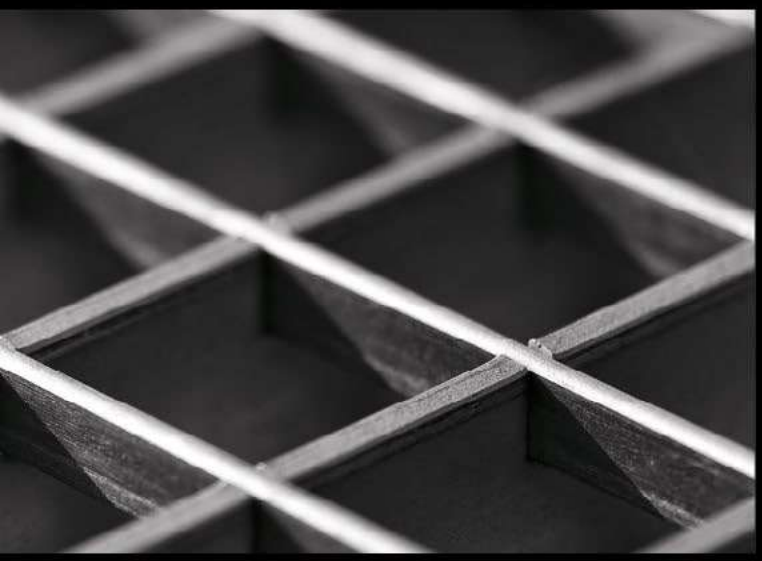
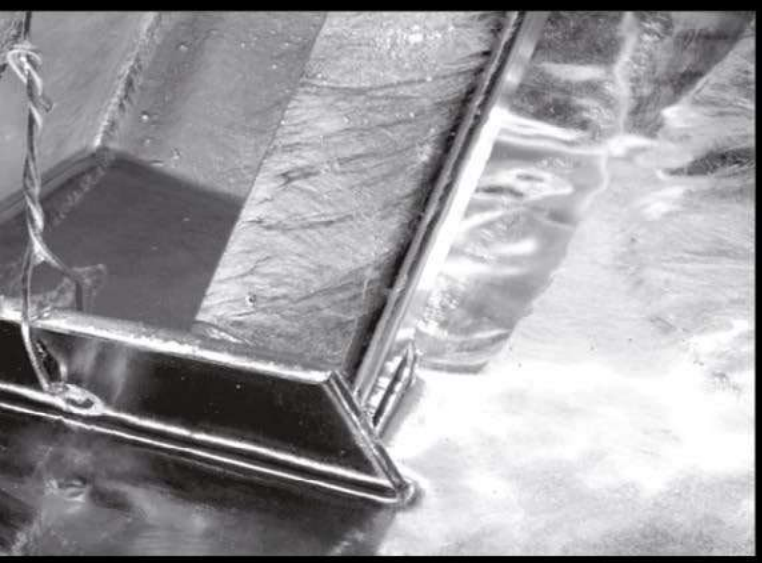
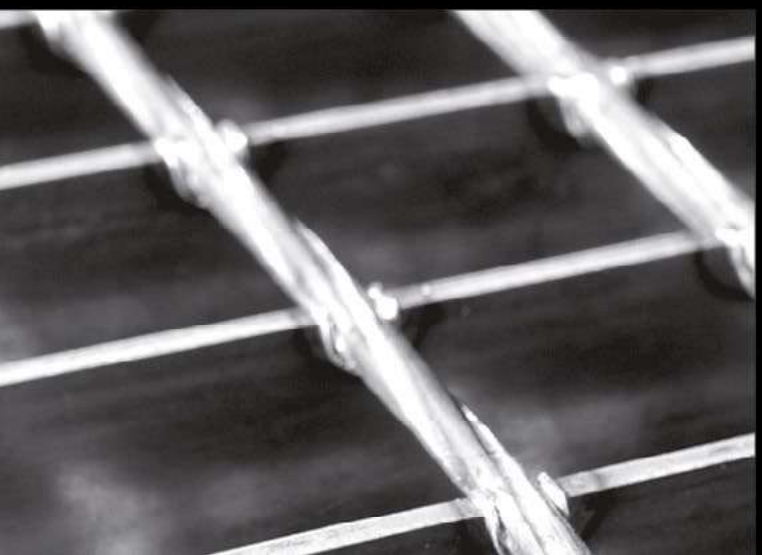






Termetal
GRUPA

Table of contents

Platform gratings

Platform gratings

1.1.Grating manufacturing technology

TERMETAL is a manufacturer of welded gratings made using automated welding lines. The process involves welding the grating elements, such as the supporting flat bars and the cross bars to connect them. The spaces created between these elements are called the mesh of the grating. It is possible to obtain different products due to their size, and the possibility of using additional elements. The basic elements of the grating, i.e. the supporting flat bars and the cross bars at the top form a single surface. Due to the different spacing between the bars or flat bars, as well as additional components used, **TERMETAL** is able to offer a very wide range of products. **TERMETAL's** production activities are based on the National Technical Assessment (PI : KOT) issued and updated by the Building Research Institute.

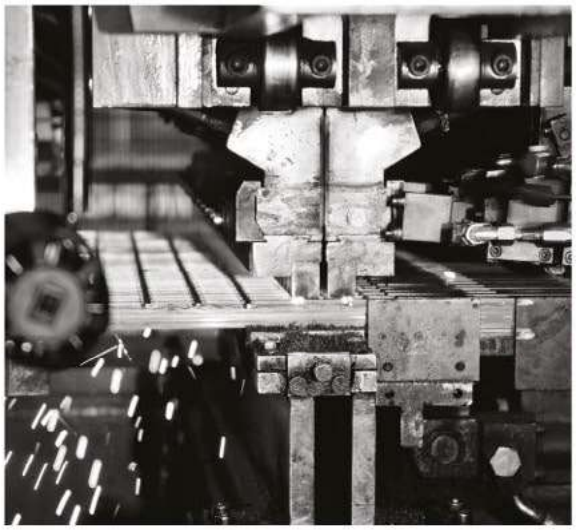
1.2. Materials

The basic material is load-bearing flat bars made by longitudinally cutting sheet metal in coils to a width corresponding to the desired height of the gratings. The basic steel grade is S235 per PN-EN 10025:2007, hot-rolled in accordance with PN-EN 10051+A1. and its equivalents according to other standards.
In addition, a load-bearing flat bar made by cold-rolling is also used in the manufacture of gratings, which meets the strength requirements characteristic for S 235, S 275, S 355 steel grades.
The transverse bar is obtained using a special plastic treatment called calibration. It consists of making suitable grooves that reinforce and increase its slip resistance.
Stainless steel grade INOX 304 can also be used for the gratings. A smooth stainless steel round bar is used for stainless steel gratings.

1.3. Anti-corrosion treatment

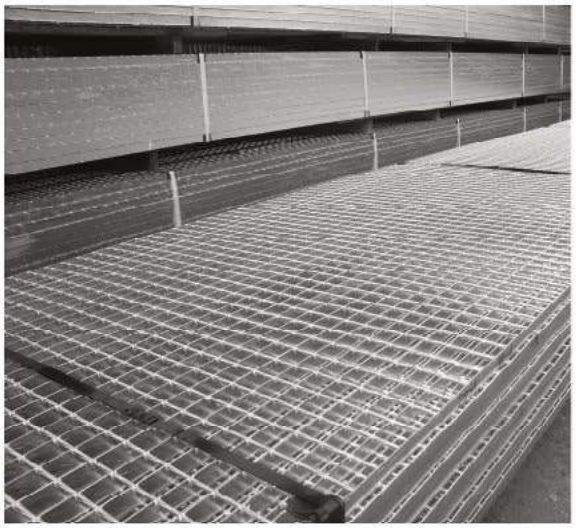
In accordance with popular demand, **TERMETAL** protects its products against corrosion using hot dip galvanizing in accordance with EN ISO 1461
TERMETAL owns four high-tech dip galvanizing plants. Semi-finished products or products made on special request can be supplied without corrosion protection.

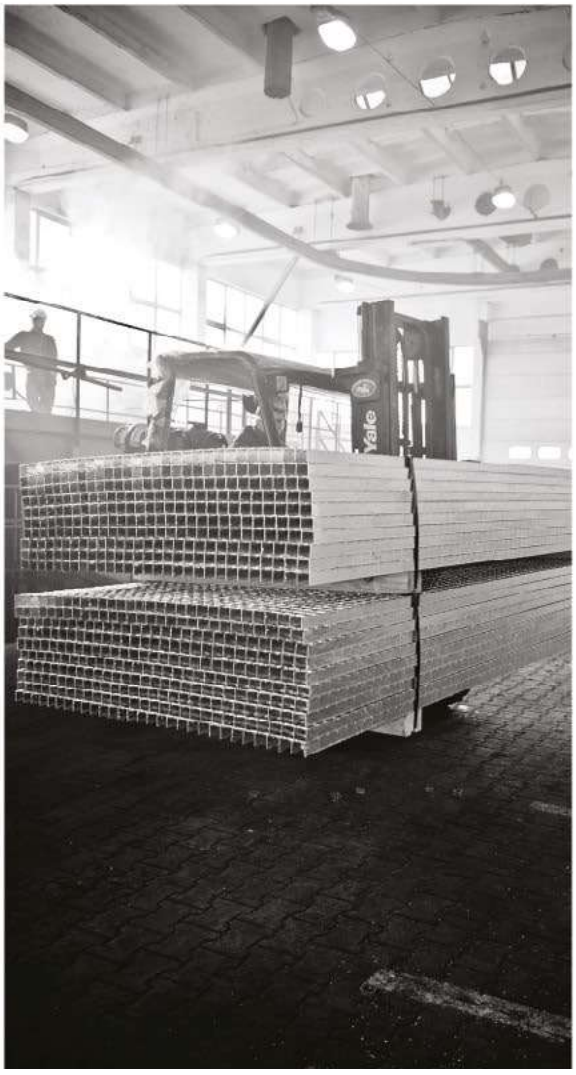
All manufacturing processes in the **TERMETAL Group** meet environmental criteria, and the technologies used are designed to minimise the generation of technological waste.



