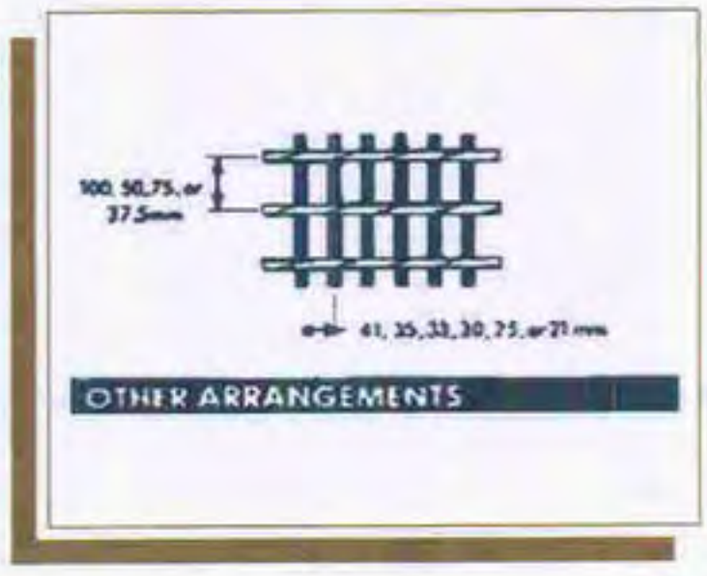
The types of gratings shown are used for various application sand considerations of required standards.
In various industries and is usually done to company with the customers orders.

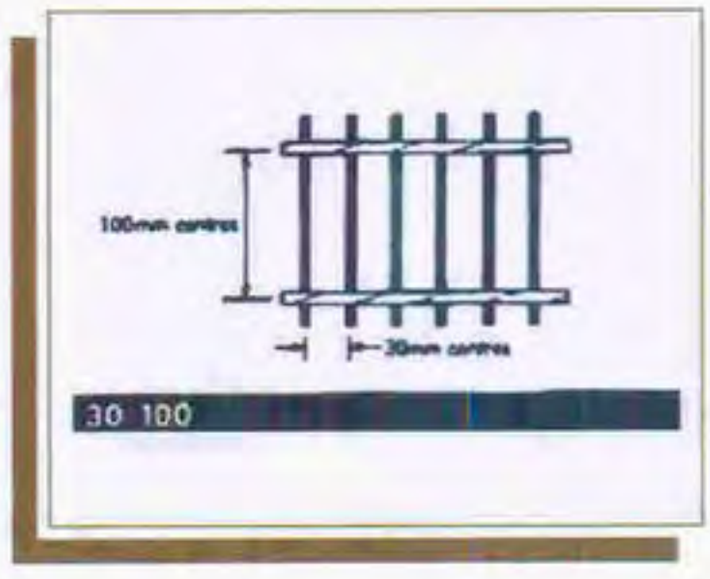












Technical Data

The following table shows various technical data at 30 mm pitch.

FLOWFORGE SAFE LOAD AND DEFLECTION TABLE – LOAD BEARING BARS AT 30mm PITCH

Bearer Bar Section in mm	Transverse Bar Centres	Mass Weight kg/m²	Pedestrian Loading Max Clear Span	Pedestrian Loading Def	Serration Factor Load	Serration Factor Def		Clear Span mm 600	750	900	1050	1200	1350	1500	1650	1800	1950	2100	2250	2400	2550	2700	2850	3000
40 x 5	50	83.5	a. 2581 b. 2152 c. 2049	10.00 10.00 10.00	0.95	1.03	U D	374.00 0.98	239.26 1.53	166.22 2.21	122.12 3.01	93.54 3.93	73.87 4.97	59.84 6.14	49.45 7.43	41.55 8.84	33.27 9.75	25.57 10.00	19.25 10.00	14.57 10.00	11.67 10.00	9.28 10.00	7.48 10.00	6.09 10.00
	100	81.7					C D	112.20 0.79	89.76 1.23	74.80 1.77	64.11 2.41	54.11 3.14	45.86 3.98	44.00 4.91	40.00 5.94	37.40 7.07	34.52 8.30	32.05 9.63	27.57 10.00	22.31 10.00	18.60 10.00	15.67 10.00	13.32 10.00	11.42 10.00
55 x 5	50	76.9	a. 2355 b. 2953 c. 2664	10.00 10.00 10.00	0.95	1.03	U D	314.26 1.07	201.12 1.67	139.67 2.41	102.62 3.28	78.54 4.29	62.07 5.42	50.28 6.70	41.55 8.10	32.50 9.00	25.63 9.75	19.54 10.00	14.83 10.00	11.45 10.00	8.99 10.00	7.15 10.00	5.76 10.00	4.69 10.00
	100	75.1					C D	94.27 0.86	75.42 1.34	62.85 1.93	53.87 2.63	47.13 3.43	41.90 4.34	37.7 5.36	34.28 6.48	31.42 7.71	29.00 9.05	25.65 10.00	20.85 10.00	17.38 10.00	14.32 10.00	12.07 10.00	10.26 10.00	8.79 10.00
50 x 5	50	70.2	a. 2124 b. 2750 c. 2485	10.00 10.00 10.00	0.94	1.03	U D	259.77 1.18	166.22 1.84	115.43 2.65	84.80 3.61	64.93 4.71	51.28 5.93	41.55 7.32	34.28 8.25	26.88 9.00	19.75 9.75	14.68 10.00	11.14 10.00	8.60 10.00	6.75 10.00	5.37 10.00	4.32 10.00	3.57 10.00
	100	68.4					C D	77.91 0.94	62.33 1.47	51.94 2.13	44.52 2.89	38.95 3.77	34.62 4.77	31.16 5.89	28.33 7.13	25.97 8.49	23.47 9.75	19.27 10.00	15.67 10.00	12.91 10.00	10.76 10.00	9.06 10.00	7.71 10.00	6.61 10.00
65 x 5	50	63.5	a. 2080 b. 2541 c. 2295	10.00 10.00 10.00	0.95	1.03	U D	210.57 1.31	134.64 2.05	93.50 2.95	68.69 4.01	52.59 5.24	41.55 6.63	33.64 7.56	27.77 8.25	21.85 9.00	16.03 9.75	11.78 10.00	8.72 10.00	6.27 10.00	4.92 10.00	3.91 10.00		
	100	61.7					C D	63.11 1.05	50.49 1.64	42.07 2.36	36.06 3.21	31.55 4.19	28.05 5.30	25.24 6.55	22.95 7.92	21.00 9.00	19.31 9.75	14.85 10.00	11.62 10.00	9.41 10.00	7.84 10.00	6.51 10.00		
60 x 5	50	56.9	a. 2643 b. 2326 c. 2103	10.00 10.00 10.00	0.95	1.03	U D	166.22 1.47	106.38 2.30	73.87 3.31	54.27 4.51	41.55 5.89	32.71 6.75	26.84 7.50	21.97 8.25	16.53 9.00	12.86 9.75	9.51 10.00	7.10 10.00	4.98 10.00	3.85 10.00			
	100	55.1					C D	49.86 1.18	39.89 1.84	33.24 2.65	28.48 3.61	24.92 4.71	22.16 5.97	19.94 7.37	18.13 8.25	16.62 9.00	15.33 9.75	12.61 10.00	9.86 10.00	8.02 10.00	6.61 10.00	5.53 10.00			
40 x 3	50	35.3	a. 2326 b. 2047 c. 1803	10.00 10.00 9.01	0.95	1.04	U D	94.75 1.47	63.82 2.30	44.22 3.31	32.56 4.51	24.93 5.89	19.62 6.75	15.99 7.50	13.18 8.25	9.92 9.00	7.72 9.75	5.91 10.00	4.51 10.00	3.42 10.00				
	100	32.7					C D	29.92 1.18	23.93 1.84	19.94 2.65	17.09 3.61	14.96 4.71	13.29 5.97	11.96 7.37	10.87 8.25	9.96 9.00	9.20 9.75	7.21 10.00	5.92 10.00	4.81 10.00				
35 x 5	50	50.2	a. 2291 b. 2104 c. 1864	10.00 10.00 9.34	0.95	1.04	U D	127.26 1.68	81.44 2.63	56.56 3.79	41.55 5.16	31.84 6.88	25.09 7.75	20.51 8.50	16.93 9.25	12.69 10.00	9.87 9.75	7.56 10.00	5.93 10.00	4.37 10.00				
	100	48.4					C D	38.17 1.35	30.54 2.10	25.45 3.02	21.81 4.13	19.08 5.39	16.97 6.75	15.26 8.50	13.88 9.25	12.72 10.00	11.74 9.75	8.85 10.00	7.26 10.00	5.97 10.00				
35 x 3	50	31.3	a. 2104 b. 1805 c. 1577	10.00 9.07 7.89	0.95	1.04	U D	76.35 1.68	48.86 2.63	33.93 3.79	24.92 5.16	19.10 6.88	15.06 7.75	12.31 8.50	10.16 9.25	7.61 10.00	5.92 9.75	4.54 10.00	3.56 10.00					
	100	29.7					C D	22.90 1.35	18.32 2.10	15.27 3.02	13.09 4.13	11.45 5.39	10.18 6.75	9.16 8.50	8.32 9.25	7.63 10.00	7.04 9.75	5.31 10.00	4.36 10.00					
30 x 5	50	43.3	a. 2130 b. 1836 c. 1607	10.00 9.17 8.03	0.95	1.05	U D	95.50 1.96	59.84 3.07	41.55 4.42	26.64 5.25	17.85 6.00	12.53 6.75	9.12 7.50	6.86 8.25	5.28 9.00	4.15 9.75							
	100	41.7					C D	28.35 1.57	22.68 2.46	18.90 3.54	16.02 4.81	13.38 6.00	10.57 6.75	8.54 7.50	7.08 8.25	5.95 9.00	5.06 9.75							
30 x 3	50	27.3	a. 1836 b. 1547 c. 1261	9.17 7.74 6.75	0.95	1.05	U D	54.10 1.96	35.90 3.07	24.93 4.42	15.98 5.25	10.71 6.00	7.52 6.75	5.48 7.50	4.11 8.25	3.17 9.00								
	100	25.7					C D	16.83 1.57	13.46 2.46	11.22 3.54	9.61 4.81	8.03 6.00	6.34 6.75	5.14 7.50	4.29 8.25	3.57 9.00								
25 x 5	50	36.9	a. 1812 b. 1579 c. 1335	9.06 7.65 6.67	0.88	1.06	U D	64.93 2.36	41.55 3.68	28.48 4.90	19.41 5.25	13.32 6.00	7.25 6.75	5.28 7.50	3.97 8.25									
	100	35.1					C D	39.67 1.89	33.58 2.95	28.98 4.28	18.11 5.25	7.74 6.00	6.12 6.75	4.95 7.50	4.09 8.25									
25 x 3	50	23.3	a. 1528 b. 1289 c. 1126	7.64 6.44 5.63	0.88	1.06	U D	38.95 2.36	24.93 3.68	16.69 4.90	9.25 5.25	6.19 6.00	4.30 6.75	3.17 7.50										
	100	21.7					C D	31.68 1.89	25.35 2.95	21.14 4.28	18.07 5.25	15.84 6.00	2.67 6.75	2.37 7.50										
20 x 5	50	30.7	a. 1449 b. 1227 c. 1068	7.24 6.11 5.34	0.86	1.08	U D	41.55 2.95	23.66 3.75	12.53 4.50	7.89 5.25	5.28 6.00	3.71 6.75											
	100	28.4					C D	32.46 2.36	25.97 3.68	21.65 4.50	18.54 5.25	15.96 6.00	3.02 6.75											
20 x 3	50	19.5	a. 1273 b. 1031 c. 901	6.37 5.15 4.51	0.86	1.08	U D	20.93 2.95	12.99 3.75	7.52 4.50	4.73 5.25	3.17 6.00												
	100	17.7					C D	7.48 2.36	5.98 3.68	4.73 4.50	3.98 5.25	3.38 6.00												

U = Safe uniformly distributed load in KN/m^2
D = Deflection in mm
C = Safe concentrated load in KN in width at mid span

Serration Factor

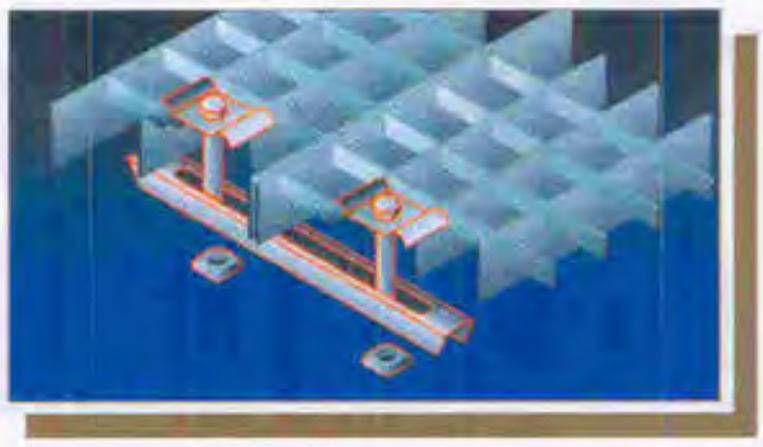
The tabulated load and deflection should be multiplied by the factor shown when using serration flooring.

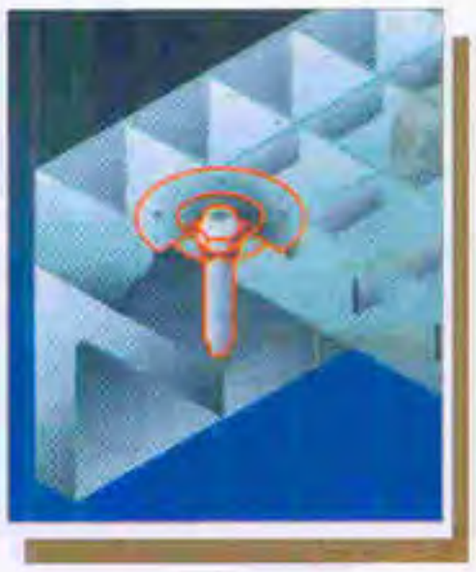
Panel Weights

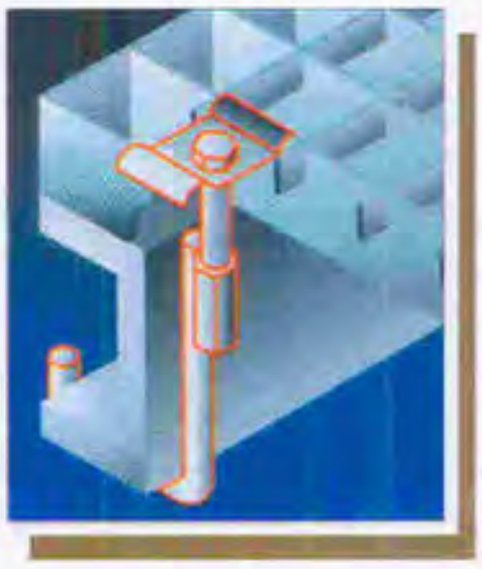
Weights shown are for flooring with 50mm and 100mm pitch transverse bars. Weights for other specifications can be obtained from our office.

Grating Fixing Methods

Depending on the application of gratings, various methods of fixing them to their supporting bases and onto each other are applied.
These diagrams show some samples of these fixings.

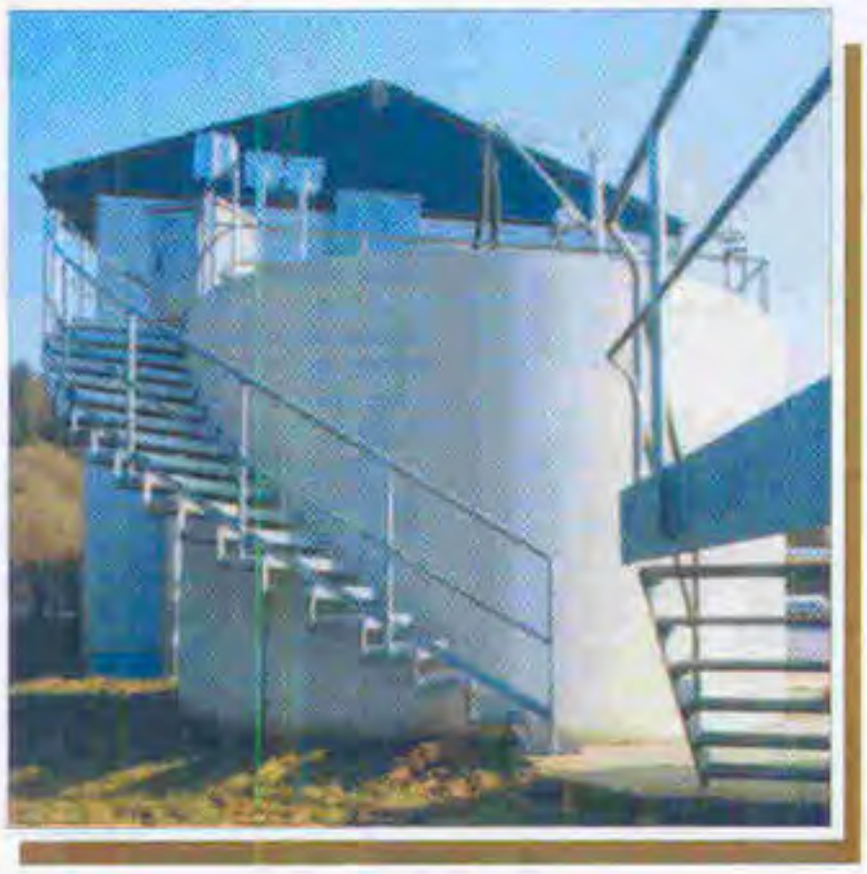


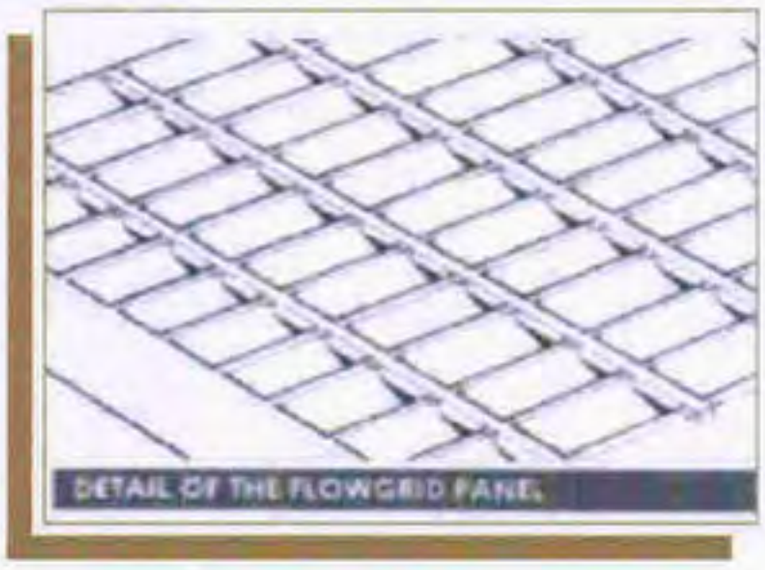


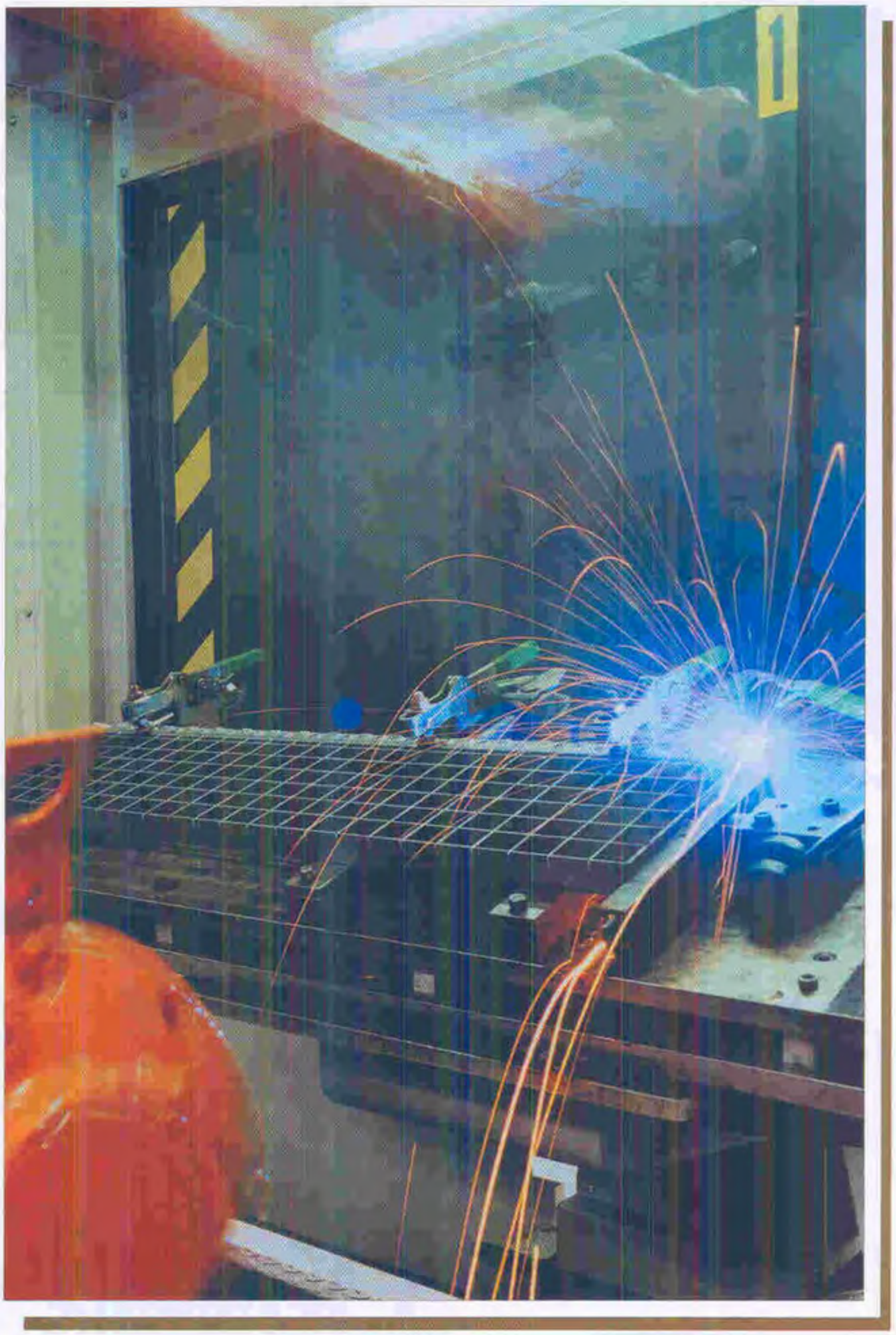


Gratings Application

Gratings have wide variety of application an all industries. Some of these applications are as follows:
1- Stairways
2- Land and space passage ways
3- Steel ditches and drainage cover
4- Pedestrians automotive bridges
5- Slip- free platforms for in- land and off-shore drilling stories
6- Construction roof support
The following pictures show the typical application of gratings







ABOUT EXPANDED METAL

Uses

Expanded metal is a versatile and functional product used in Hundreds of application s where rigidity, strength, light weight, and the free passage of light and air plus economy are required. This is a list of some of the known uses of expanded metal other uses are only inhibited by a person imagination.

Finishes

Some of the common and not so common finishes are Galvanizing, Porcelain Enamel, Painting, Lacquering, Plastic Coating, Anodizing.

Terminology

The language used in describing a sheet of expanded metal is universal it is easy to learn and once the fundamental terminology is mastered it can be convex to anyone with ease.

Load Tables

Guideline for structural applications.

Tolerances

There is no empirical standard for expanded metal products but there is a "quasi"standard for acceptable tolerances adhered to by the Manufacturers of Expanded Metal.

FINISHES

Cleaning - Carbon expanded metal is lightly oiled and should be cleaned before finishing. The most common cleaning method is an acid or solvent bath with a water rinse. For aluminum, use a non-etching chemical or detergent, then rinse and dry thoroughly.

Anodizing - A surface treatment for aluminum where an oxide coating is added electrochemically to the metal. For interior abrasion resistance a .0025" coating is necessary. Medium abrasion applications for interior or maintained exteriors need a.0004" coating. Use a .0008" coating for exteriors.

Porcelain Enamel - Porcelain enamels can be readily applied to expanded metal. Forming, cutting, welding and drilling should be done before applying the finish. All surfaces should be covered.

Painting , Lacquering, Plastic Coating - Be sure the coating used had good surface tension or wetting properties and viscosity to prevent any pullback from metal edge sand webbing-in of diamonds.

Galvanizing - Hot dip galvanizing is primarily a protective coating and may have a rough uneven appearance. Where smooth finish is required, other coatings and protective methods should be used. Certain small expanded metal styles do not lend themselves to hot dip galvanizing because the openings become filled with zinc. Warping or distortion may occur during hot dip galvanizing due to the heat of the molten zinc. For these reasons patterns lighter than 18 gauge, with opening of 1/2" or less or any pattern with a weight per square foot of 0.45 lbs or less are not recommended to be galvanized.

TOLERANCES

Stock Size Sheets

Raised Mesh

SWD: Plus 1/4" minus 0" per foot of width
LWD: Plus 3/4" minus 0"

Flattened Mesh
SWD: Plus 1/4" minus 0" per foot of width
LWD: Plus 3/4" minus 0"

Grating
SWD: Plus 1/4" minus 0" per foot of width

Camber
Measured by placing a straight edge along the concave side of the sheet parallel to the LWD, touching both ends. The maximum distance from the edge expanded metal to the straight edge is the camber

Raised Mesh
1/16" per foot of length

Flattened Mesh
3/32" per foot of length

Out of Square
Expended metal sheets are not perfectly square as manufactured. Stock size sheets and machine run non standard size sheets will be produced to the following tolerances
SWD: 1/16" per foot of width
LWD: 1/16" per foot of length
Sheets that have to be perfectly square must go through a secondary processor Shearing.

Flattening
Flattened sheet thickness shall be plus or minus10% of published thickness or strand thickness

Non Standard Sheets

Machine Run
Where tolerances permit, machine run non standard sheet sizes are manufactured to the same tolerances as stock size sheets.

Random Shearing
Stock size sheets can be random sheared when a closer tolerance is required.
This is a secondary process.

Bond shearing
Bond shearing can sometimes be performed, with limitations. This is a secondary Process.

TERMINOLOGY

STYLE DESIGNATION
Expanded metal products are designated by a series of numbers which identify a given style
* The first number designates nominal diamond pitch Short way of diamond (SWD)
* The second number used in conjunction with the first may specify the gauge of metal.
* Grating products are designated by weight per square foot of the finished product.

STRANDS
The Individual slit metal strips, or sides of an expended metal pattern.
* Strand Thickness in raised expanded metal is the gauge or thickness of the sheet or coil from which the expanded metal was produced in flattened expanded metal it is the overall thickness of the finished sheet.
* Strand Width in raised expanded metal is the amount of metal fed in to the expanding machine, which is slit and stretched with each stoke of the upper die. In flattened expanded metal, It is as the name implies, the width of the Strand.

PERCENT OPEN AREA
The open area necessary in determining the light or air passage. The number is an approximate figure.

SWD
The distance from a point on a bond to a corresponding point on the following bond measured across the Short Way of Design. This is also sometimes referred to as "Pitch SWD"

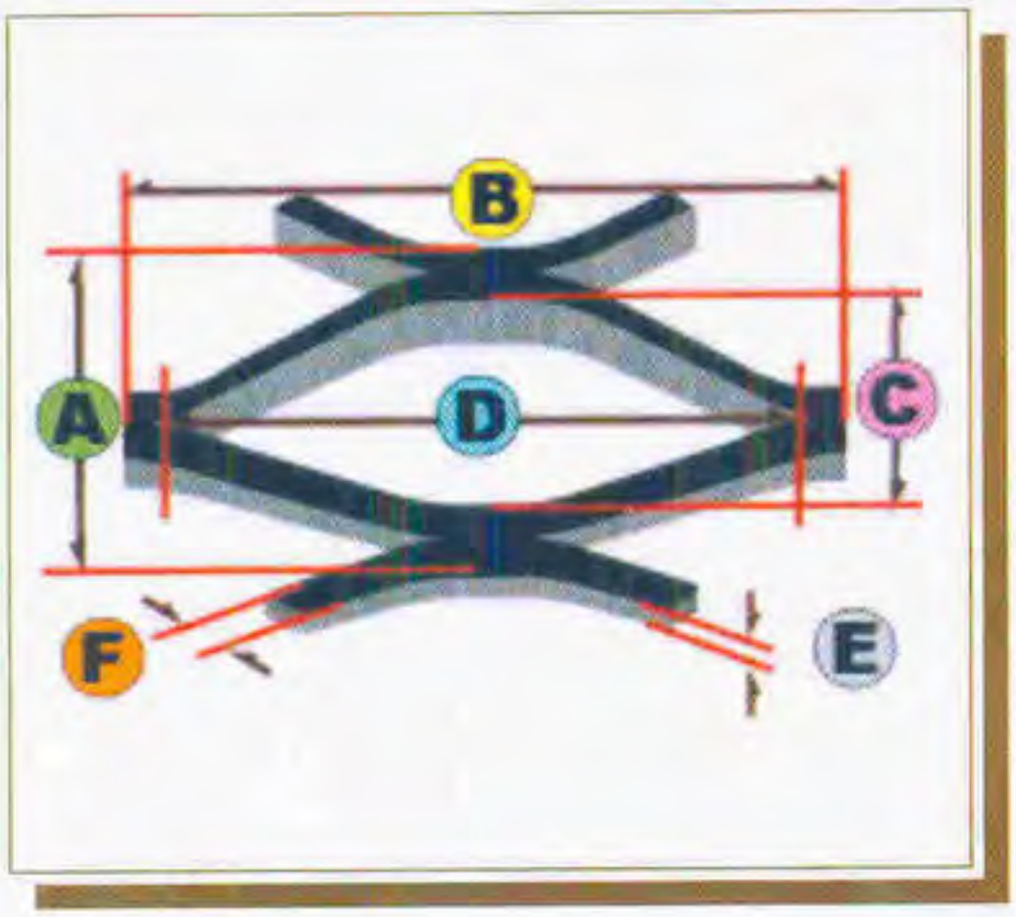
SWO
Short Way of Opening, the distance measured from the inside of the bond across to inside of the bond

LWO
Long Way of opening, the distance measured from the inside of the bond across to inside of the bond

BOND
The intersection of two strands and is always the width of two strands

OVERALL THICKNESS
The actual measurement of the thickness of the mesh measured at he bond

A Width of mesh (SWD)
B Length of mesh (LWD)
C Width of opening
D Length of opening
E Strand thickness
F Strand Width



LOAD TABLES

CONCENTRATED LOAD - CLEAR SPAN

LBS. PER FOOT OF LENGTH OF CATWALK OR PLATFORM	23"	30"	*35"	42"	47"	54"	60"
50 lbs.							
Light or Occasional	3.0	3.0	3.0	3.0	3.0	4.0	5.0
Pedestrain Traffic	3.14	3.14	3.14	3.14	3.14	4.27	6.25
100 lbs.							
Normal or Frequent	3.0	3.0	3.0	4.0	5.0		
Pedestrain Traffic	3.14	3.14	3.14	4.27	6.25		
150 lbs.							
Heavy or Constant	3.0	4.0	4.0	5.0	6.25		
Pedestrian Traffic	3.14	4.27	4.27	6.25			
200 lbs.							
Pedestrian Traffic	3.0	4.0	4.0	6.25			
With light Equipment	3.14	4.27	4.27				
250 lbs.							
	4.0	5.0	5.0				
	4.27		6.25				
300 lbs.							
	4.0	5.0	6.25				
	4.27	6.25					
350 lbs.							
	4.0	6.25					
	4.27						

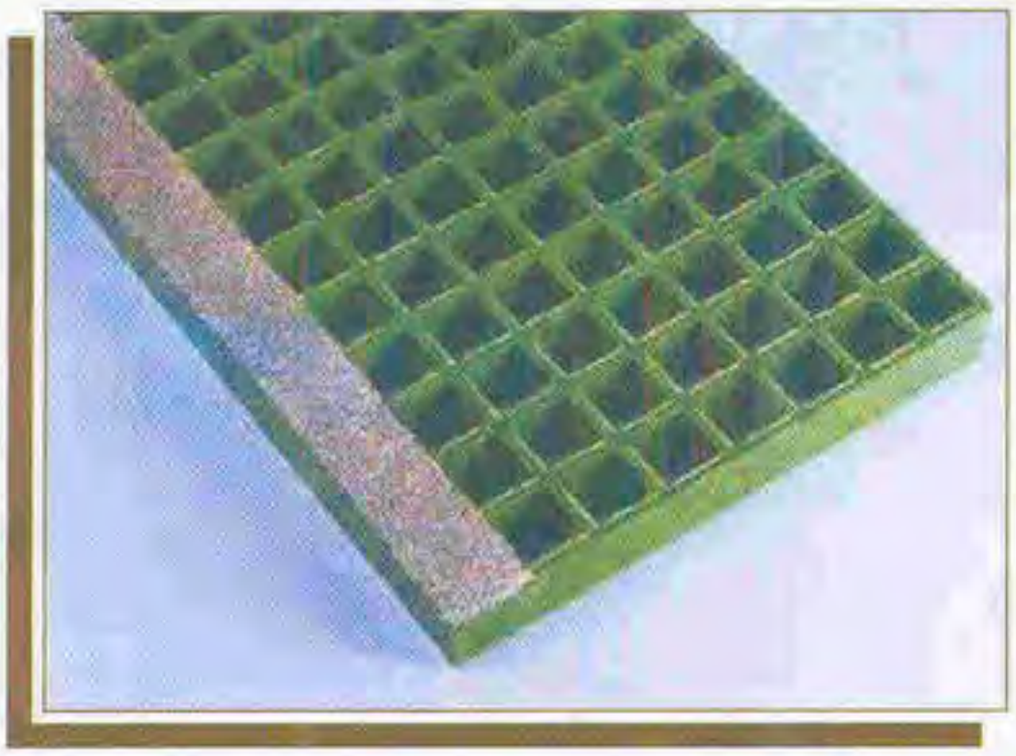
The concentrated load deflections for the above selection chart do not exceed the 1/4"maximum deflection as the generally accepted recommendation for normal pedestrian comfort.