2. Terms and abbreviations

MNZ/MNO – unframed grating/stainless unframed grating
KNZ/KNO – unframed grating (K — grating; N — unframed; Z — grooved wire/O — round wire)
KOZ/KOO/KOK – framed grating (K — grating; O — framed; Z — grooved/O — round/ K — square)
SOZ – stair tread
AKP – side plate
REG – border stopping below bottom edge of a grating
ASP – anti-slip side strip, in the front of the stair tread/grating/landing
ASP-out – side plate in the front of the stair tread/grating/landing. (Same as ASP, but without the perforated top)
WBB – additional bar welded from below with transverse wires between support bars
SM – perforated strip welded from below to cross bars between support bars
SERR – top edge of supporting flat bar SERRATED, with cut-outs to increase the anti-slip properties of the grating
X-X – grating symmetrical in the direction of dimension B if the width of the grating is different from that resulting from the mesh distribution, the outermost meshes shall have the same dimension other than 34.3 mm
Y-Y – grating symmetrical in the direction of dimension L, the ends of the supporting bars (or border) are at the same distance from the nearest transverse bar
h – the height of load-bearing flat bar
g – the thickness of load-bearing flat bar
L – length of a grating/stair tread, dimension of supporting flat bar
B – width of a grating / stair tread, dimension of the transverse bar
straight cut-outs cut outs with straight lines in the grating forming its shape other than a rectangle
curved cut-outs – cut-outs in the grating and lines other than straight lines
STD/FIN/ESP – various types of side framing for stair treads and landings





3. Method of ordering

Use the method of ordering described below to avoid ambiguity when ordering your products.
e.g. **KOZ/34,3X38,1/30X2/L=1200 /B=1000/OCYNK/ (ADDITIONAL ELEMENTS, SUCH AS WBB, SERR, SM)**

4.1 Unframed and framed gratings

4.1.1. Unframed

a. Panel — is the product of welding a standard length of 6050 flat bars and is not framed.

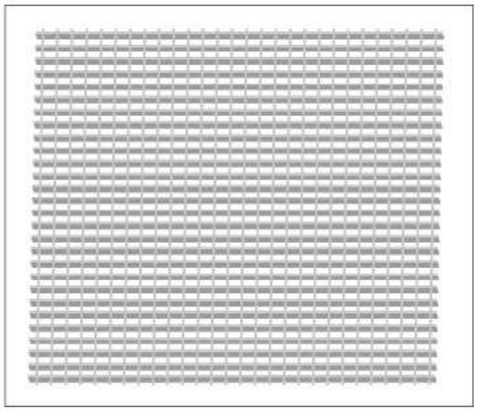
- Example code: panel MNZ/34,3x38,1/30x2/L=6050/B=1000/...
- The panels can also be available in other lengths, e.g. L=6100, L=5800, L=3050

Good to know:	tolerance for L +/-10 mm

b. KNZ — is a product obtained from a panel of specified dimensions
- Example code: KNZ/34,3x38,1/30x2/L=1200/8=1000/... .
- Dimension L can be of any length, but it is recommended that dimension B be in accordance with the flat bar spacing table, Table 2.

Good to know:	tolerances for KNZ are the same as for framed gratings.

Fig. 1 Panels

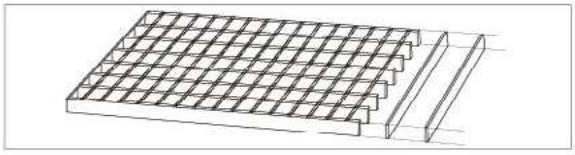


4.1.2. Framed

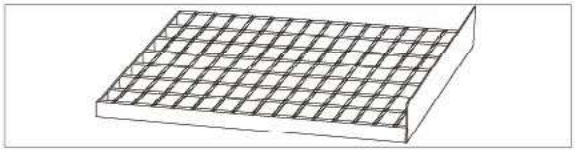
A. KOZ — is a grating in which the ends of the flat bars on both sides are closed by a border.
- Example code: KOZ/34,3x38,1/30x2/L=1000/B=1000/... .
- Dimension L can be any length, dimension B can be any width not exceeding 1990 mm.

B. Types of framing:

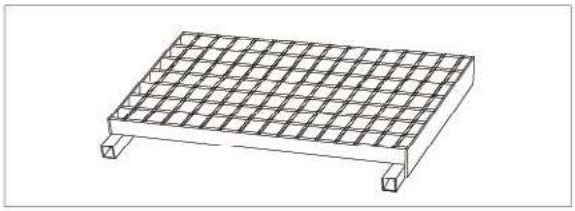
a. Standard – height of the border the same as the supporting flat bar for a flat bar thickness of g= 2 and 3 mm, border thickness is g=2 mm (optional g=3 mm)
- Most gratings are framed by welding the frames to the grating.
- In some cases, the border is welded.



b. AKP this is the side plate that extends above the surface of a grating / stair tread for a specified length.

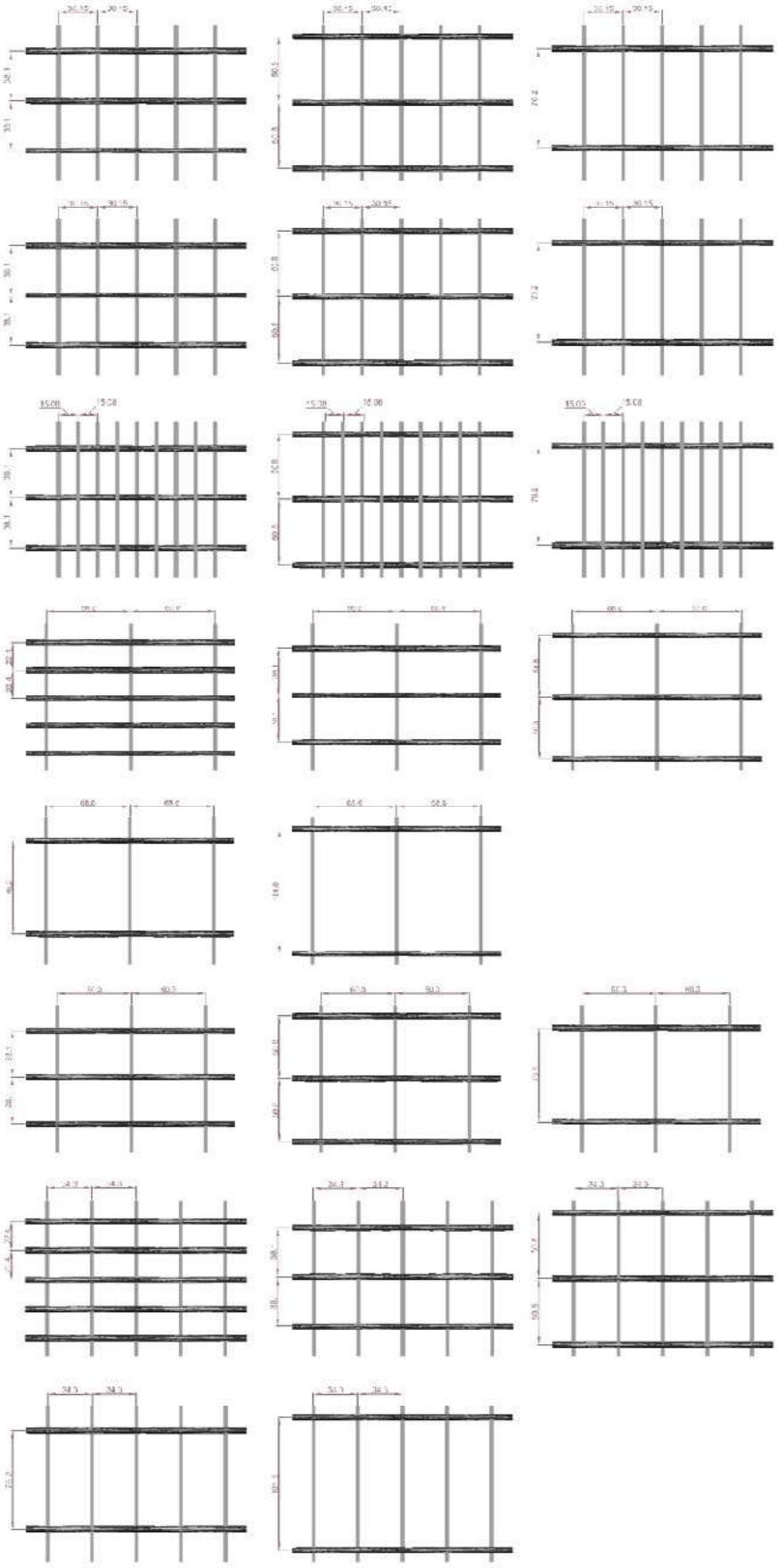


c. REG — This is a type of frame that allows the use of gratings for shelving in storage systems
- This is a frame of flat bar or angle, usually stopping 10 mm below the plane of the grating.



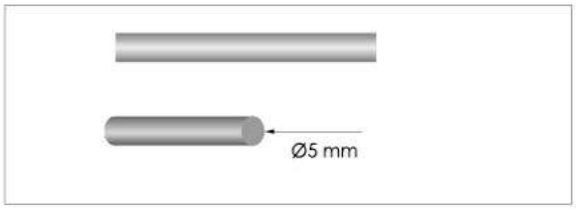
4.2. Types of mesh

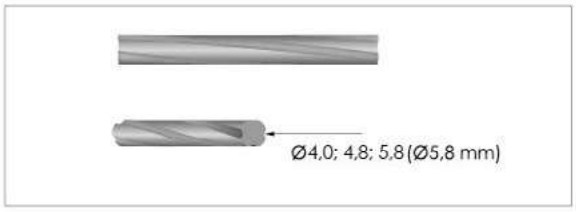
The distances between the flat bars (in the centreline of the material) are 15.08 mm, 30.16 mm, 34.3 mm and 68.6 mm while the distances between the cross bars are 22.4 mm, 38.1 mm, 50.8 mm, 76.2 mm, 101.6 mm, forming a so-called 'mesh' with size respectively:



4.3. Types of transverse bars

A grooved cross bar with a thickness adapted to that of the supporting flat bar is used for the grating.



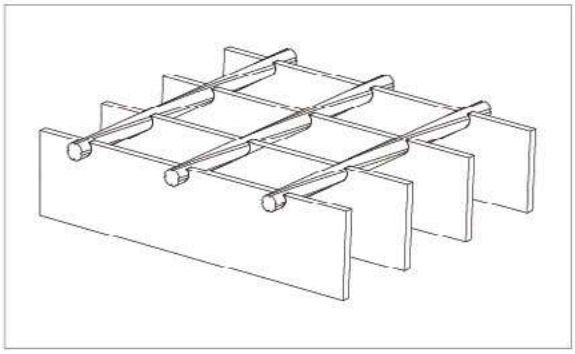


4.4. Types of gratings

4.4.1. Standard grating

Plattorm gratings are made ot parallel supporting tlat bars transversely connected to each other by a circular grooved bar so that the elements form a single plane at the top of the grating.

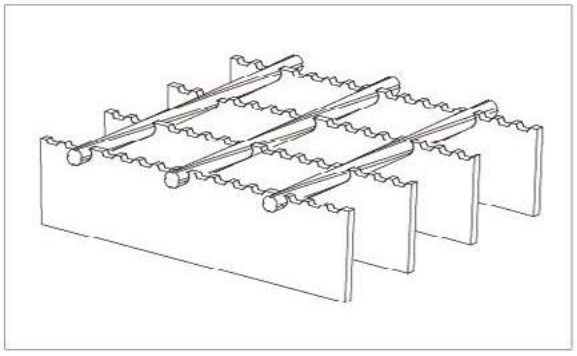
Fig. 2. Standard grating

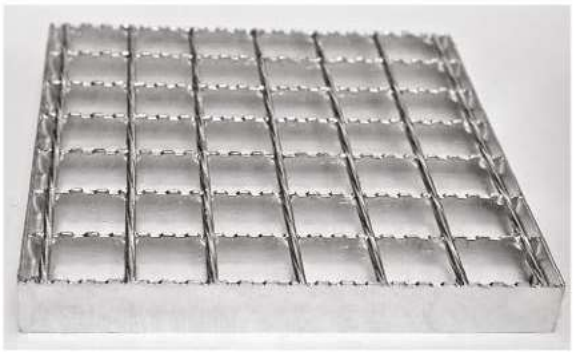


4.4.2. Serrated grating (SERR)

The serrated grating uses a supporting flat bar with trapezoidal notches Fig. 4.
It is a grating with increased anti-slip properties for use in particularly hazardous areas, such as sloping approaches, oily floors, etc.

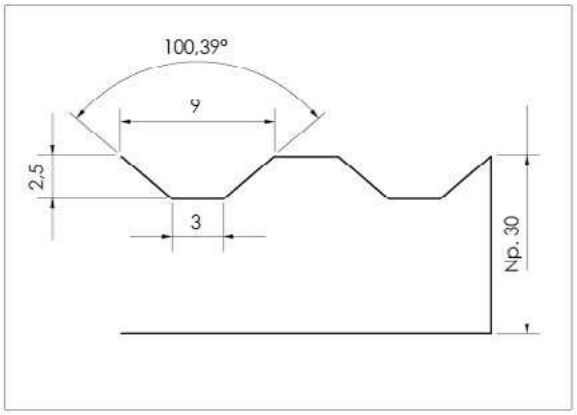
Rys. 3. Serrated grating

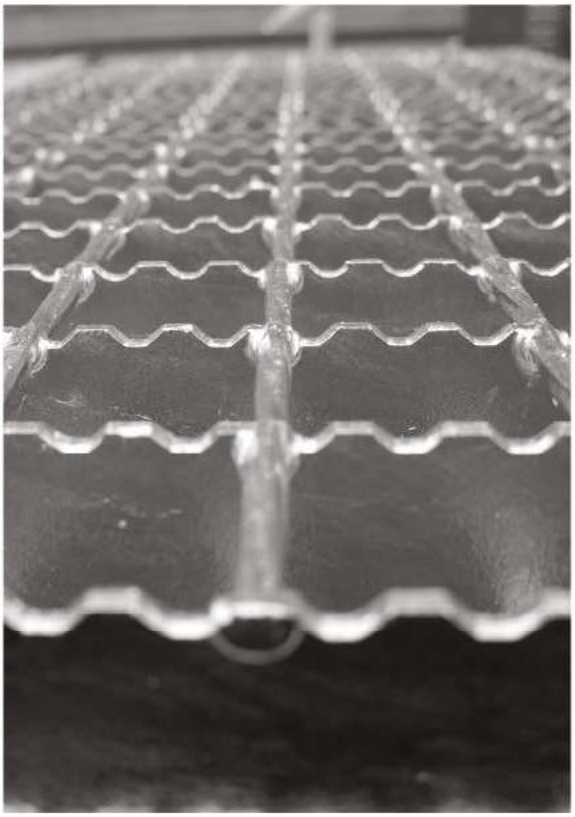




Rys. 4. Serration parameters

trapeze

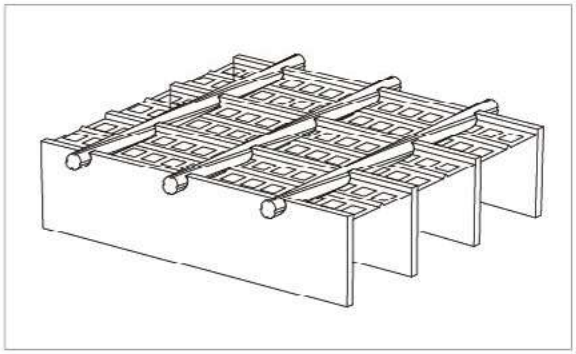




4.4.3. Security Mesh (SM) grating

The Security Mesh grating can be made on the basis of standard grating and serrated grating by welding a g=0.5 mm thick flat bar with 8 mm by 8 mm holes from below between the supporting bars.

Fig.5. Standard SM grating



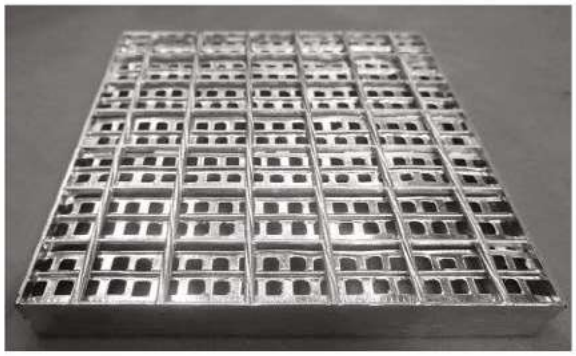


Fig. 6. Serrated SM grating

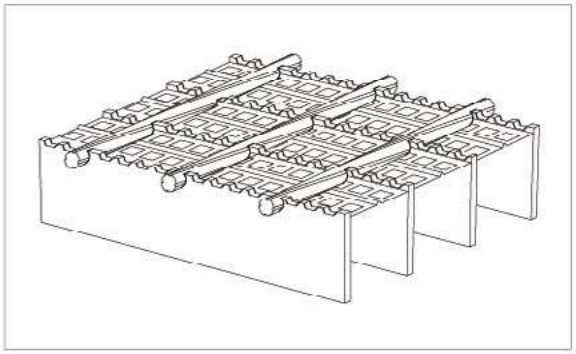
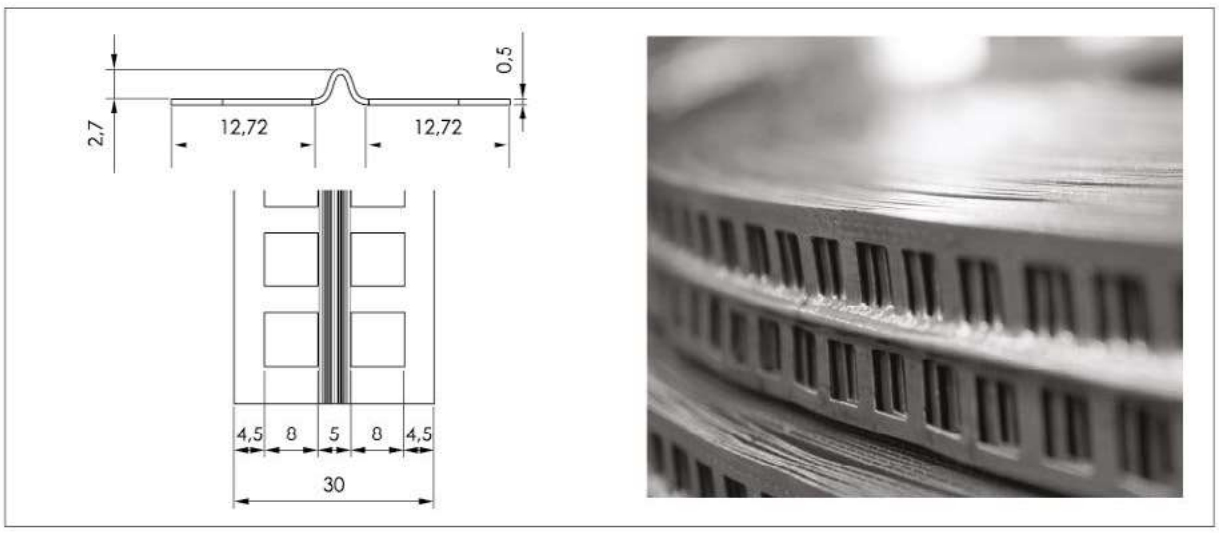


Fig. 7. Security Mesh flat bar diagram



4.4.4. WBB grating

The WBB type grating can be made on the basis of the standard grating and serrated grating by welding a 5.8 mm diameter slotted bar from below between the supporting bars.