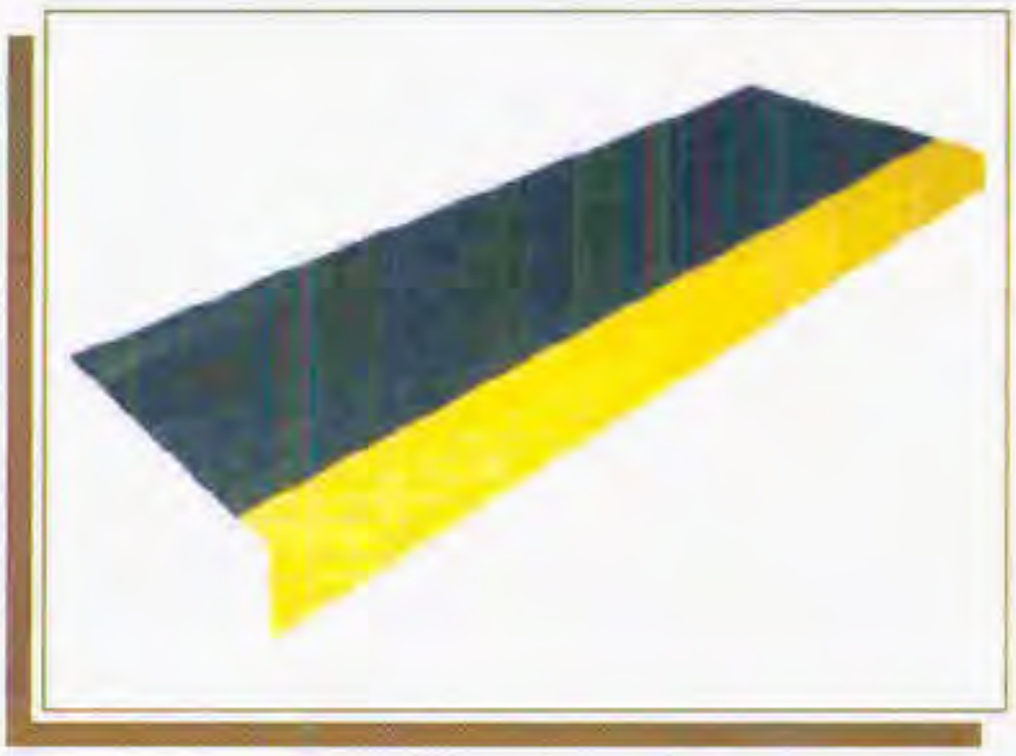
CONCENTRATED LOAD AND UNIFORM LOAD DEFELCTION TABLES/FIXEDSPAN

STYLE (LBS. PER SQ FT.)		SPAN 24"	36"	48"
Carbon				
3#	U	275	100	
	D	.250	.220	
	C	275	165	75
	D	.250	.250	.250
3.14#	U	375	150	50
	D	.250	.240	.250
	C	375	155	75
	D	.250	.250	.250
4#	U	350	150	50
	D	.240	.245	.250
	C	440	225	100
	D	.250	.250	.250
4.27#	U	500	165	60
	D	.245	.245	.250
	C	400	225	100
	D	.250	.240	.250
5#	U	600	175	100
	D	.240	.240	.250
	C	540	310	140
	D	.245	.250	.250
6.25#	U	800	300	115
	D	.220	.250	.240
	C	800	300	150
	D	.220	.240	.240
Aluminum				
2#	C	250	100	50
	D	.250	.250	.250

U = Uniform Lbs. Per Sq.Ft.
C = Concentrated Load in Lbs. Per Sq.Ft.
D = Deflection in inches

STAIR TREADS & TREAD COVERS





The wide range of safety anti-slip treads, tread covers and landing areas all from stock. Treads are manufactured from high quality Isophthalic Polyester resin for superior chemical resistance and have a hard wearing quartz grit added for the ultimate in anti-slip.

Tread covers can be installed directly over concrete, steel or wood in minutes and provide positive traction even In wet or oily conditions.

GRP stair treads are available in green, yellow or grey, treads are a standard275 mm wide and can be cut to any length.

Treads have a solid black nosing for added strength where it matters.

The new from are a range of tread plates that can be fitted over the top of existing stair treads. The treads are manufactured from a high quality resin that is corrosion resistant, chemical resistant, fire resistant and hard wearing.

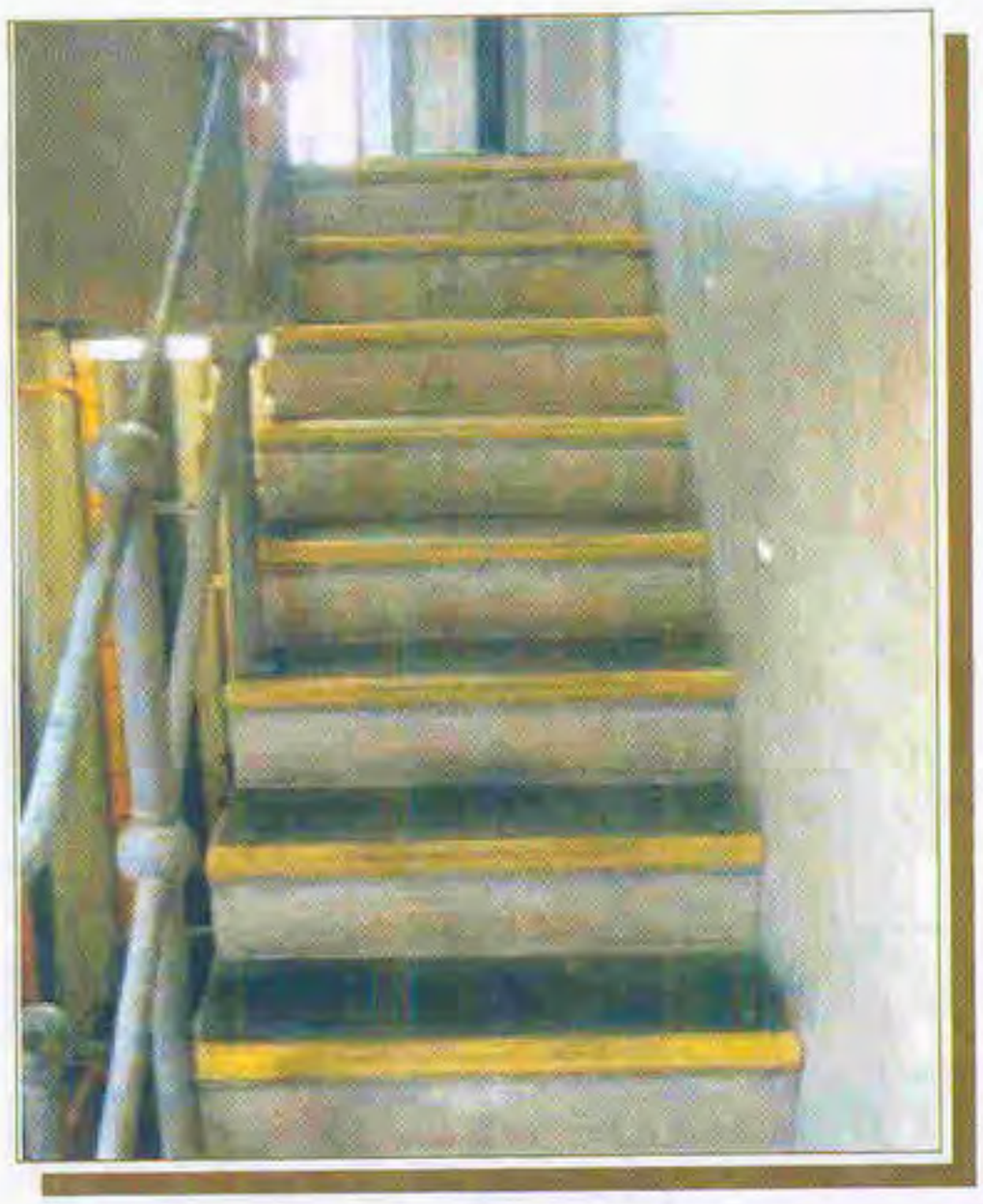
The tread plates are typically 4mm thick and have a course aggregate finish making the step anti-step, reducing slips and falls in the work place. Treads can be easily cleaned using usual cleaning agents.

The Hazard strips are yellow as standard. Solid plate is also available for landing areas to complete the installation and a range of stainless steel fixing are available from stock to fix down the treads and plates. Adhesives are also available for effective fixing.

Tread covers can be cut to your exact requirements and pre-drilled to accept treads the manufacturers are using high quality Isophthalic, polyester Resin and have a quartz heavy-duty grit surface for maximum anti-slip properties.

Tread covers are black with a yellow nosing for greater contrast and visibility.

Special colours can be manufactured to order. The maximum tread size is 3000x300. Any size of tread cover can be cut from this size completely. Solid plate is also available for



TreadGrip stair tread covers price per unit		Delivery charge	
Up to 750mm x 300mm going	£10.00	£10 up to 15 treads	15 for 16 treads+
Up to 1000mm x 300mm going	£12.00	£10 up to 15 treads	15 for 16 treads +
Up to 1500mm x 300mm going	£18.00	£12 up to 15 treads	18 for 16 treads +
Up to 2000mm x 300 mm going	£24.00	£12 up to 15 treads	18 for 16 treads +
Up to 3000mm x 300mm going	£36.00	£14 up to 15 treads	20 for 16 treads +
2m x 1m x 4mm landing area	£70.00	£please ask	please ask
High strength adhesive	£3.50		Free with treads
Adhesive applicator	£3.50		Free with treads
The going of 300mm is the maximum Any going up to 300mm is available. Any cutting or drilling is free of charge.			

FIBREGLASS PLATFORMS

Fibreglass ladders, steps and platforms are the cost effective answer to access Problems in corrosive areas.

Ladders and platforms are made to order therefore any size and shape is possible. Platforms are built to British Standards. For advice on the relevant standard. platforms and ladders are built to British Standards and can be used in potable water.

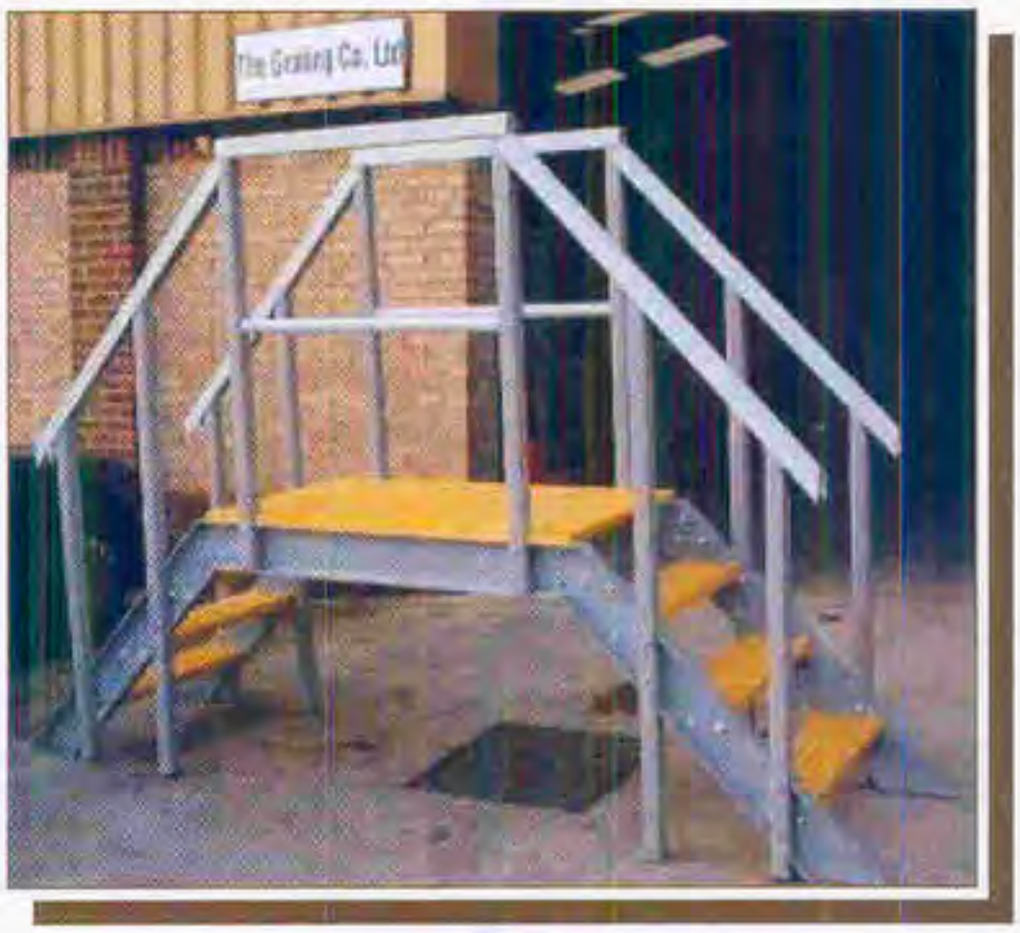
Platform designed for well known soft drinks manufacturer.

This platform was designed and installed in less than a week.

The platform is bolted to the floor using our unique fibreglass 'feet'.

Up and Over steps designed for Rolls Royce Power.

The grating Company have designed and built many hundreds of simple up and over steps.
Each set is individually mad to order so any size or shape is possible.
All platforms, ladders and steps are manufactured to the relevant British Standards and fully conform to the new European standards with regard to material quality.



Platform designed for the Environment Agency - Thames Region.

This platform was designed and installed on the River Thames. During high tide the platform is completely submerged. The old steel platform was corroded and dangerous. The new fibreglass platform will give many years of trouble-free life.

Platform designed for Leicester County Council.

This platform was designed and installed in a school for access to portable classroom. The existing platform was manufactured from wood and had seriously deteriorated over the years making it unsafe.
The new platform has a slip resistant surface and will require no maintenance.

FIBREGLASS STRUCTURAL PROFILES

Fibreglass structural shapes are the material choice in a wide variety of applications including walkways, platforms, bridges, ladders and sub floors.

Kilo for Kilo, GRP profiles are stronger than steel. In addition they are corrosion resistant, lightweight, thermally stable, non-conductive and maintenance free.

Structural profiles include box sections, tubes, angles, flat plates, solid square and round bars, I beams, channels etc. GRP pultruded material can be used in a wide variety of application limited only by your imagination.

Each year, The Grating Company supply the off shore industry with thousands of square metres of fibreglass gratings and thousands of metres of structural profiles.

We have recently completed a very large contract to supply petrobras with handrails and gratings as pictured here. We are at present negotiating phase two.

We have supplied GRP products to companies such as Esso, Shell, Fina, Exon, Petrobras, B P. Etc.

The picture on the left shows a structure built in Belgium using our fibreglass profiles.