Fig. 8. Standard WBB grating

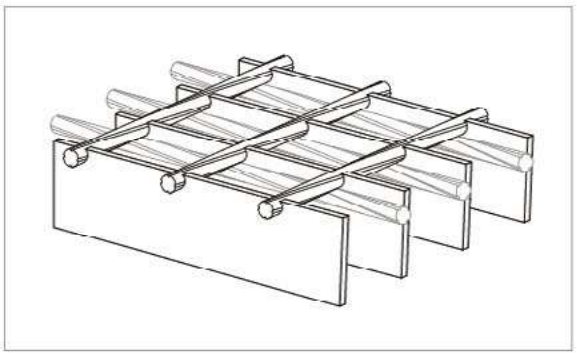
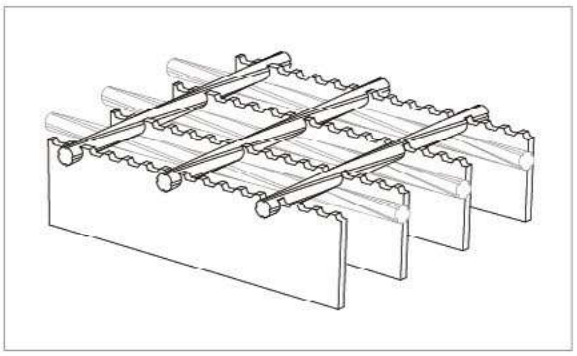
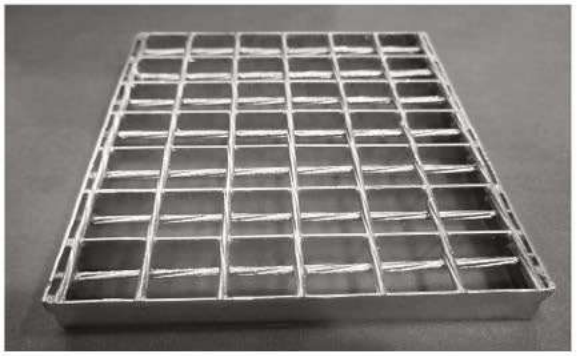
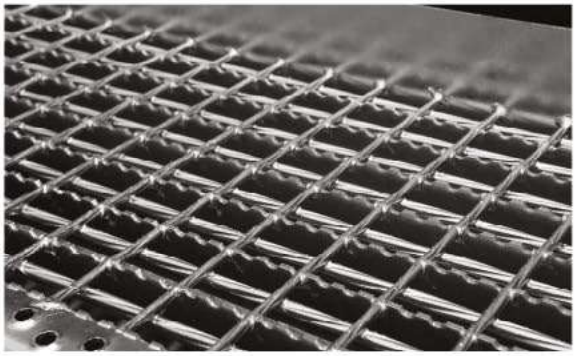
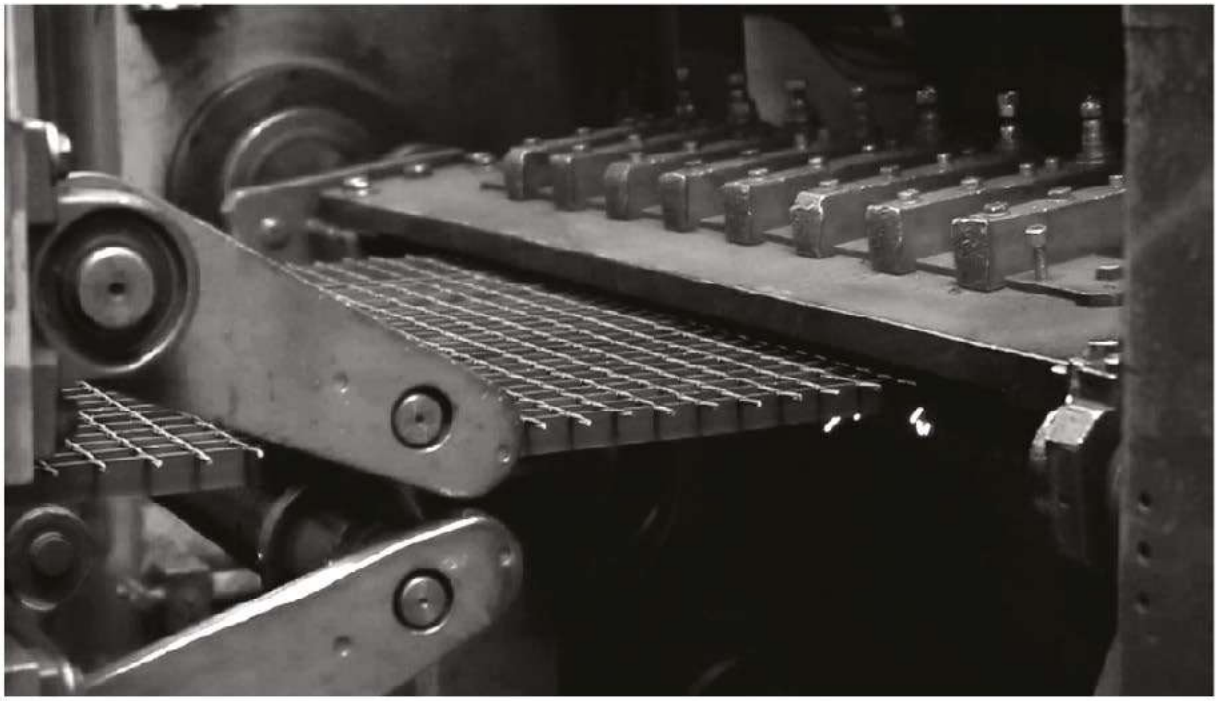


Fig. 9. Serrated WBB grating





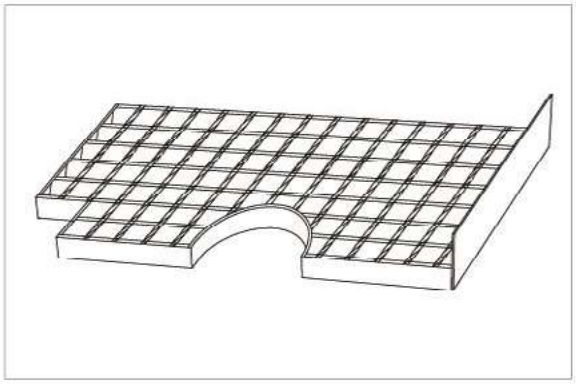


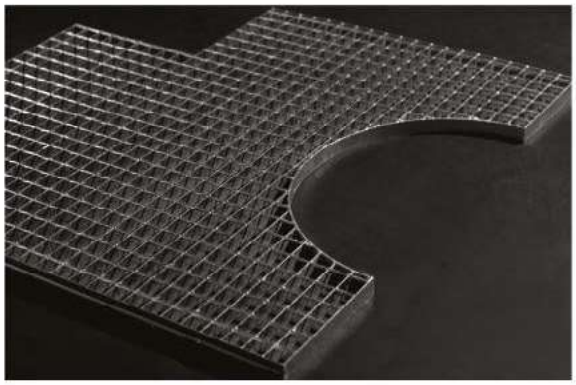


4.4.5. Burnt-out gratings - sides

Burnt-out gratings are gratings of various shapes made on the basis of a technical drawing. A special type of framing known as 'boarding' can be used in the burnt-out gratings (not limited to the burnt-out gratings). The thickness and height of the sideboards are defined in the technical documentation, an defined by the client. The framing of the grating — the board is therefore always subject to individual agreement with the customer.

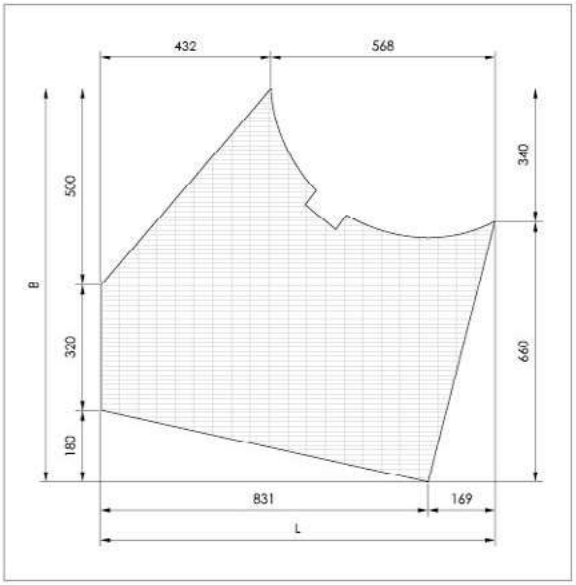
Fig. 10. A grating with straight and curved cut-outs





When determining the "L" and "B" dimensions, the smallest rectangle into which the grating can be fitted should be taken, as shown in Figure 11.

Fig. 11. Selecting dimensions of burnt-out gratings



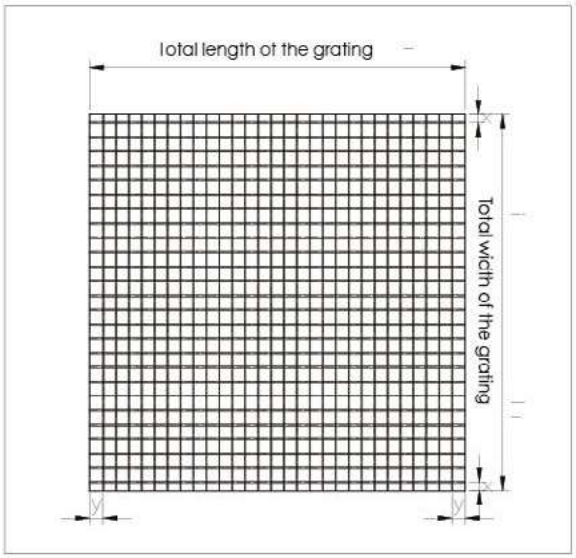
4.4.5. Burnt-out gratings - sides

4.4.6. Gratings with special dimensions XX and YY

The X-X type grating is symmetrical in the direction of dimension B if the width of the grating is different from that resulting from the mesh distribution, the outermost meshes shall have the same dimension but other than 34.3 mm.

A YY-type grating is characterised by symmetry in the direction of the L-dimension, the ends of the supporting (or framing) flat bars being at the same distance from the nearest transverse wire.

Fig. 12. Diagram of an XX and YY grating



4.4.7. Stainless steel gratings

The **TERMETAL** Group, thanks to its modern production lines, also manufactures stainless steel gratings in INOX 304 steel grade.
A smooth round bar with a diameter of 0=5 mm is used for stainless steel gratings.

4.4.8. Production program according to pitch

Table 1. Grating manufacturing program				
For pitch a = 15.08 mm				
Height of flat bar in mm	Load-bearing flat bar thickness in mm			
	2	3	4	5
20	X	X		
25	X	X		
30	X	X		
40				
50				
60				
70				
For pitch a = 30.15 mm				
20	X	X		
25	X	X		
30	X	X		
40				
50				
60				
70				
For pitch a = 34.3 mm				
20	X	X	X	X
25	X	X	X	X
30	X	X	X	X
35	X	X		
40	X	X	X	X
50		X	X	X
60		X	X	X
70				X

Table 2. Recommended grating widths for B#1000 mm resulting from the spacing of the flat bars				
Number of support flat bars for pitch 34.3 mm	Grating width with flat bar thickness			
	g = 2 mm	g = 3 mm	g = 4 mm	g = 5 mm
2	36	37	38	39
3	71	72	73	74
4	105	106	107	108
5	139	140	141	142
6	174	175	176	177
7	208	209	210	211
8	242	243	244	245
9	276	277	278	279
10	311	312	313	314
11	345	346	347	348
12	379	380	381	382
13	414	415	416	417
14	448	449	450	451
15	482	483	484	485
16	517	518	519	520
17	551	552	553	554
18	585	586	587	588
19	619	620	621	622
20	654	655	656	657
21	688	689	690	691
22	722	723	724	725
23	757	758	759	760
24	791	792	793	794
25	825	826	827	828
26	860	861	862	863
27	894	895	896	897
28	928	929	930	931
29	962	963	964	965
30	997	998	999	1000

Important fact:	Tolerances for these widths +/- 3 mm.

4.5. Installation of the gratings

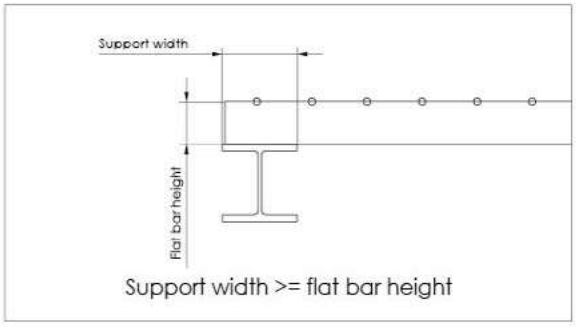
4.5.1. Selection of the grating width

In order to reduce the cost of gratings, using a module width of B=1000 is recommended. Using a module of B=1000, try to cover the largest possible surface of the platform. The width of the last piece of grating necessary to cover the entire surface should be made by result. The use of methods, e.g. averaging and standardising grating widths, raises the cost of covering the entire area.

4.5.2. Grating support

When sizing the grating supports, design the support ends of the supporting flat bars to a minimum length equal to at least the height of the supporting flat bar, but not less than 30 mm (e.g. for 20 mm and 25 mm flat bars).

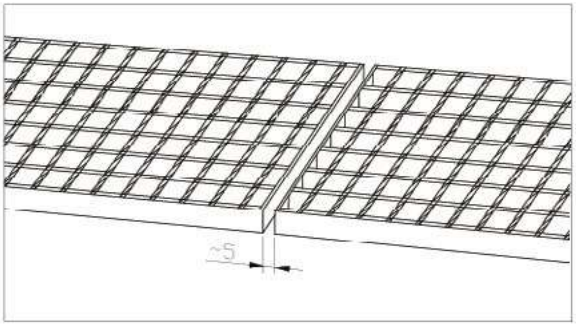
Fig. 13. Diagram of the grating support



The following principles should be kept in mind during the design stage of the grating layout:

- The distance between the designed gratings should be ~ 5 mm.

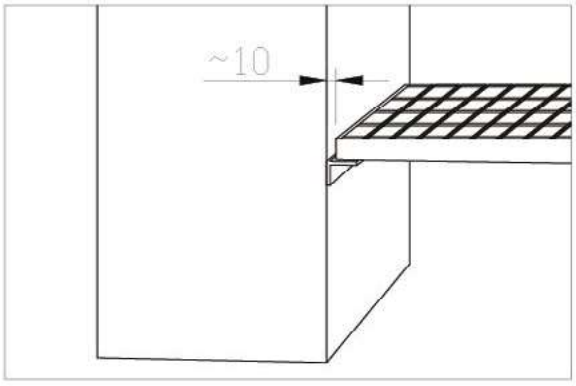
Figure 14. Grating spacing diagram



Good to know:	Please note that gratings are manufactured with negative tolerances as standard

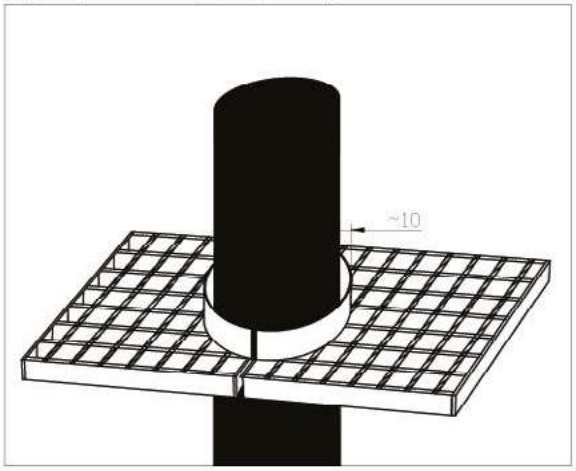
- The distance from the edge of the platform, approximately ~ 10 mm, must be taken into account when laying the gratings on the platform.

Fig. 15. The diagram showing the distance of the grating from the edge of the platform



- A spacing of ~10 mm should also be assumed at the deck penetrations of various process installations, supporting columns, etc.

Fig. 16. Diagram showing the transition e.g. a post through a grating



4.6. Table of strengths

4.6.1. For pitch a=34.3 mm

Table 3 shows the loads for welded gratings for pitch a = 34.3 mm with a bar spacing of 38.1 mm.