All materials used were GRP with the exception of nuts and bolts which were stainless steel.

Only 3 different profile sections were used in the construction making it quick and easy to build. The resulting structure will require no maintenance and is completely corrosion

FIBREGLASS STRUCTURAL PROFILES

Grating

SAFE: The Safety Grating's standard slip-resistant surface contains hundreds of shoe-gripping nibs formed into the ribs to provide a safe, comfortable walking surface. The open design keeps small debris from accumulating, and allows passage of air and light.

STRONG: The efficient Channel-Lock design achieves a very high strength-to-weigth ratio lateral strength. Since each piece is nested in with double flange on each rib and multiple flange on each side and in adjacent planks, they actually strengthen one another. Each one-piece rigid plank is manufactured by a continuous roll-forming process capable of producing custom lengths up to 24 feet long.

ECONOMICAL: Easy installation of grating pays off in labor savings.
Each plank is light enough for one person to carry. Cutting can be easily done with a hacksaw or power saw. All fastening can be done with standard tools no welding is required, no special material handling equipment is required.

THE ADVANTAGES: The grating is an extremely cost-efficient way to provide an elevated walking surface. Its hot dipped galvanized corrosion-resistant coating insures long, safe life for interior or exterior applications.
The Channel-Lock Safety Grating comes standard with the Expanda-Deck modular mezzanines, and it is the ideal companion for multilevel installations made from Clipper(R) or Rivet Rite (R) Shelving, or the Pallet Rack.
Grating is shown here in the most popular sizes. All are 2" high x 8-7/8" wide, 16 gauge. Other gauges and sizes are available for large applications.

HANDRAIL, KICKPLATE & ACCESSORIES

The square tube handrail is designed for shelving decks or other types of storage decks which use the Channel-Lock Saftety Grating (excluding Expanda-Deck, which has its own handrail system).
Designed for post installation on nominal 6' centers, Base plates are welded to posts. All required fastening hardware including channels for support beneath the grating is included with the posts. Standard finish is 710 Yellow baked enamel.

Pallet Rack

The Pallet Rack is a carefully engineered system designed to provide highly efficient storage of palletized items. Excellent design features combined with the use of high strength steel produces a superior pallet rack that can handle nearly any job you can give it.

Following is a list of the wide range of features and components that make Penco Rack one of the best values for your storage dollar.

Design Features

The basic components of Pallet Rack are upright Frames and Beams. Each Is manufactured to exacting tolerances to provide many years of dependable service at their rated loads.

Pallet Rack Beams

It has engineered its roll-formed one piece beam achieve the highest possible strength-to-weight ratios is the most frequently desired load ratings through the use efficient design and high strength steel.

Beams are offered in different vertical profiles and stee gauges. Beam step heights of7/8" and 1-5/8" are avail for wide variety of accessory use. Both the overlapping seam and the beam end connector are securely MIG welded for strength.

The face of the beam has an M-design recessed configuration for added strength, protecting the locking key, and to accept pressure sensitive labeling. Each b is stamped with an identifying letter referring to the load bearing capacity. Beams are finished in710 Safety Yellow baked enamel for high visibility.

Pallet Rack Frames

The Pallet Rack Upright Frames are available in five different load carrying ranges. A letter code stamped into the face of the post indicates the frame type. Depths of 30",36", 42", 48", 54" and 60" are standard, but other depths are available. Standard height srange from 48" to 240" in 6" increments, but greater heights can be achieved

Beam heights adjust on 3" vertical centers, and are independent on each side of the frame.
Beams of any type can be placed along the full height of the post; there are no dead spots on the post, even across a splice. Various load rated frames can be combined in arow of rack for maximum economy.
The Pallet Rack Upright Frames are furnished completely fabricated, welded into rigi units. Standard finish for upright frames is 028 Gray baked enamel.
We recommend that all upright frames be securely anchored to the floor for safety.

Pallet Rack Accessories

PLYWOOD SUPPORTS: For supporting plywood or other wood decking. Styles areavailable
for 1/2" deck on 7/8" step beams 3/4" deck on 1-5/8" step beams.

GENERAL DUTY CROSS BARS: Supports heavier loads smaller than unit de on1-5/8" step beams.

FORK CLEARANCE BAR: Provides proper fork clearance for unpalletized stock, 2"wide by 2-3/4" high.

HEAVY DUTY SKID CHANNEL
ASSEMBLY: Provides a channeled base for skid run4" wide
by 2" high.

FRAME SPLICE: For adding to height of existing frame. Can be supplied welded
in topnew frame if specified on order. (Top frame must be ordered without foot plate.) Withhardware.
FRAME PROTECTOR: Anchors to floor at front post. Provides protection againstdamage from material handling vehicles.

RIGID WALL BRACKET: Structurally connects and spaces tow rows of rackback-to-back
Bolted type. Hardware included.

RIGID ROW SPACER: Structurally connects racks to wall for additonal stability
.Frahardware included.

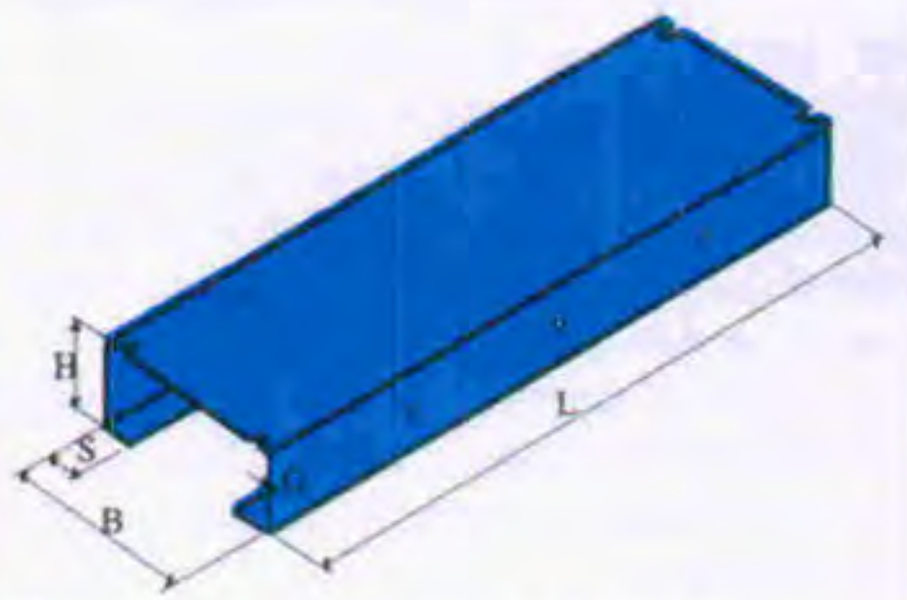
RELL HOLDER: Accessorizes rack for reel storage. Max. axle 2-1/2" diameter.

ROOF PANELS

Roof panels - cold-rolled construction elements made of steel sheets. The main application of them is covering of light roofs with slope up to 10% in industry and municipal civil engineering. Roof panels are used to both insulated and non insulated roofs but always should be water-resistant. Lower layer of covering is connected with panel by gluing. In case of insulated roof, the best effect is given by usage of poliuretan foam (water and temperature protection). Mineral wool of foamed polystyrene with covering of roofing paper can be applied.

Maximal length of panels amount of 6.0 m. is used for purlinless roofs. This feature is and advantage in comparison with corrugated sheets mainly applied to roofing.

Rigidity of panels id sufficient to protect against skewing of girders on which panels are put down. Other advantages of panels: quick assembly, flat upper surface, protection against corrugation. If it is needed lower surface of



Characteristic dimension of panels:
Constant - height of rib H = 100mm
and width of foots S=35 mm
Variable - width B,
thickness of sheet G and length L

Panels can be covered by masking plates of different materials. Lower part of panels are appropriated for fastening of such elements. In similar cases panels can be applied as construction layer of light suspended ceilings.

PARAMETERS OF ROOF PANELS

Type	Type Symbol	Width B (mm)	Height H (mm)	Width of foots (mm)	Sheet width G (mm)	Max Length Lmax (mm)	Steel type	Weight unit (kg/m)
S-500x2	500	500	100	35	2.0	5520	St3S	12.1
S-360x2	360	360	100	35	2.0	6000	St3S	9.9
S-500x2,5	500	500	100	35	2.5	5520	St3S	15.1
S-360x2,5	360	360	100	35	2.5	6000	St3S	12.4
H-500x2	500	500	100	35	2.0	5520	10HA	12.1
H-360x2	360	360	100	35	2.0	6000	10HA	9.9

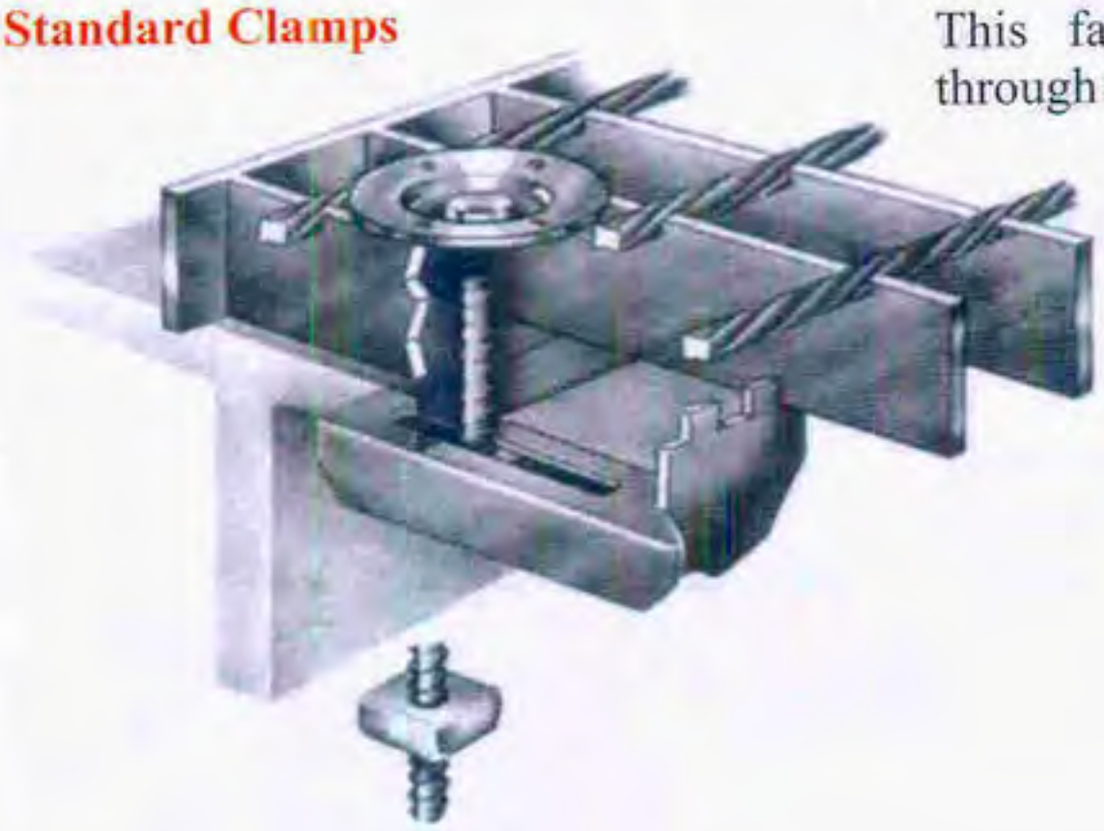
GAS PRESSURE REGULATOR

We offers a line of fastening for every type of grating and all supporting structures. The fastening are made of steel according to DIN 17 100 and hot-galvanized according to DIN 50 976 or Stainless Steel 1.4301 and/or 1.4571. (Exception: Hook bolts will be electro-galvanized according to DIN 50 961.)

Type of Fastening

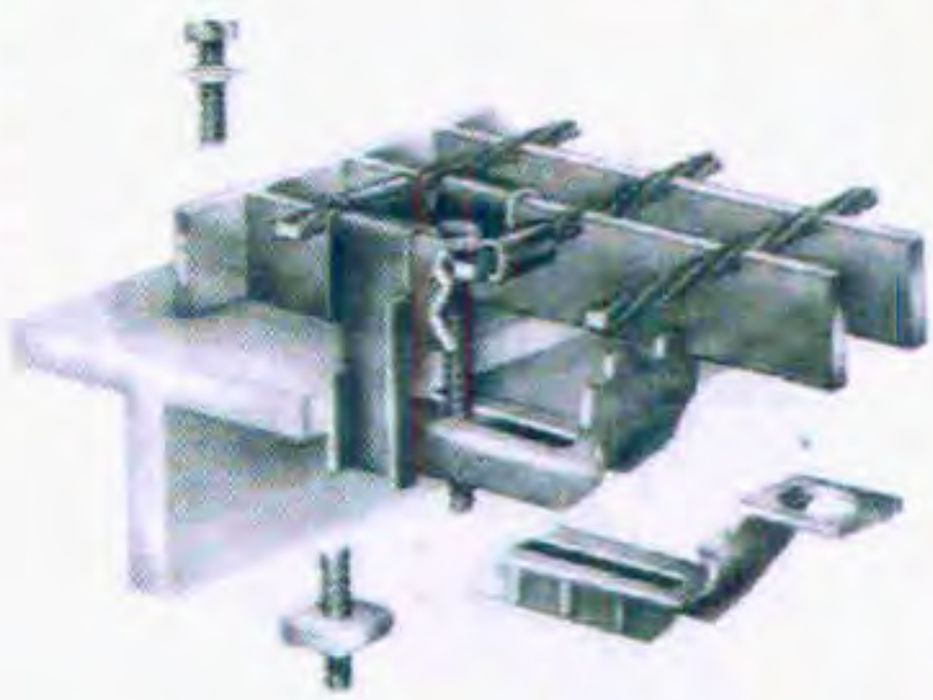
Standard Clamps

This fastening set permits easy assembly through the grate from above.

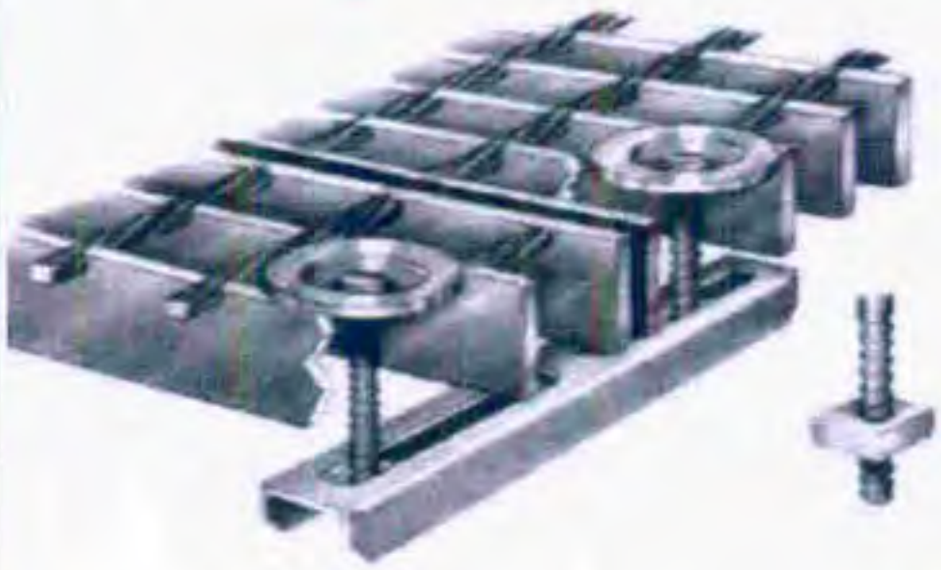


Safety Clamps

The safety clamps are provided with a special clamp of which the retaining straps are additionally attached to the transverse bars and secured in position thereon. The bottom part of safety clamps can be supplied with finger hole, at option. This design is provided with a locking device additionally securing the clamp against slipping in bearing bar direction.