Table 3. Strength table for pitch a=34.3 mm

flat bar	para-meter	Grating span (length), dimension L in mm																				
		500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	2500
20×2	Fv	1 990	1 382	1 015	777	614	498	411	346	294	254	221	194	172	154	138	124	113	103	94	86	80
	fv	0,20	0,29	0,39	0,51	0,64	0,79	0,96	1,14	1,34	1,56	1,79	2,03	2,29	2,57	2,87	3,17	3,50	3,84	4,20	4,57	4,96
	Fp	172	138	115	98	86	76	69	63	57	53	49	46	43	40	38	36	34	33	31	30	29
	fp	0,20	0,27	0,36	0,46	0,58	0,71	0,85	1,00	1,16	1,34	1,53	1,73	1,95	2,18	2,42	2,67	2,94	3,22	3,51	3,82	4,13
20×3	Fv	2 985	2 073	1 523	1 166	921	746	617	518	442	381	332	292	258	230	207	187	169	154	141	130	119
	fv	0,20	0,29	0,39	0,51	0,64	0,79	0,96	1,14	1,34	1,56	1,79	2,03	2,29	2,57	2,87	3,17	3,50	3,84	4,20	4,57	4,96
	Fp	258	206	172	148	129	115	103	94	86	80	74	69	64	61	58	54	52	49	47	45	43
	fp	0,20	0,27	0,36	0,46	0,58	0,71	0,85	1,00	1,16	1,34	1,53	1,73	1,95	2,18	2,42	2,67	2,94	3,22	3,51	3,82	4,13
25×2	Fv	3 110	2 160	1 587	1 215	960	777	643	540	460	397	346	304	269	240	215	194	176	161	147	135	124
	fv	0,16	0,23	0,31	0,41	0,51	0,63	0,77	0,91	1,07	1,24	1,43	1,63	1,83	2,06	2,29	2,54	2,80	3,07	3,36	3,66	3,97
	Fp	267	214	178	153	134	119	107	97	89	82	76	71	67	63	59	56	53	51	49	46	45
	fp	0,15	0,21	0,28	0,36	0,45	0,55	0,67	0,79	0,92	1,06	1,21	1,38	1,55	1,73	1,93	2,13	2,34	2,57	2,80	3,04	3,30
25×3	Fv	4 665	3 239	2 380	1 822	1 440	1 166	964	810	690	595	518	456	404	360	323	292	264	241	220	202	187
	fv	0,16	0,23	0,31	0,41	0,51	0,63	0,77	0,91	1,07	1,24	1,43	1,63	1,83	2,06	2,29	2,54	2,80	3,07	3,36	3,66	3,97
	Fp	401	321	267	229	201	178	160	146	134	123	115	107	100	94	89	84	80	76	73	70	67
	fp	0,15	0,21	0,28	0,36	0,45	0,55	0,67	0,79	0,92	1,06	1,21	1,38	1,55	1,73	1,93	2,13	2,34	2,57	2,80	3,04	3,30
25×4	Fv	6 220	4 319	3 173	2 430	1 920	1 555	1 285	1 080	920	793	691	607	538	480	431	389	353	321	294	270	249
	fv	0,16	0,23	0,31	0,41	0,51	0,63	0,77	0,91	1,07	1,24	1,43	1,63	1,83	2,06	2,29	2,54	2,80	3,07	3,36	3,66	3,97
	Fp	535	428	356	306	267	238	214	194	178	165	153	143	134	126	119	113	107	102	97	93	89
	fp	0,15	0,21	0,28	0,36	0,45	0,55	0,67	0,79	0,92	1,06	1,21	1,38	1,55	1,73	1,93	2,13	2,34	2,57	2,80	3,04	3,30
25×5	Fv	7 775	5 399	3 967	3 037	2 400	1 944	1 606	1 350	1 150	992	864	759	673	600	538	486	441	402	367	337	311
	fv	0,16	0,23	0,31	0,41	0,51	0,63	0,77	0,91	1,07	1,24	1,43	1,63	1,83	2,06	2,29	2,54	2,80	3,07	3,36	3,66	3,97
	Fp	668	535	446	382	334	297	267	243	223	206	191	178	167	157	149	141	134	127	122	116	111
	fp	0,15	0,21	0,28	0,36	0,45	0,55	0,67	0,79	0,92	1,06	1,21	1,38	1,55	1,73	1,93	2,13	2,34	2,57	2,80	3,04	3,30
30×2	Fv	4 478	3 110	2 285	1 749	1 382	1 120	925	777	662	571	498	437	387	346	310	280	254	231	212	194	179
	fv	0,13	0,19	0,26	0,34	0,43	0,53	0,64	0,76	0,89	1,04	1,19	1,35	1,53	1,71	1,91	2,12	2,33	2,56	2,80	3,05	3,31
	Fp	382	306	255	218	191	170	153	139	127	118	109	102	96	90	85	80	76	73	69	66	64
	fp	0,12	0,17	0,23	0,30	0,38	0,46	0,55	0,66	0,77	0,88	1,01	1,15	1,29	1,44	1,60	1,77	1,95	2,14	2,33	2,54	2,75
30×3	Fv	6 717	4 665	3 427	2 624	2 073	1 679	1 388	1 166	994	857	746	656	581	518	465	420	381	347	317	292	269
	fv	0,13	0,19	0,26	0,34	0,43	0,53	0,64	0,76	0,89	1,04	1,19	1,35	1,53	1,71	1,91	2,12	2,33	2,56	2,80	3,05	3,31
	Fp	573	459	382	328	287	255	229	208	191	176	164	153	143	135	127	121	115	109	104	100	96
	fp	0,12	0,17	0,23	0,30	0,38	0,46	0,55	0,66	0,77	0,88	1,01	1,15	1,29	1,44	1,60	1,77	1,95	2,14	2,33	2,54	2,75
30×4	Fv	8 956	6 220	4 570	3 499	2 764	2 239	1 850	1 555	1 325	1 142	995	875	775	691	620	560	508	463	423	389	358
	fv	0,13	0,19	0,26	0,34	0,43	0,53	0,64	0,76	0,89	1,04	1,19	1,35	1,53	1,71	1,91	2,12	2,33	2,56	2,80	3,05	3,31
	Fp	764	611	509	437	382	340	306	278	255	235	218	204	191	180	170	161	153	146	139	133	127
	fp	0,12	0,17	0,23	0,30	0,38	0,46	0,55	0,66	0,77	0,88	1,01	1,15	1,29	1,44	1,60	1,77	1,95	2,14	2,33	2,54	2,75
30×5	Fv	11 195	7 775	5 712	4 373	3 455	2 799	2 313	1 944	1 656	1 428	1 244	1 093	968	864	775	700	635	578	529	486	448
	fv	0,13	0,19	0,26	0,34	0,43	0,53	0,64	0,76	0,89	1,04	1,19	1,35	1,53	1,71	1,91	2,12	2,33	2,56	2,80	3,05	3,31
	Fp	955	764	637	546	478	425	382	347	318	294	273	255	239	225	212	201	191	182	174	166	159
	fp	0,12	0,17	0,23	0,30	0,38	0,46	0,55	0,66	0,77	0,88	1,01	1,15	1,29	1,44	1,60	1,77	1,95	2,14	2,33	2,54	2,75
40×2	Fv	7961	5 529	4 062	3 110	2 457	1 990	1 645	1 382	1 178	1 015	885	777	689	614	551	498	451	411	376	346	318
	fv	0,10	0,14	0,19	0,25	0,32	0,40	0,48	0,57	0,67	0,78	0,89	1,02	1,15	1,29	1,43	1,59	1,75	1,92	2,10	2,29	2,48
	Fp	668	535	445	382	334	297	267	243	223	206	191	178	167	157	148	141	134	127	121	116	111
	fp	0,09	0,13	0,17	0,23	0,28	0,35	0,42	0,49	0,57	0,66	0,76	0,86	0,97	1,08	1,20	1,33	1,46	1,60	1,75	1,90	2,06
40×3	Fv	11 942	8 293	6 093	4 665	3 686	2 985	2 467	2 073	1 767	1 523	1 327	1 166	1 033	921	827	746	677	617	564	518	478
	fv	0,10	0,14	0,19	0,25	0,32	0,40	0,48	0,57	0,67	0,78	0,89	1,02	1,15	1,29	1,43	1,59	1,75	1,92	2,10	2,29	2,48
	Fp	1 002	802	668	573	501	445	401	364	334	308	286	267	251	236	223	211	200	191	182	174	167
	fp	0,09	0,13	0,17	0,23	0,28	0,35	0,42	0,49	0,57	0,66	0,76	0,86	0,97	1,08	1,20	1,33	1,46	1,60	1,75	1,90	2,06
40×4	Fv	15 922	11 057	8 124	6 220	4 914	3 981	3 290	2 764	2 355	2 031	1 769	1 555	1 377	1 229	1 103	995	903	822	752	691	637
	fv	0,10	0,14	0,19	0,25	0,32	0,40	0,48	0,57	0,67	0,78	0,89	1,02	1,15	1,29	1,43	1,59	1,75	1,92	2,10	2,29	2,48
	Fp	1 336	1 069	891	764	668	594	535	486	445	411	382	356	334	314	297	281	267	255	243	232	223
	fp	0,09	0,13	0,17	0,23	0,28	0,35	0,42	0,49	0,57	0,66	0,76	0,86	0,97	1,08	1,20	1,33	1,46	1,60	1,75	1,90	2,06
40×5	Fv	19 903	13 821	10 154	7 775	6 143	4 976	4 112	3 455	2 944	2 539	2 211	1 944	1 722	1 536	1 378	1 244	1 128	1 028	941	864	796
	fv	0,10	0,14	0,19	0,25	0,32	0,40	0,48	0,57	0,67	0,78	0,89	1,02	1,15	1,29	1,43	1,59	1,75	1,92	2,10	2,29	2,48
	Fp	1 671	1 336	1 114	955	835	742	668	607	557	514	477	445	418	393	371	352	334	318	304	291	278
	fp	0,09	0,13	0,17	0,23	0,28	0,35	0,42	0,49	0,57	0,66	0,76	0,86	0,97	1,08	1,20	1,33	1,46	1,60	1,75	1,90	2,06