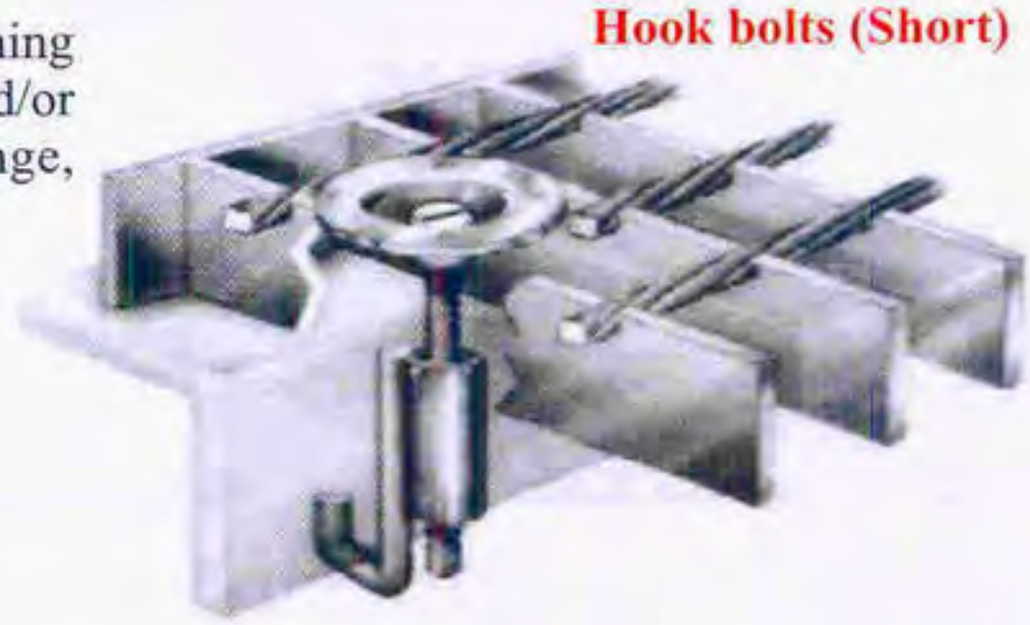
Double Clamps



Double Clamps are primarily used for the connection of grates. They prevent displacement of the grates longitudinal and transverse direction and avoid tripping edges.

Hook bolts (Short)

Hook bolts with short hook serve for fastening of grates in case of angular profile sand/or vertical supports without bottom flange, Electro-galvanized according to DIN 50961

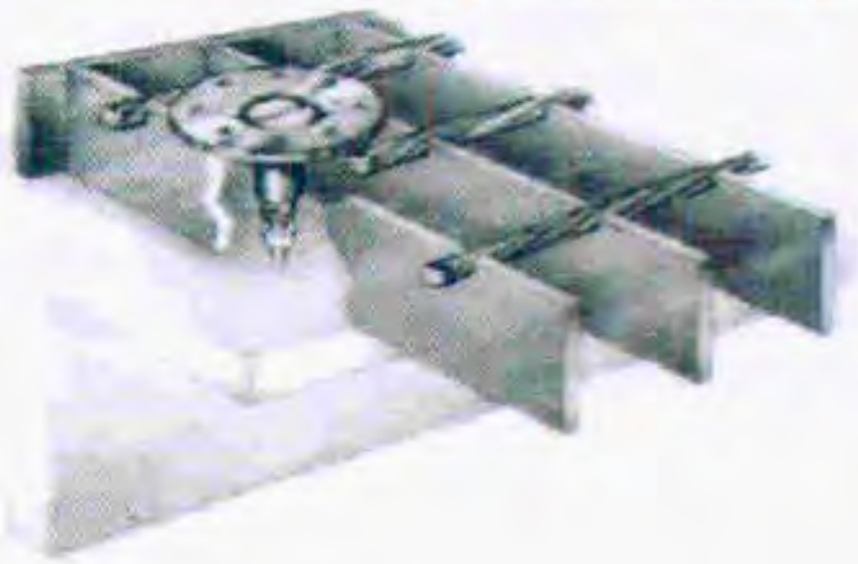


Welding Bolt Fastenings

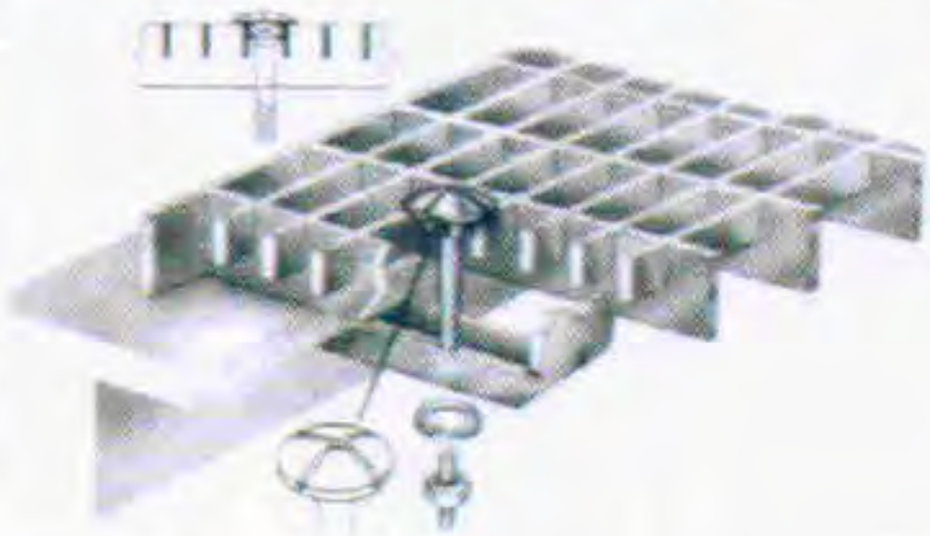
As a rule, fastenings of this type consist of an electro-galvanized threaded bolt to be welded to the supporting structure by means of a bolt welder (according to DIN 32 500)specifically develop for this purpose. Further fastening elements are hexagon nuts and washers and/or clamps.

Setting Bolt Fastenings

A threaded bolt is forced into the supporting structure by means of a bolt driving tool resulting in some sort of cold welding. With an upper part specifically developed for this type of bolts and called holding flange the grate will be secured on the supporting structure.



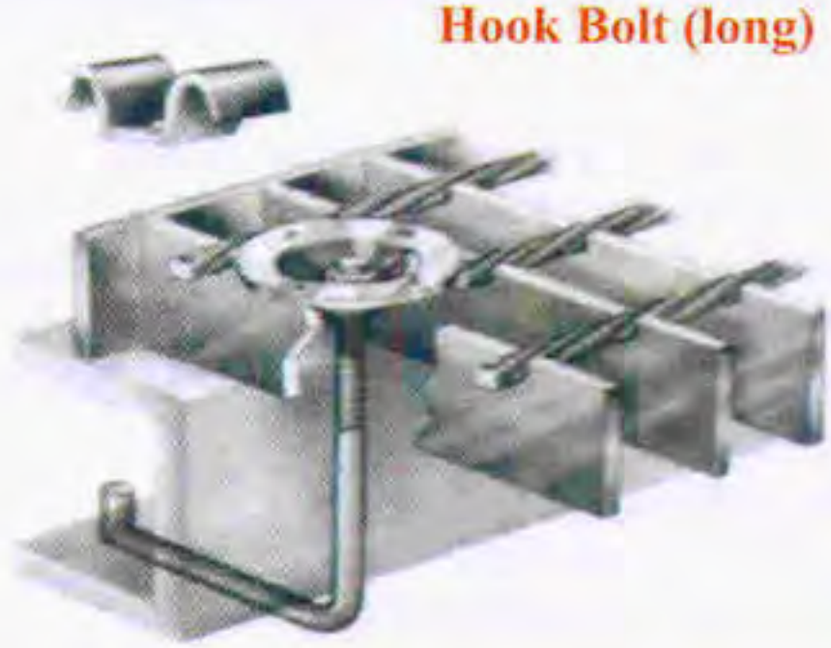
Clamps for Narrow Mesh Widths



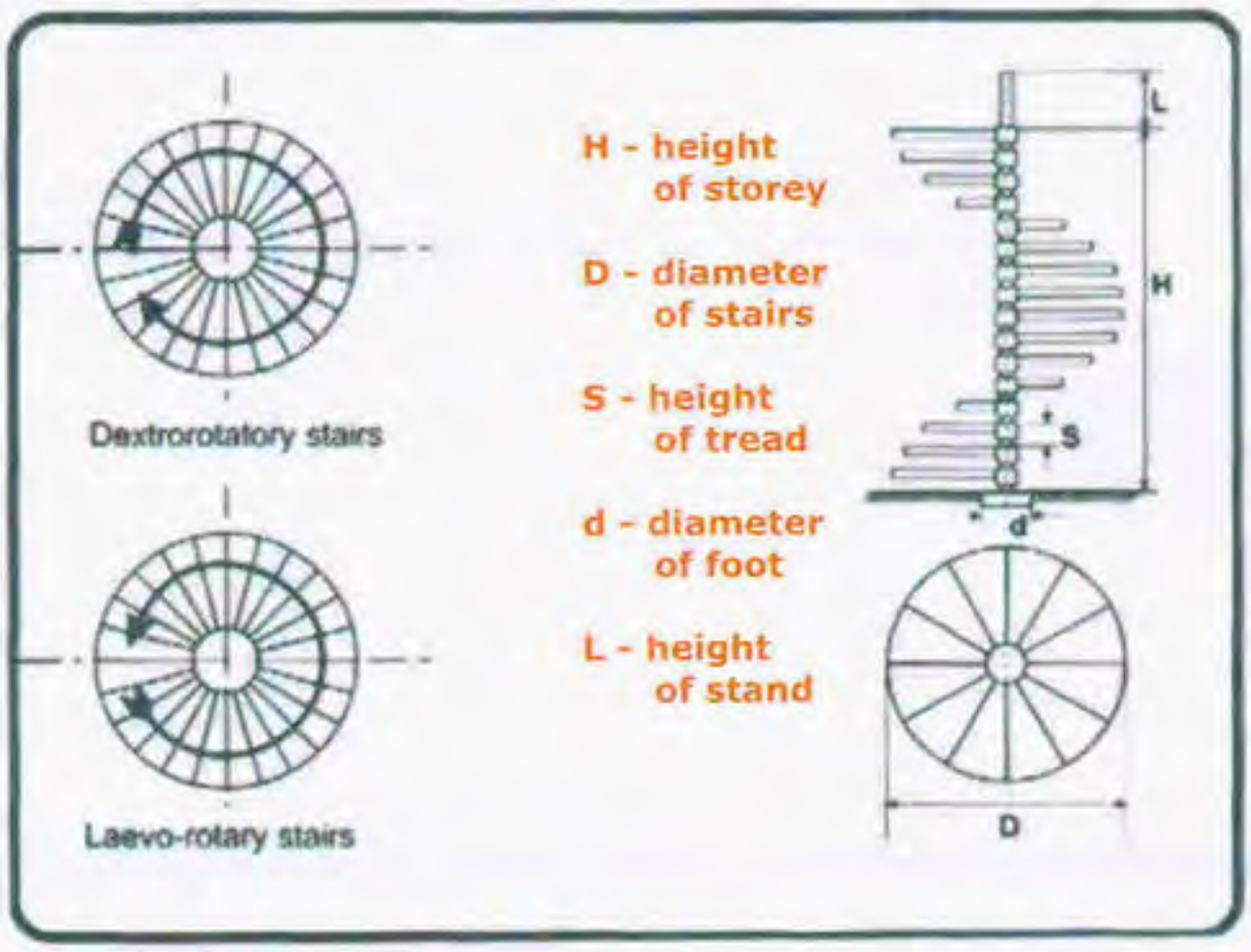
This clamping set is suitable for fastening grates with narrow mesh widths such as30x10mm for instance.

Hook Bolt (long)

Upon request, hook bolts with long hook are supplied as a special design for vertical supports with bottom flange such as channel section. Electro-galvanized according to DIN 50 961



Our metallic winding stairs are made of rough iron or hot galvanized. Full diameter of stairs is of 1600, 1800 or 2000 mm. Winding stairs can be installed inside or outside the building. They are used for industrial building and in building engineering.
They are offered in two versions: dextrorotatory and laevo-rotary. They are made as assembly set according to individual request.



Advantages of winding stairs:

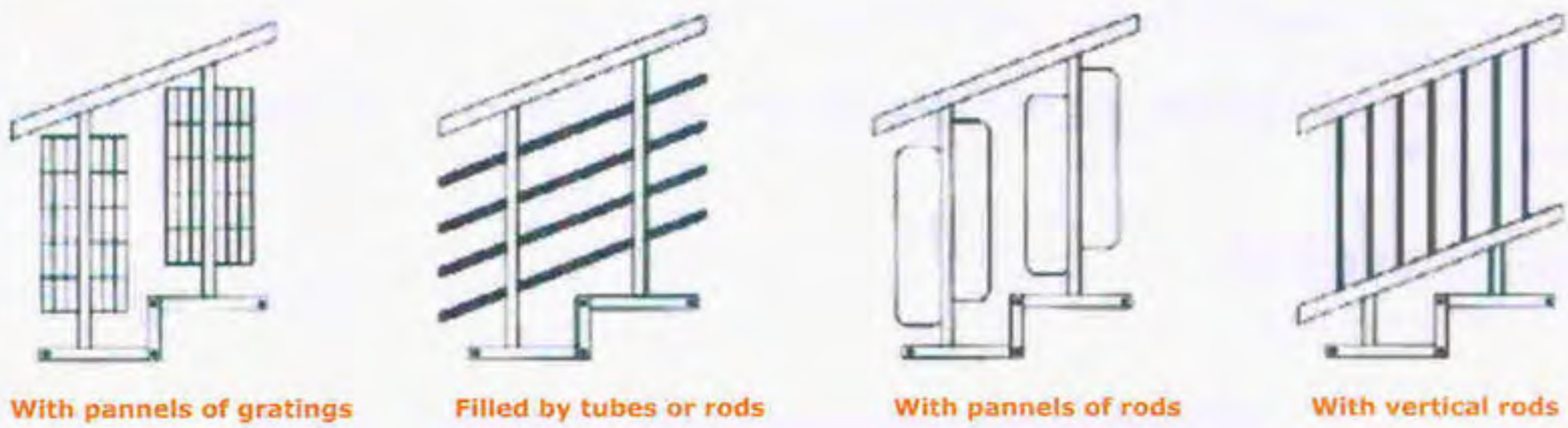
* Ensure free choice for architecture designing of non-classical objects.
* Save area appropriated for stairs in comparison with other solutions
* Are good for quick assemble and disassembly.

Winding Stairs are produced as assembly sets including construction tube, treads, barriers and railing for quick individual assembly for orders the following parameters have to be defined:

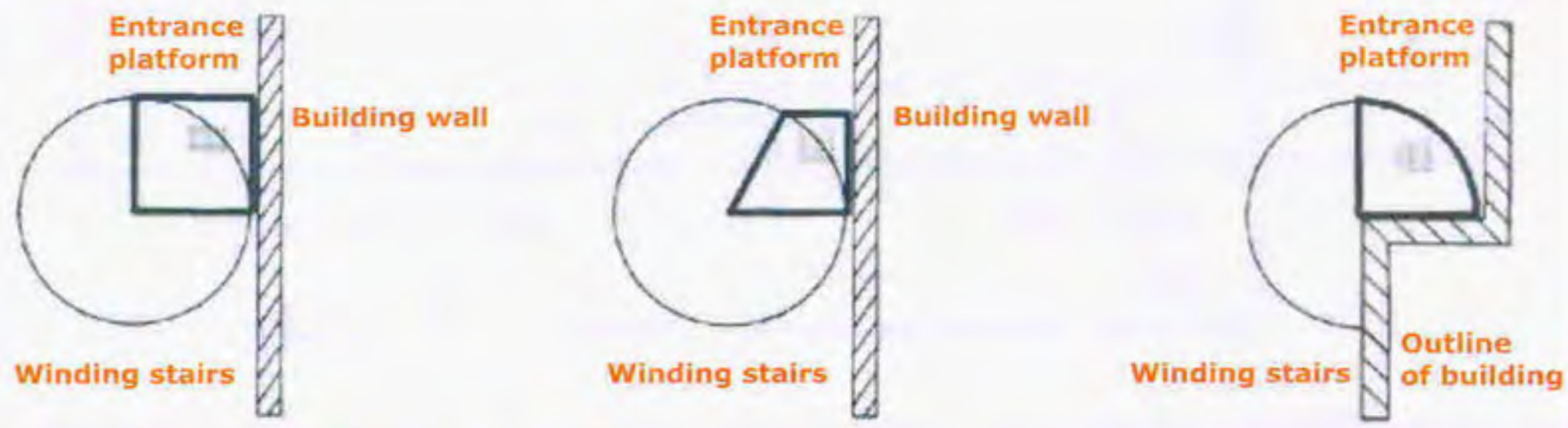
* Height of storey defined as distance between floor levels
* Outer diameter of stairs
* Number of treads on one turn
* Type of barriers and mesh size on tread
* Mutual location of entrances at the upper and lower levels.