Table 3. Strength table for pitch a=34.3 mm

flat bar	para-meter	Grating span (length), dimension L in mm																				
		500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	2500
50×2	Fv	12 439	8 638	6 347	4 859	3 839	3 110	2 570	2 160	1 840	1 587	1 382	1 215	1 076	960	861	777	705	643	588	540	498
	fv	0,08	0,11	0,16	0,20	0,26	0,32	0,38	0,46	0,54	0,62	0,71	0,81	0,92	1,03	1,15	1,27	1,40	1,54	1,68	1,83	1,98
	Fp	1 028	822	685	587	514	457	411	374	343	316	294	274	257	242	228	216	206	196	187	179	171
	fp	0,07	0,10	0,14	0,18	0,23	0,28	0,33	0,39	0,46	0,53	0,61	0,69	0,77	0,87	0,96	1,06	1,17	1,28	1,40	1,52	1,65
50×3	Fv	18 659	12 958	9 520	7 289	5 759	4 665	3 855	3 239	2 760	2 380	2 073	1 822	1 614	1 440	1 292	1 166	1 058	964	882	810	746
	fv	0,08	0,11	0,16	0,20	0,26	0,32	0,38	0,46	0,54	0,62	0,71	0,81	0,92	1,03	1,15	1,27	1,40	1,54	1,68	1,83	1,98
	Fp	1 542	1 234	1 028	881	771	685	617	561	514	475	441	411	386	363	343	325	308	294	280	268	257
	fp	0,07	0,10	0,14	0,18	0,23	0,28	0,33	0,39	0,46	0,53	0,61	0,69	0,77	0,87	0,96	1,06	1,17	1,28	1,40	1,52	1,65
50×4	Fv	24 879	17 277	12 693	9 718	7 679	6 220	5 140	4 319	3 680	3 173	2 764	2 430	2 152	1 920	1 723	1 555	1 410	1 285	1 176	1 080	995
	fv	0,08	0,11	0,16	0,20	0,26	0,32	0,38	0,46	0,54	0,62	0,71	0,81	0,92	1,03	1,15	1,27	1,40	1,54	1,68	1,83	1,98
	Fp	2 056	1 645	1 371	1 175	1 028	914	822	748	685	633	587	548	514	484	457	433	411	392	374	358	343
	fp	0,07	0,10	0,14	0,18	0,23	0,28	0,33	0,39	0,46	0,53	0,61	0,69	0,77	0,87	0,96	1,06	1,17	1,28	1,40	1,52	1,65
50×5	Fv	31 098	21 596	15 866	12 148	9 598	7 775	6 425	5 399	4 600	3 967	3 455	3 037	2 690	2 400	2 154	1 944	1 763	1 606	1 470	1 350	1 244
	fv	0,08	0,11	0,16	0,20	0,26	0,32	0,38	0,46	0,54	0,62	0,71	0,81	0,92	1,03	1,15	1,27	1,40	1,54	1,68	1,83	1,98
	Fp	2 570	2 056	1 714	1 469	1 285	1 142	1 028	935	857	791	734	685	643	605	571	541	514	490	467	447	428
	fp	0,07	0,10	0,14	0,18	0,23	0,28	0,33	0,39	0,46	0,53	0,61	0,69	0,77	0,87	0,96	1,06	1,17	1,28	1,40	1,52	1,65
60×2	Fv	17 913	12 439	9 139	6 997	5 529	4 478	3 701	3 110	2 650	2 285	1 990	1 749	1 550	1 382	1 240	1 120	1 015	925	847	777	717
	fv	0,07	0,10	0,13	0,17	0,21	0,26	0,32	0,38	0,45	0,52	0,60	0,68	0,76	0,86	0,96	1,06	1,17	1,28	1,40	1,52	1,65
	Fp	1 456	1 164	970	832	728	647	582	529	485	448	416	388	364	342	323	306	291	277	265	253	243
	fp	0,06	0,09	0,12	0,15	0,19	0,23	0,28	0,33	0,38	0,44	0,51	0,57	0,65	0,72	0,80	0,89	0,98	1,07	1,17	1,27	1,37
60×3	Fv	26 869	18 659	13 709	10 496	8 293	6 717	5 551	4 665	3 975	3 427	2 985	2 624	2 324	2 073	1 861	1 679	1 523	1 388	1 270	1 166	1 075
	fv	0,07	0,10	0,13	0,17	0,21	0,26	0,32	0,38	0,45	0,52	0,60	0,68	0,76	0,86	0,96	1,06	1,17	1,28	1,40	1,52	1,65
	Fp	2 183	1 747	1 456	1 248	1 092	970	873	794	728	672	624	582	546	514	485	460	437	416	397	380	364
	fp	0,06	0,09	0,12	0,15	0,19	0,23	0,28	0,33	0,38	0,44	0,51	0,57	0,65	0,72	0,80	0,89	0,98	1,07	1,17	1,27	1,37
60×4	Fv	35 825	24 879	18 278	13 994	11 057	8 956	7 402	6 220	5 300	4 570	3 981	3 499	3 099	2 764	2 481	2 239	2 031	1 850	1 693	1 555	1 433
	fv	0,07	0,10	0,13	0,17	0,21	0,26	0,32	0,38	0,45	0,52	0,60	0,68	0,76	0,86	0,96	1,06	1,17	1,28	1,40	1,52	1,65
	Fp	2 911	2 329	1 941	1 663	1 456	1 294	1 164	1 059	970	896	832	776	728	685	647	613	582	554	529	506	485
	fp	0,06	0,09	0,12	0,15	0,19	0,23	0,28	0,33	0,38	0,44	0,51	0,57	0,65	0,72	0,80	0,89	0,98	1,07	1,17	1,27	1,37
60×5	Fv	44 781	31 098	22 848	17 493	13 821	11 195	9 252	7 775	6 624	5 712	4 976	4 373	3 874	3 455	3 101	2 799	2 539	2 313	2 116	1 944	1 791
	fv	0,07	0,10	0,13	0,17	0,21	0,26	0,32	0,38	0,45	0,52	0,60	0,68	0,76	0,86	0,96	1,06	1,17	1,28	1,40	1,52	1,65
	Fp	3 639	2 911	2 426	2 079	1 819	1 617	1 456	1 323	1 213	1 120	1 040	970	910	856	809	766	728	693	662	633	606
	fp	0,06	0,09	0,12	0,15	0,19	0,23	0,28	0,33	0,38	0,44	0,51	0,57	0,65	0,72	0,80	0,89	0,98	1,07	1,17	1,27	1,37
70×2	Fv	24 381	16 931	12 439	9 524	7 525	6 095	5 037	4 233	3 607	3 110	2 709	2 381	2 109	1 881	1 688	1 524	1 382	1 259	1 152	1 058	975
	fv	0,06	0,08	0,11	0,15	0,18	0,23	0,27	0,33	0,38	0,44	0,51	0,58	0,66	0,73	0,82	0,91	1,00	1,10	1,20	1,31	1,42
	Fp	1 950	1 560	1 300	1 114	975	867	780	709	650	600	557	520	487	459	433	410	390	371	355	339	325
	fp	0,05	0,07	0,10	0,13	0,16	0,20	0,24	0,28	0,33	0,38	0,43	0,49	0,55	0,62	0,69	0,76	0,84	0,92	1,00	1,09	1,18
70×3	Fv	36 571	25 397	18 659	14 286	11 287	9 143	7 556	6 349	5 410	4 665	4 063	3 571	3 164	2 822	2 533	2 286	2 073	1 889	1 728	1 587	1 463
	fv	0,06	0,08	0,11	0,15	0,18	0,23	0,27	0,33	0,38	0,44	0,51	0,58	0,66	0,73	0,82	0,91	1,00	1,10	1,20	1,31	1,42
	Fp	2 925	2 340	1 950	1 671	1 462	1 300	1 170	1 064	975	900	836	780	731	688	650	616	585	557	532	509	487
	fp	0,05	0,07	0,10	0,13	0,16	0,20	0,24	0,28	0,33	0,38	0,43	0,49	0,55	0,62	0,69	0,76	0,84	0,92	1,00	1,09	1,18
70×4	Fv	48 762	33 862	24 879	19 048	15 050	12 190	10 075	8 466	7 213	6 220	5 418	4 762	4 218	3 762	3 377	3 048	2 764	2 519	2 304	2 116	1 950
	fv	0,06	0,08	0,11	0,15	0,18	0,23	0,27	0,33	0,38	0,44	0,51	0,58	0,66	0,73	0,82	0,91	1,00	1,10	1,20	1,31	1,42
	Fp	3 900	3 120	2 600	2 228	1 950	1 733	1 560	1 418	1 300	1 200	1 114	1 040	975	918	867	821	780	743	709	678	650
	fp	0,05	0,07	0,10	0,13	0,16	0,20	0,24	0,28	0,33	0,38	0,43	0,49	0,55	0,62	0,69	0,76	0,84	0,92	1,00	1,09	1,18
70×5	Fv	60 952	42 328	31 098	23 810	18 812	15 238	12 593	10 582	9 017	7 775	6 772	5 952	5 273	4 703	4 221	3 810	3 455	3 148	2 881	2 646	2 438
	fv	0,06	0,08	0,11	0,15	0,18	0,23	0,27	0,33	0,38	0,44	0,51	0,58	0,66	0,73	0,82	0,91	1,00	1,10	1,20	1,31	1,42
	Fp	4 874	3 900	3 250	2 785	2 437	2 166	1 950	1 773	1 625	1 500	1 393	1 300	1 219	1 147	1 083	1 026	975	928	886	848	812
	fp	0,05	0,07	0,10	0,13	0,16	0,20	0,24	0,28	0,33	0,38	0,43	0,49	0,55	0,62	0,69	0,76	0,84	0,92	1,00	1,09	1,18

Legend to Table 3:

Fv – continuous load value, daN/m^2,
fv – deflection from Fv load,
Fp – value of concentrated load per 200x200 mm area, daN,
fp – deflection from Fp load,

4.6.2. For pitch a=15.08 mm; a=30.15 mm

Diagram for the calculation of the characteristic resistance for gratings using load-bearing bars h = (20÷30) mm, with bearing bar spacing a = 30.15 mm