WINDING STAIRS - BASIC PARAMETERS			
Outer diameter	Number of stairs on one turn	Maximal height of stairs	Type
D (mm	(Pieces)	(mm)	
1600	15,16	</=4000	DI
1800	15, 16, 18	</=6000	D2
2000	15, 16, 18	</=6000	D3

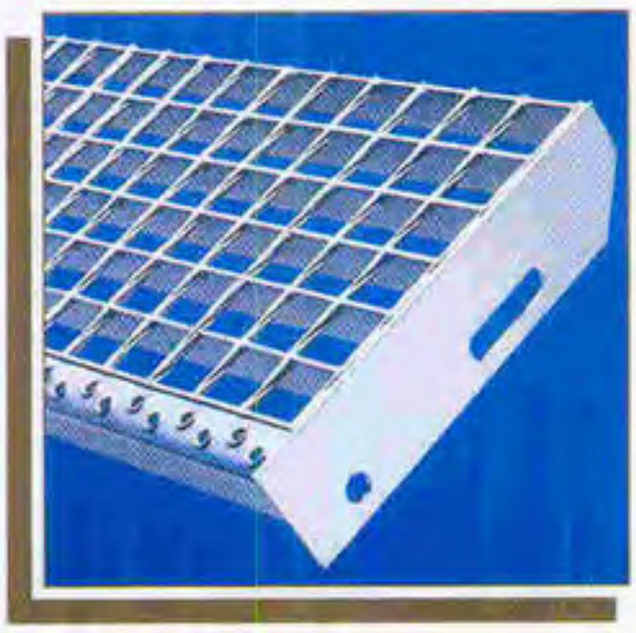
Type of Barriers



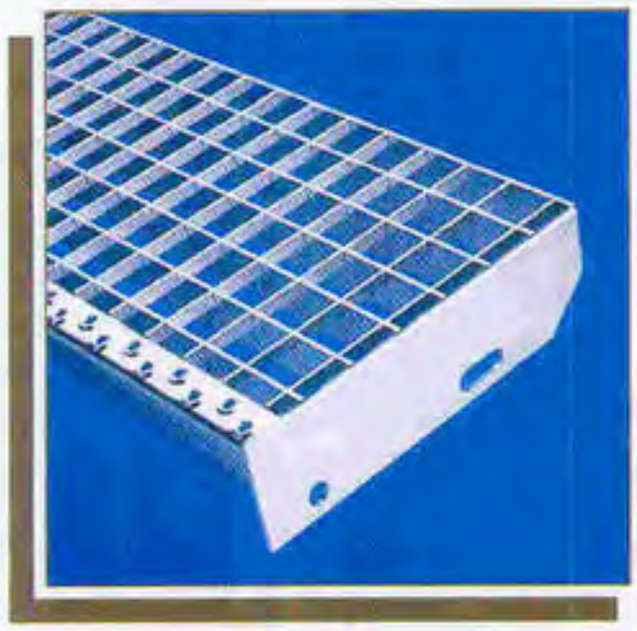
Platforms connecting winding stairs and objects



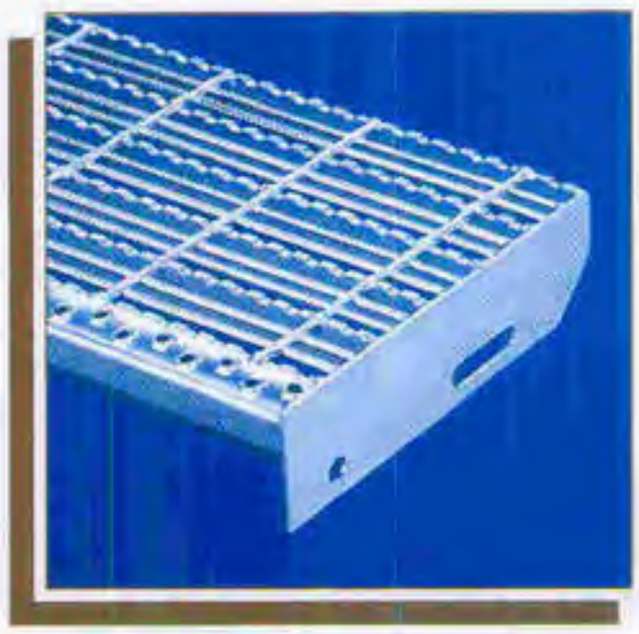
STAIR TREADS



Pressure welded grating steps TYPE SP 30x32

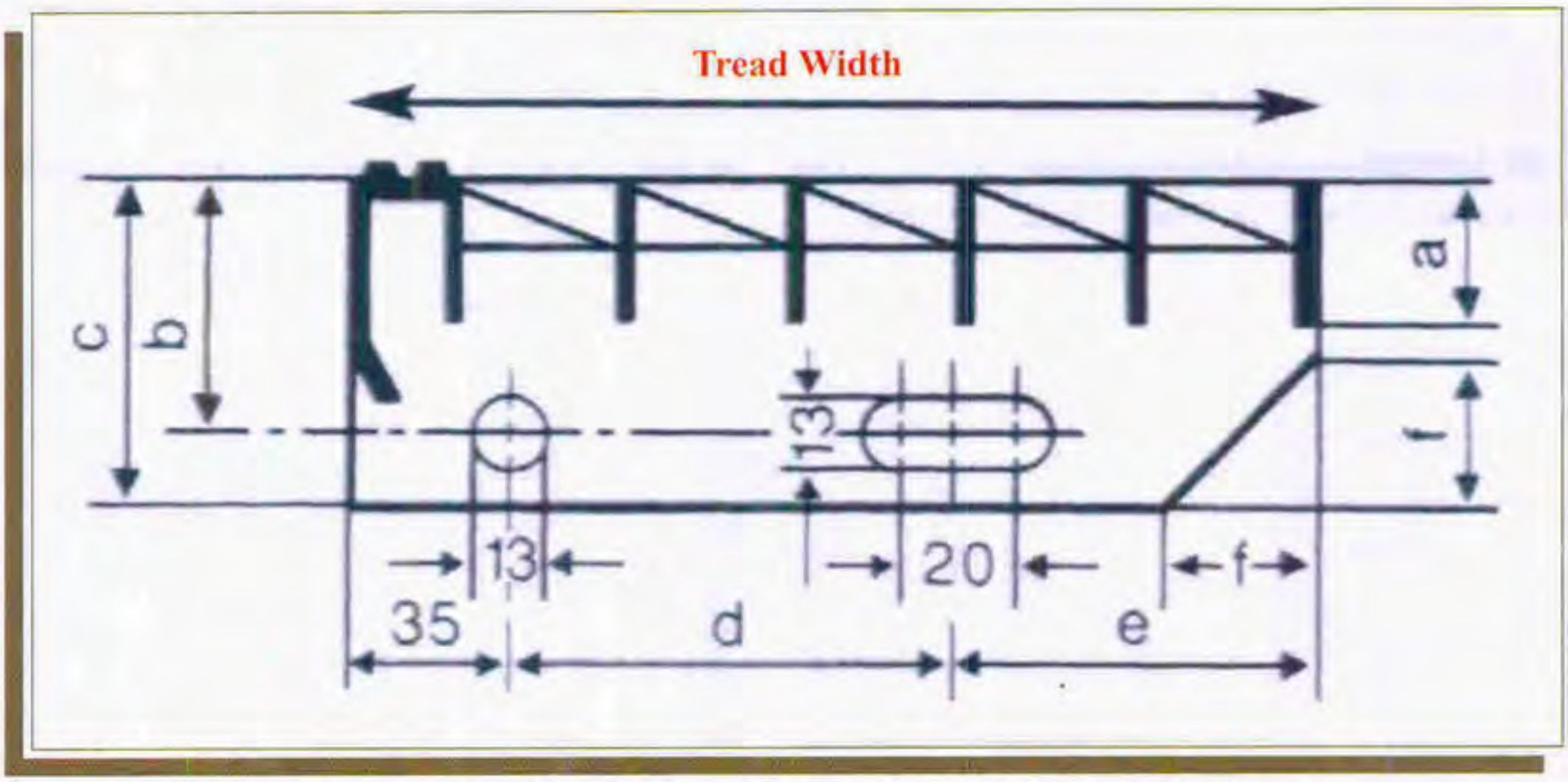


Pressed grating steps TYPE PR 30x30



For safety reasons, the stairs treads will be provided with a perforated safety front edge which prevents persons from skidding.
On the tread front edge and ensures a safe hold also in case of icing, contamination, slippery oil films or similar conditions.
In order to facilitate assembly and installation, the side plates of Treads are provided with round and elongated holes.

Treads: SP AND PR

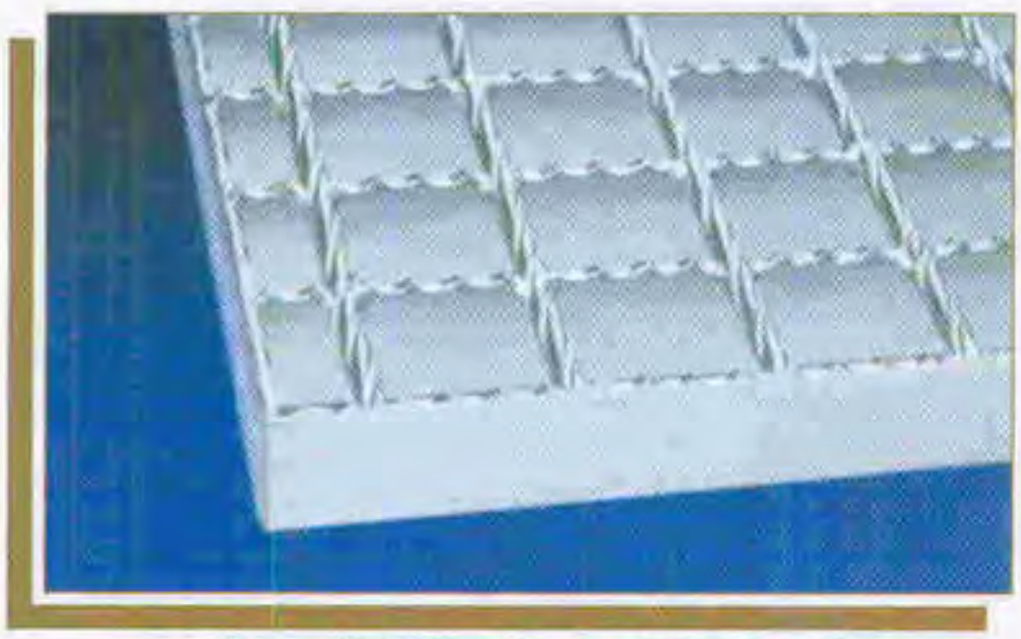


Bores acc. to DIN 24 531 - Hot-galvanized acc. DIN EN ISO 50 976 (DIN 50 976)

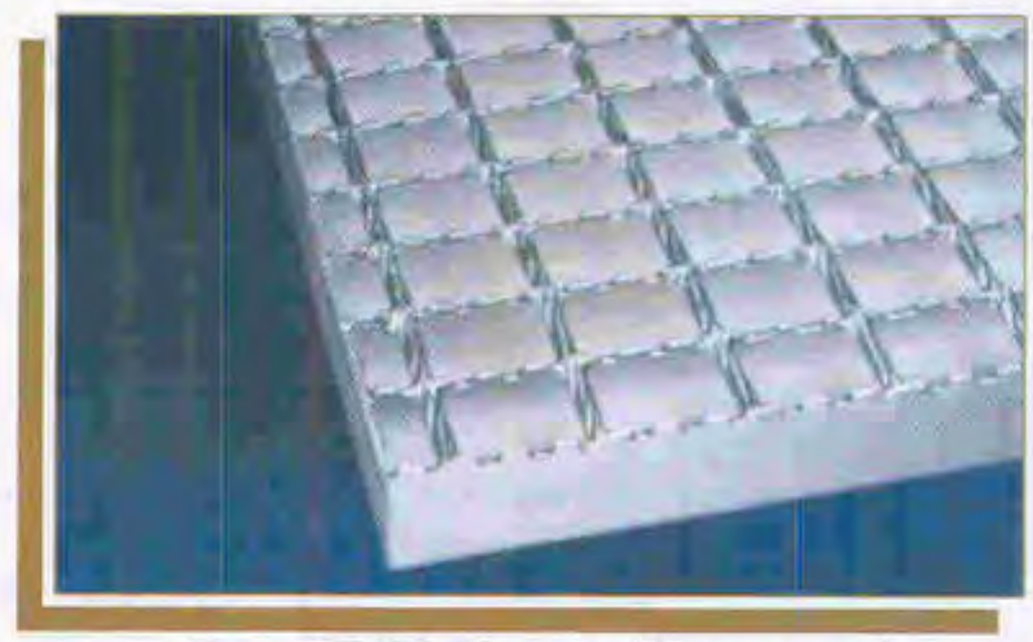
L +0.3 (mm)	B + - 5 (mm)	Carrier bar height a	b	c	d	e	f	Permissible single load N1	Weight appro. Kg
600 30x2	240	30	55	70	120	85	30	1500	5.1
	270	30	55	70	150	85	30	1500	6.5
	305	30	55	70	180	90	30	1500	9.0
600 30x2	240	30	55	70	120	85	30	1500	8.0
	270	30	55	70	150	85	30	1500	9.0
	305	30	55	70	180	90	30	1500	11.5
800 30x3	240	30	55	70	120	85	30	1200	6.9
	270	30	55	70	150	85	30	1200	7.7
	305	30	55	70	180	90	30	1200	10.0
800 30x2	240	30	30	70	120	85	30	1500	13.0
	270	30	30	70	150	85	30	1500	15.5
	305	30	30	70	180	90	30	1500	18.0
1000 30x2	240	30	30	70	120	85	30	960	8.1
	270	30	30	70	150	85	30	960	8.9
	305	30	30	70	180	90	30	960	11.1
1000 30x2	240	30	30	70	120	85	30	1500	9.5
	270	30	30	70	150	85	30	1500	10.5
	305	30	30	70	180	90	30	1500	13.0
1200 40x2	240	30	40	70	120	85	30	1500	13.0
	270	30	40	70	150	85	30	1500	15.5
	305	30	40	70	180	90	30	1500	18.0

ANTI-SLIP GRATING "SERRATED"

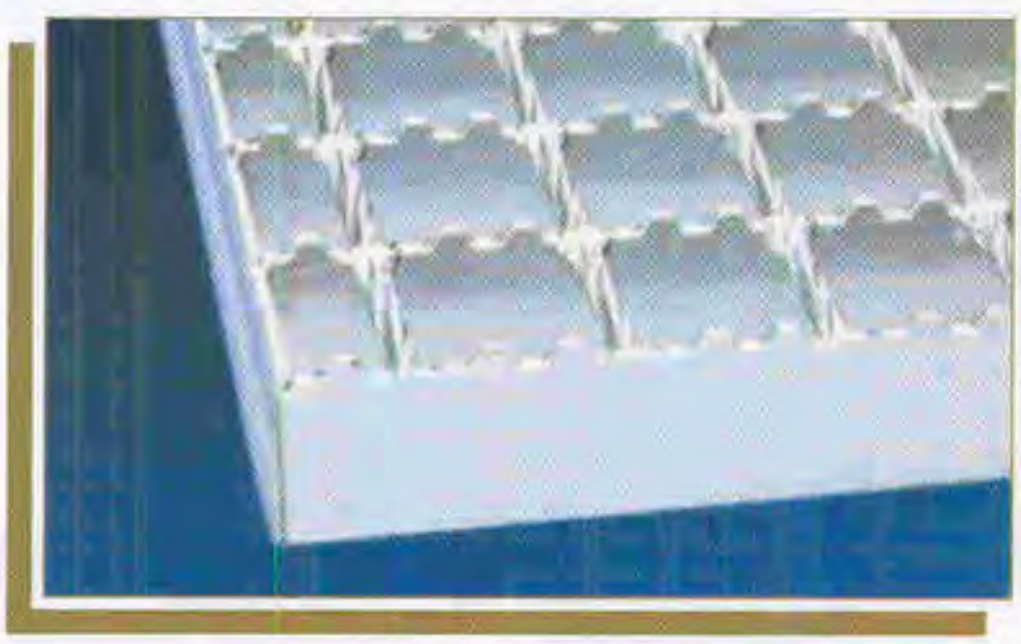
When oil, moisture, icing or similar conditions increase the danger of skidding on platforms or catwalks,
Serrated Grates and treads with their non-slip notches offer a very good grip.



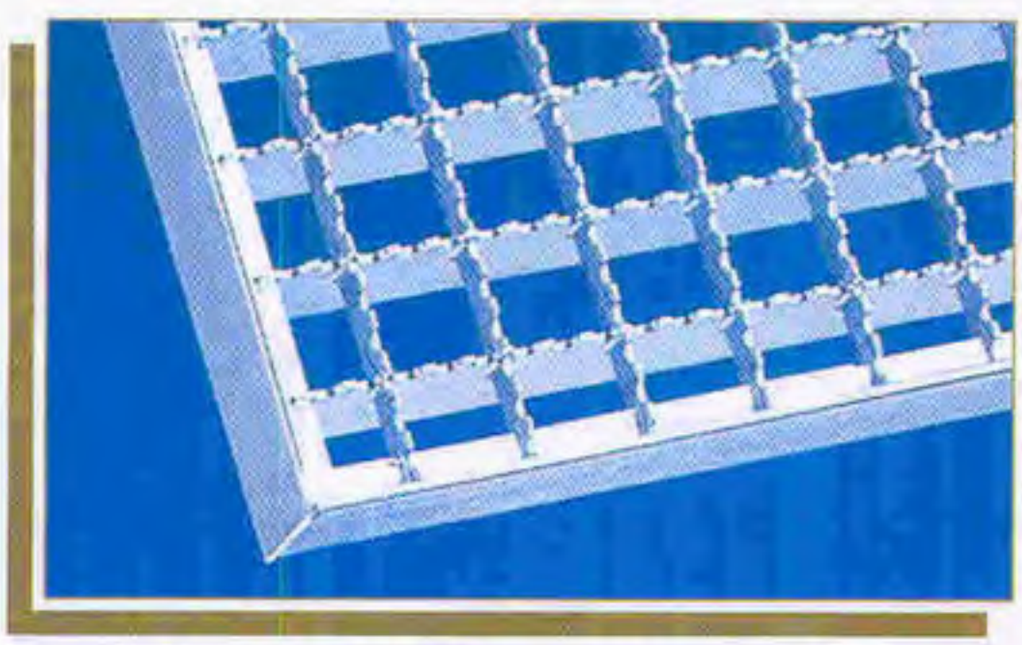
Type SP/S1: Normal Serrated

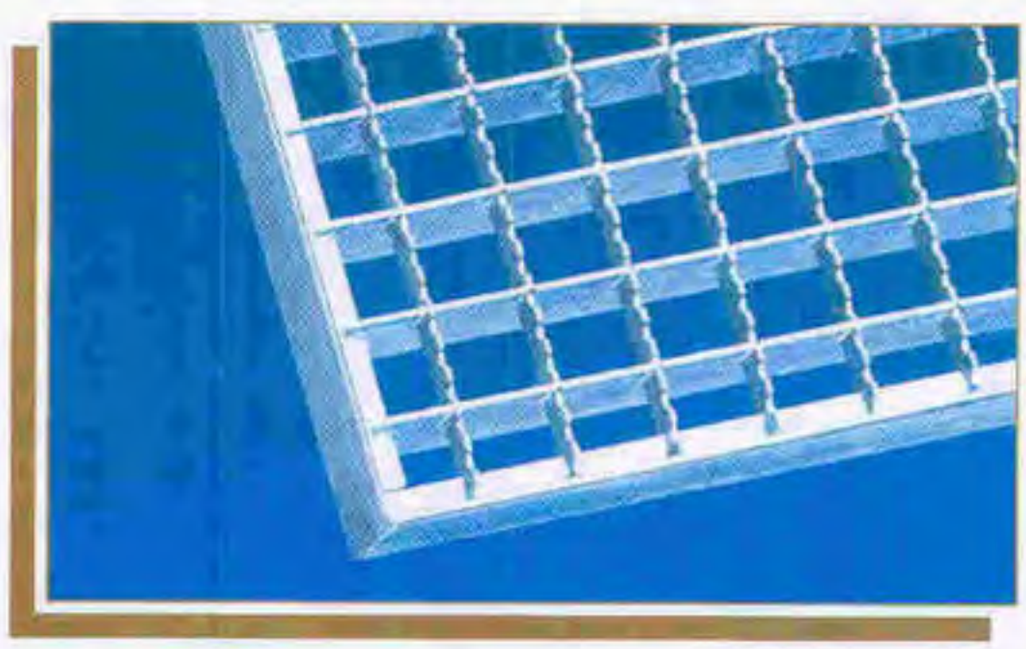


Type SP/S2: Serrated interrupted



Type PR/S1: Serrated carrier bar





Type PR/S2: Serrated carrier bar
and cross-bar

Anti skidding Evaluation Table

(according to Code of Practice ZH 1 /571 issued by the (German) Employers' Liability Insurance Association)

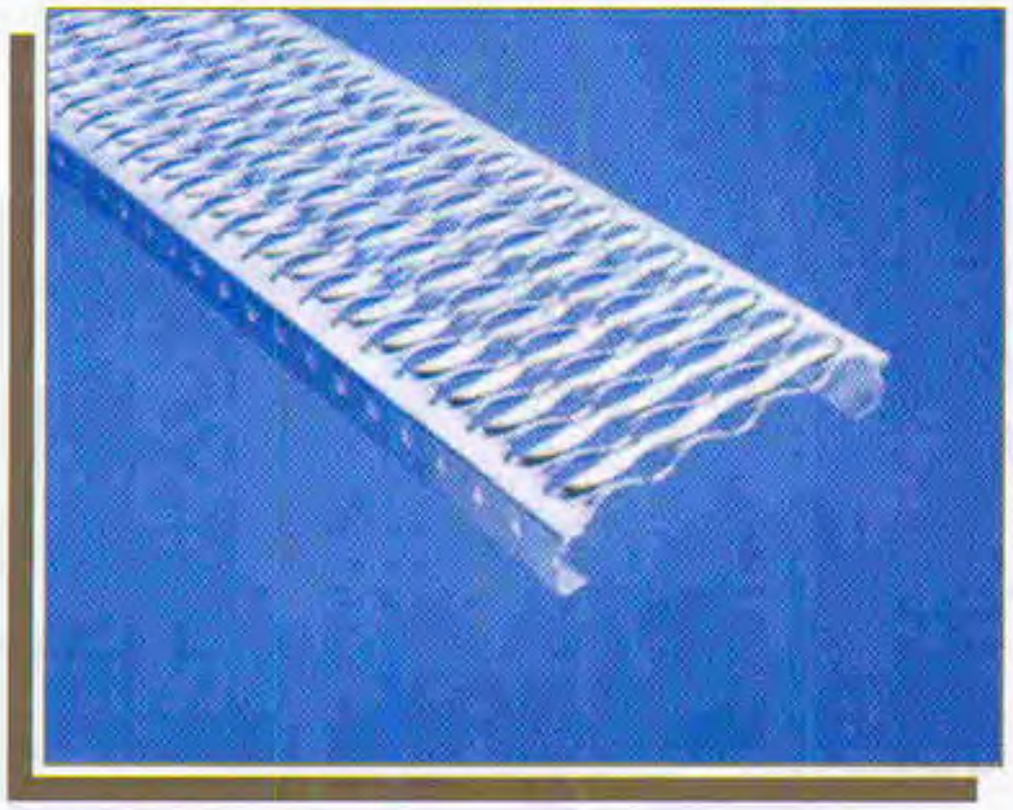
Pressure Welded Grating: Testing performed on Type SP/AA 3032* - 30/3 - Hot-galvanized according to DIN				
Type of anti skidding		Testing number	Evaluation group 1) for anti skidding	Evaluation group 2) for displacement volume
SP	(Transverse bar: twisted round steel)	92211	R 10	V 10
SP/S1	(Bearing bar with standard serration)	91208	R 11	V 10
SP/S2	(Bearing bar with intermittent serration)	91210	R 11	V 10
SP/S3	(Bearing bar Serration Trapezoid)	91209	R 11	V 10
Pressed Grating: Testing performed on Type PR 3030* - 30/3 Hot - galvanized according to DIN				
PR		92213	R 10	V 10
PR/S1		92212	R 11	V 10
PR/S2		92214	R 12	V 10
PR/S3		92215	R 11	V 10
Profile				

*** Nominal Mesh**

For high requirements of anti-slip protection, such as for inclined gangways with a pitch a (alpha) of 10-24 degrees, we recommend equipping the grating

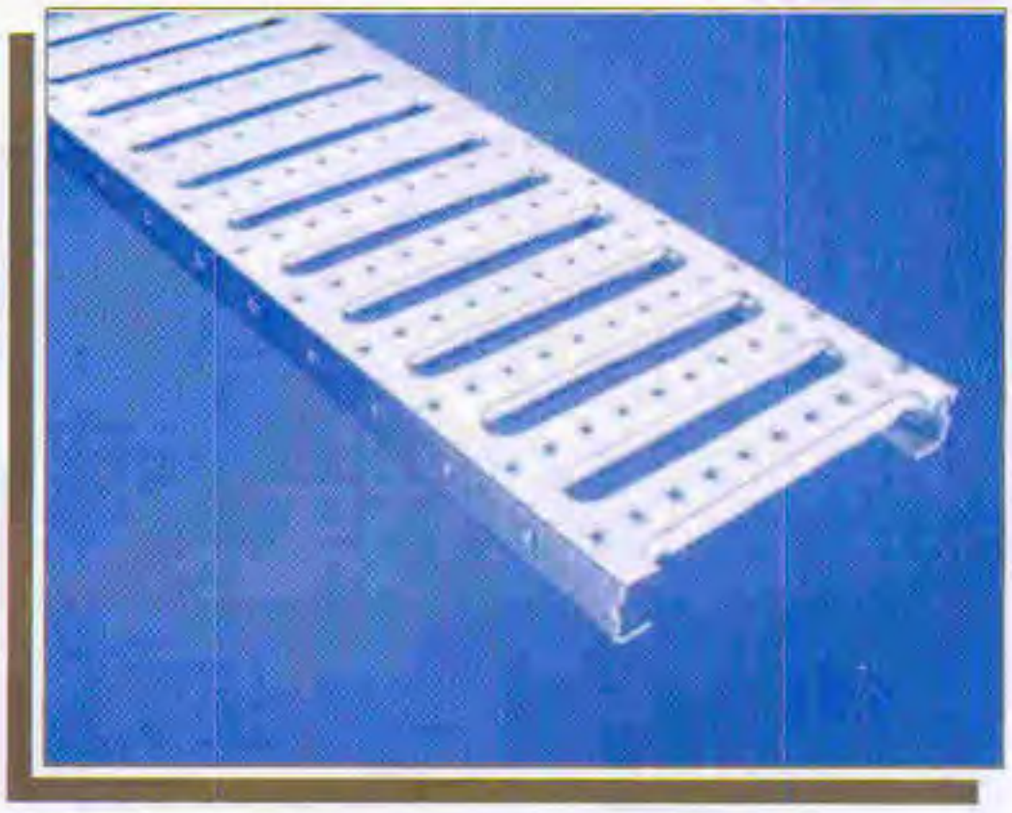
PROFILE PLATFORM GRATINGS (BR)

Type serrated



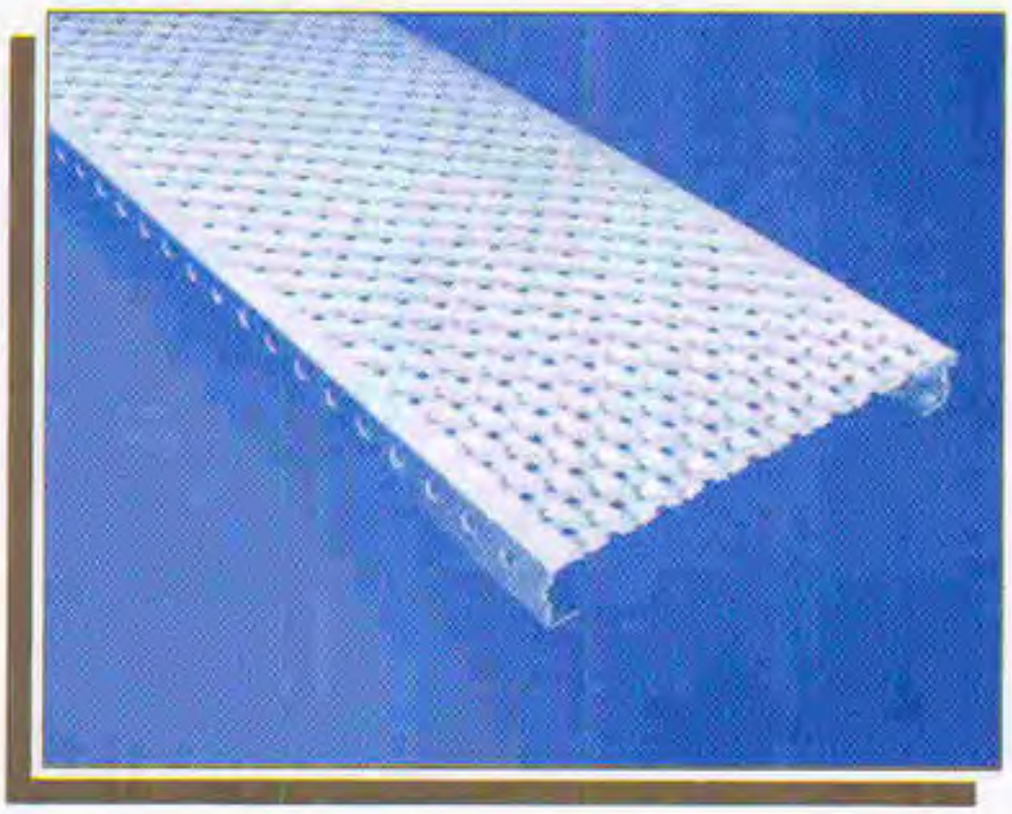
* high protection against slipping.
* good distribution of loading from the middle to sheet sides.
* good drainage properties.

Type Steg



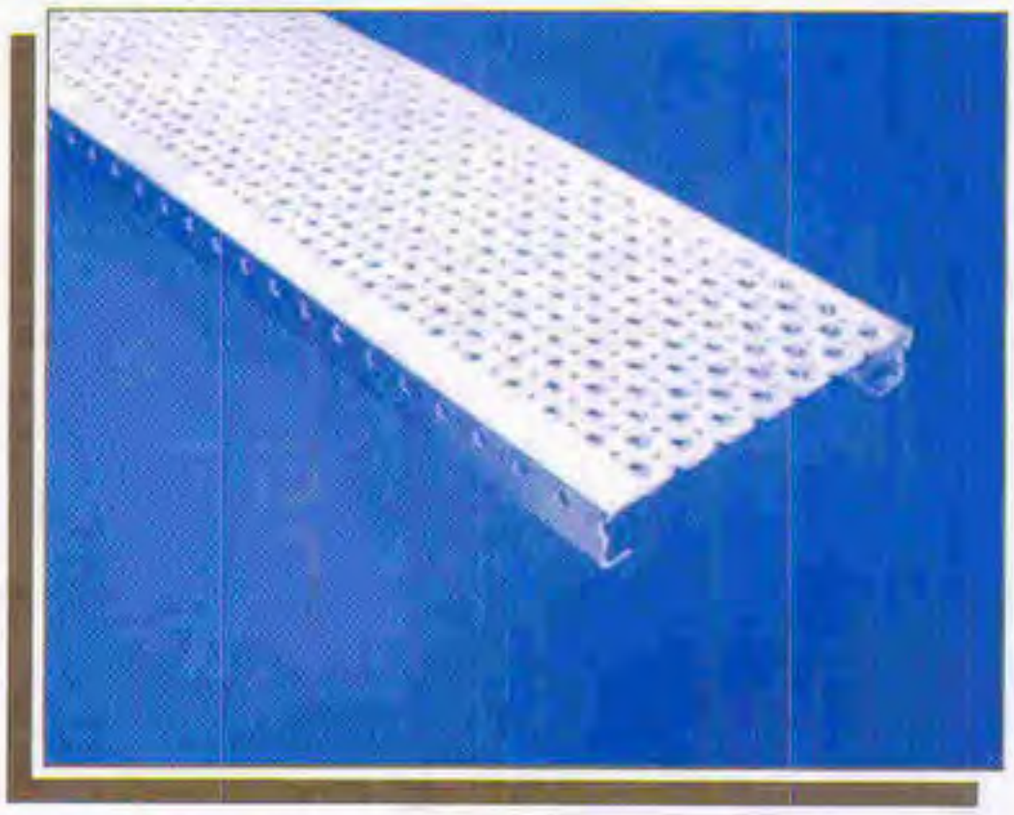
* good non-slip protection.
* the greatest level of sheet drawing.
* good distribution of loading from the middle to sheet sides.
* good drainage properties.

Type Round



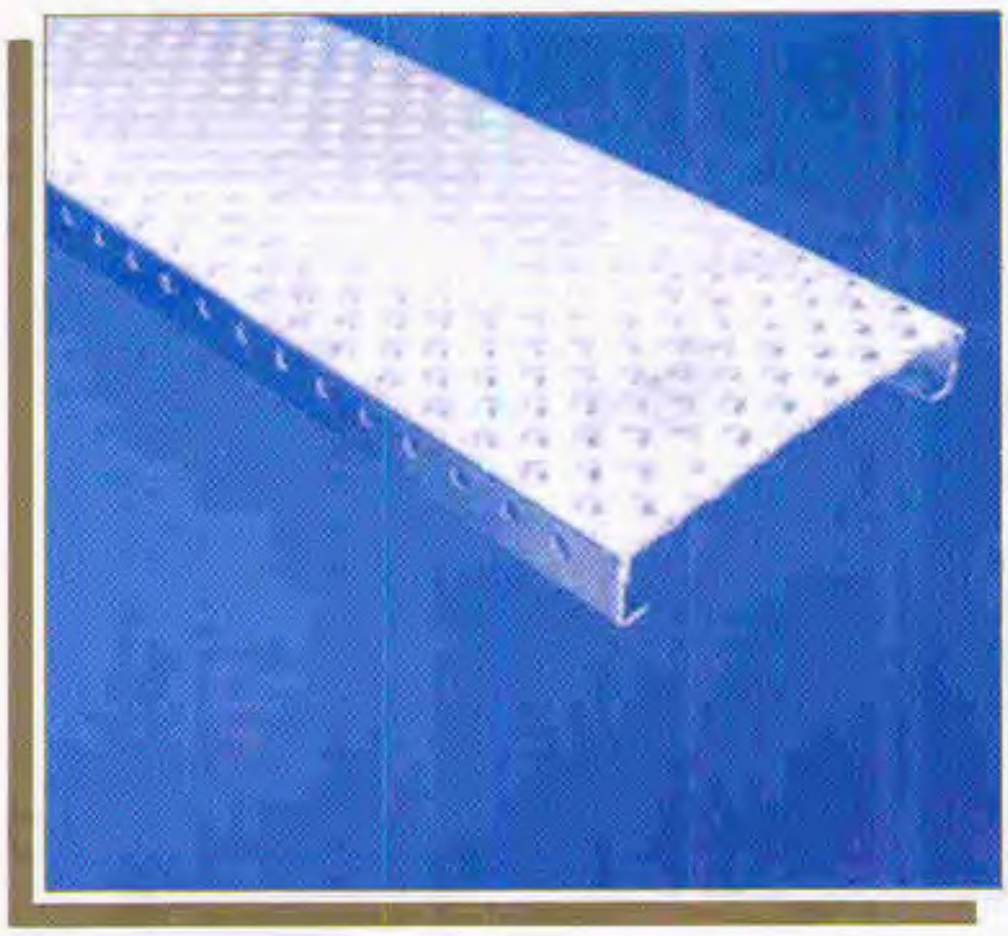
* good non-slip protection.
* good drainage properties.
* feeling of stability while walking.
* good drainage properties.

Type Offshore



* good non-slip protection.
* Satisfy requirements for offshore products.

Type Close



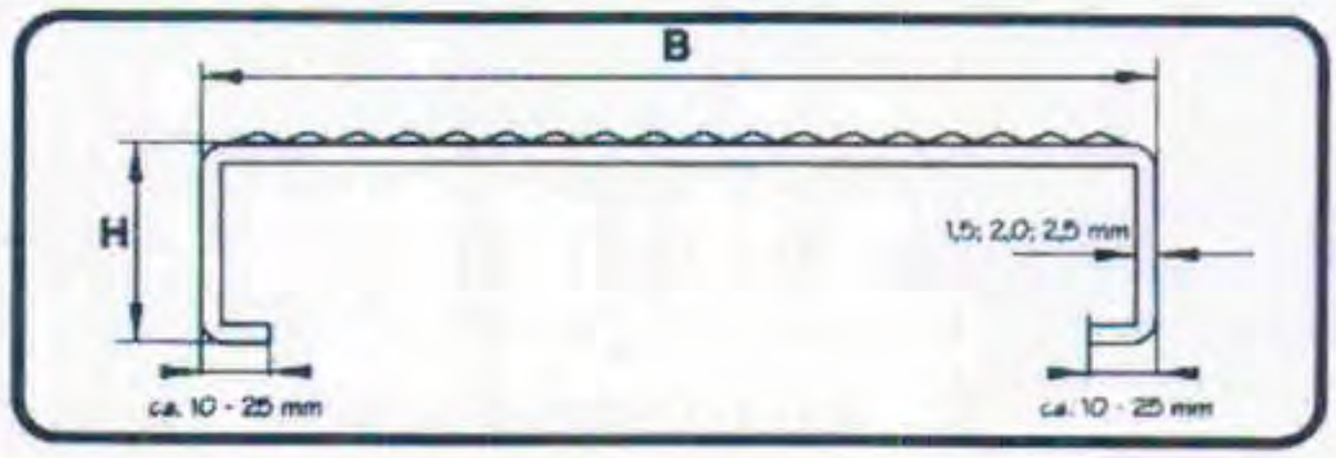
* good non-slip protection.
* no drainage holes
* Satisfy requirements of covering appropriated to walk on high heels.

After assembly work Profile gratings platforms create a flat, compact area. Side hole shelf screwing platform elements together. Structural reinforcements in connection points are similar to double T-profile.

* Steel St 37.2 or ST3SX
* Stainless steel
* Copper or alluminium sheet.

Finishing
* Carbon steel (non-galvanized)
* hot dip galvanized acc. to DIN 50976
* galvanized by Sendimir method

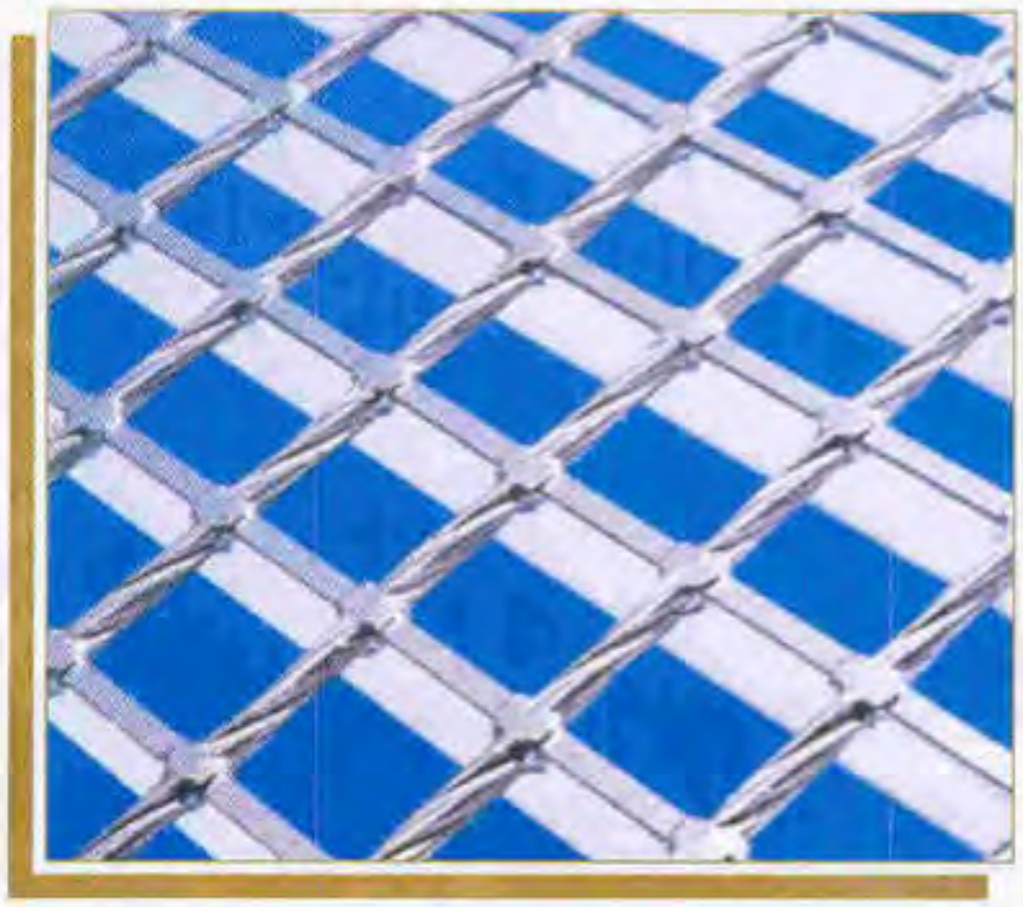
Type					
Material	Serrated	Steg	Round	Offshore	Close
Thickness in mm					
Carbon steel or Galvanized Acc to DIN50976 steel St3S lub St3SX	1,5/2,0/2,5	1,5/2,0/2,5	1,5/2,0/2,5	1,5/2,0/2,5	1'5/2,0/2,5
Galvanized sheet	1,5/2.0	1,5/2,0	1,5/2.0	1,5/2.0	1,5/2.0
Stainless Steel or Copper	on request	1,5/2.0	1,5/2.0	1,5/2.0	1,5/2.0
Dimension in mm					
length - L/max/	6000	6000	6000	6000	6000
Length Scale	60	62,5	60	60	60
Width - up to B	12-480	150-300	150-300 Thickness up to 2,0 150-200 Thickness up to 2,5	150-300 Thickness up to 2.0 150-200 Thickness up to 2.5	150-400
Scale - B	60	50	50	50	50
Typical Height - H	45/50/75	45/50/75	45/50/75	45/50/75	45/50/75



We can produce stair treads of different width from profile gratings, Standard dimensions:180, 240, 300 mm, height 40 mm. tread length optional: standard 600, 800,1000mm. Side parts of tread are equipped with notch boards or handles with assembly holes. On special request treads of profile gratings are available with non-skidding bars.

FORGE-WELDED GRATING (SP)

SP Grating is produced using highly modern pressure welding systems. The cross-bars of the grating are pressure welded to the bearing bars with a pressure of up to 100 ton sand a welding current of up to 2000 KVA. The production systems are completely computer-controlled. The pressure and welding current are optimally adjusted and monitored during the welding process control. SPG rating is distinguishing itself by its extreme durability and torsion rigidity. The application of this type of grating permits the total statical loading of structural units tobe increased.



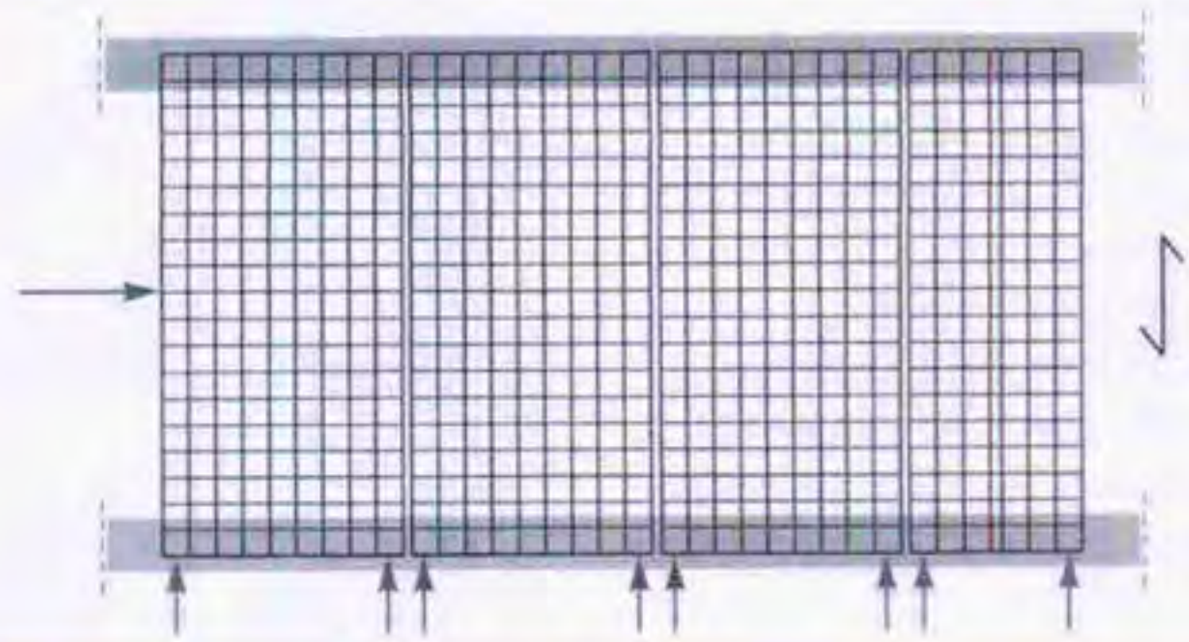
Manufacturing Program

The ***bearing bars*** serve for load transmission and thus should always be located on a sturdy supporting structure.
The ***transverse bars*** are used to connect the bearing bars with each other and contribute to load distribution.
The ***mesh widths*** defines the clearance between the bars.
The mesh Pitch (manufacturing dimension) is the spacing between the bar centers.

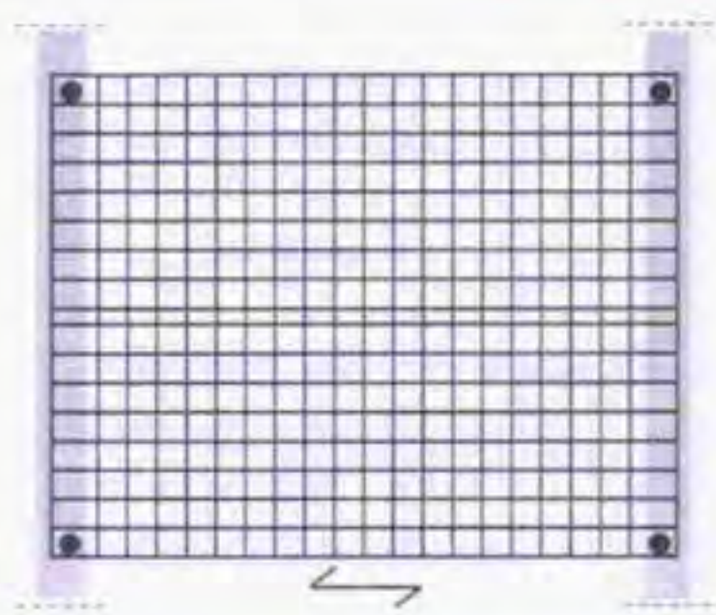
SP Symmetric Grating

SP symmetric grating has all the advantages of customary pressure welded grating and combine these with additional important advantages. For slippery conditions, were commend SP symmetric grating with anti-slip protection.

Additional advantages of Symmetric grating.
* Gangways and platforms are usually made of a series of gratings laid one after the other with equal length carrier bars. The direction of running is in the direction of the cross-bars. Symmetric grating guarantees alignment of the cross-bars. The cross-bars of the previous grating connect with the cross-bars of the following grating. This results in a high-quality impression of the platform.



* The Grating is fastened to the substructure by the first and last cross-bar mesh (end Mesh), meaning in the support area of the grating the cross-bars often run through the middle of these assembly meshes. As a result, the fastening is insufficient or cuts at the construction site give rise to additional cost and corrosion problems due to the damage done to the hot-galvanized.
On request, symmetric grating is produced with defined minimum sizes of the assembly meshes (=end mesh). This ensures fast, inexpensive and high-quality assembly.
If grating is to be exchanged and laid with already existing bolts (e.g. in spraying cabins)then, on request, symmetric grating is able to guarantee end meshes in the right size. There is no need for adaptation work at the customer.



* If the desired width of the grating does not comply with the grid of the grating Mesh, then the grating normally needs to be sawn off to the desired width. An end carrier bar needs to be manually welded on (so-called "3rd side"). This outer carrier bar is then not attached using the Forge-welded process.
* Symmetric grating is produced in all widths using the pressure welding process without manual reworking. If the grating width so requires, the processor-controlled System installed and adapter mesh into the middle of the grating. Symmetric grating guarantees a process-controlled, reliable and uniform product quality in all dimension.