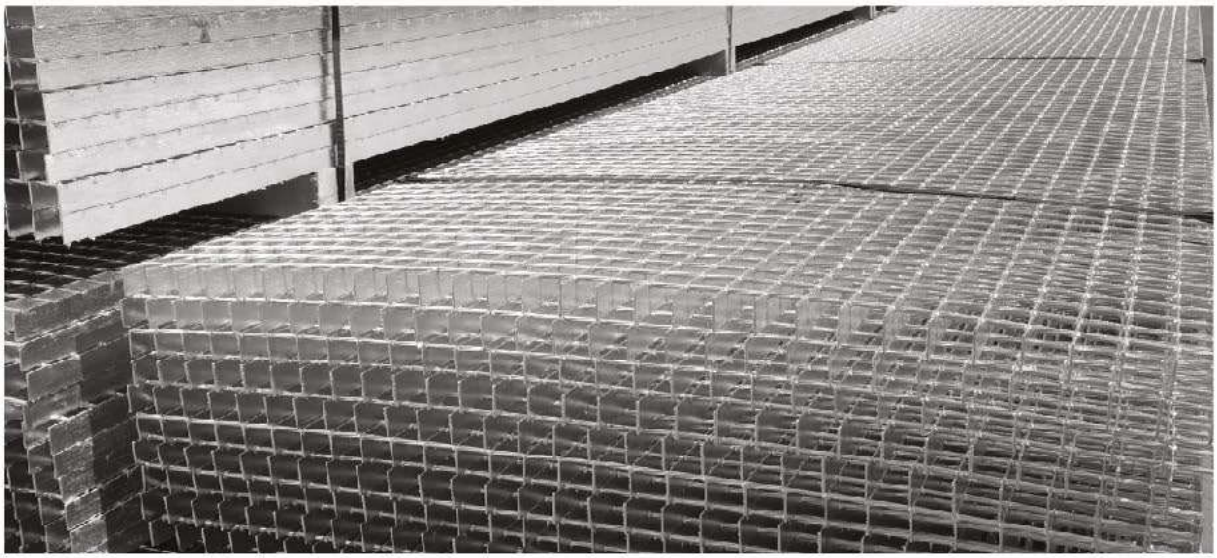
Fv – continuous load value, daN/m²
Fp – value of concentrated load per 200x200 mm area, daN
fv – load deflection Fv, cm
fp – load deflection Fp, cm

Template:

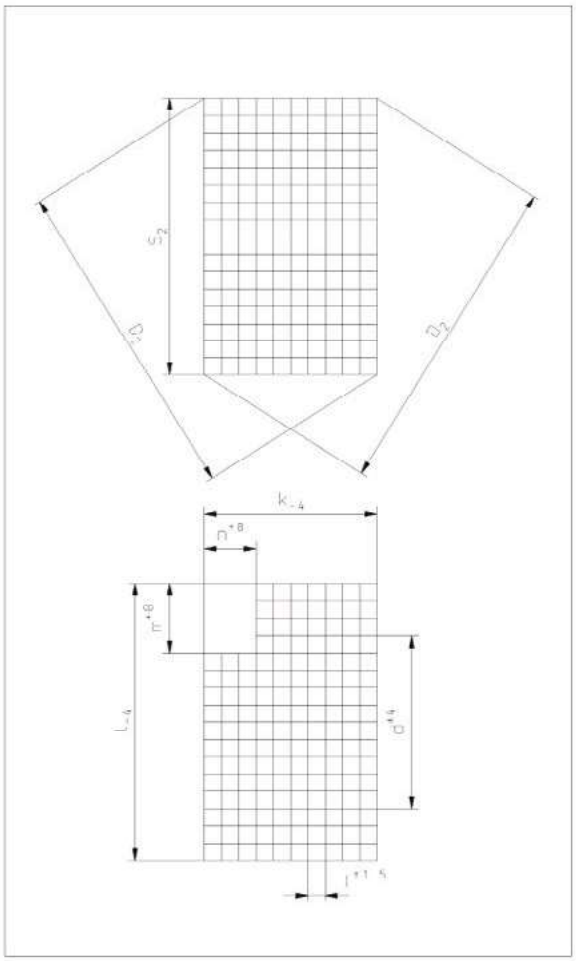
Table 4. Coefficients for the calculation of load values for gratings with pitch a=15, I and a=30,2		
Pitch:	a=15,1	a=30,2
Coefficients for the calculation of Fv:	2,3	1,2
Coefficients for calculating Fp:	2,6	1,13

Legend to Table 4:

Fv – continuous load value, daN/m²
Fp – value of concentrated load per 200x200 mm area, daN



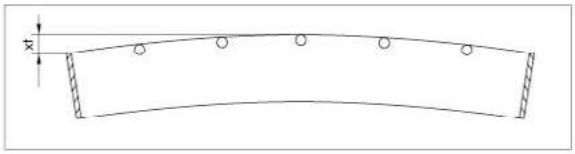
4.7. Manufacturing tolerances of the gratings



Important fact:	Permissible dimensional deviations d — measurement through 10 meshes

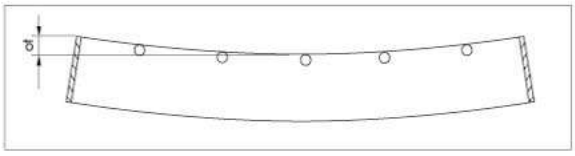
Permissible tolerances for the gratings (for unloaded gratings)

Fig. 17. Convexity deviation diagram



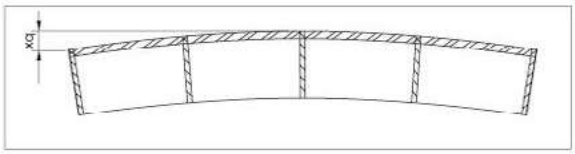
Important fact:	Convexity deviation xt max = 1/150 length for dimensions > 450 mm; max. 8 mm for dimensions < 450 mm; max. 3 mm

Fig. 18. Concave deviation diagram



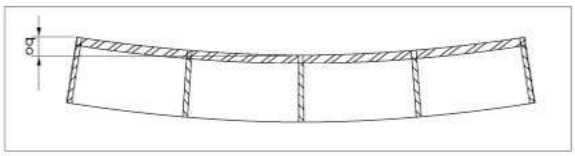
Important fact:	Concavity deviation ot max. = 1/200 length for dimensions > 600 mm; max. 8 mm for dimensions < 600 mm; max. 3 mm

Fig. 19. Convexity deviation diagram



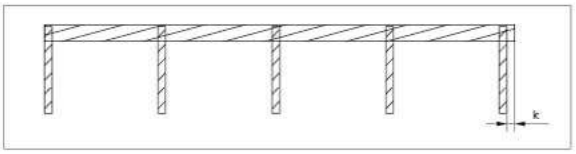
Important fact:	Convexity deviation xq max = 1/150 length for dimensions > 450 mm; max. 8 mm for dimensions < 450 mm; max. 3 mm

Fig. 20. Concave deviation diagram



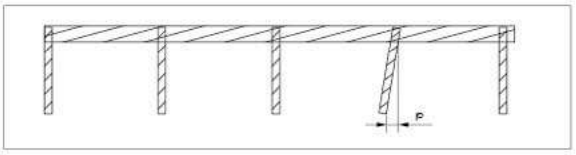
Important fact:	Concavity deviation oq max. = 1/200 length for dimensions > 600 mm; max. 8 mm for dimensions < 600 mm; max. 3 mm

Fig. 21. Protruding crossbar or framing



Important fact:	Projecting transverse bar or framing k_{max} = 0.5 mm

Fig. 22. Cutting of bearing bars and framing

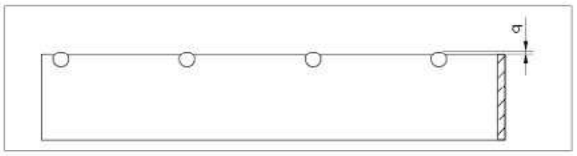


Important fact:	Tilting of load-bearing flat bars and framing p_{max} = 0.1 x h maximum 3 mm

Fig. 23. Bevel of cutting of load bearing flat bars in relation to the transverse bar

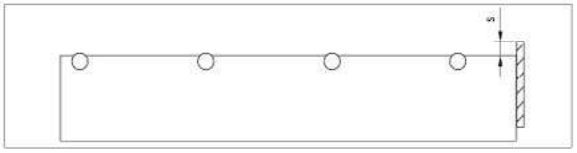
Important fact:	Bevel of cutting of load bearing flat bars in relation to the transverse bar

Fig. 24. Cross bar projection



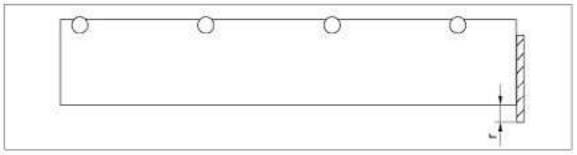
Important fact:	Cross bar projection q_{max} = 1,5mm

Fig. 25. Upwardly projecting edge



Important fact:	Upwardly projecting edge s_{max} = 1,0mm

Fig. 26. Downward projecting edge



Important fact:	Downward projecting edge r_{max} = 1,0mm

5. Stair tread

A stair tread can be built on a platform grating acting as a base: STD, SERR, SM, WBB, SERR-WBB, SERR-SM, with the difference that it is equipped with a special side frame for quick and easy assembly to the supporting structure ("stair tread side"). Also equipped with an anti-slip face strip created by a special perforation on the upper surface.

Important fact:	Dimensional tolerances B + / - 5 mm Dimensional tolerances L + 0 / - 4 mm

Fig. 27. STD stair tread

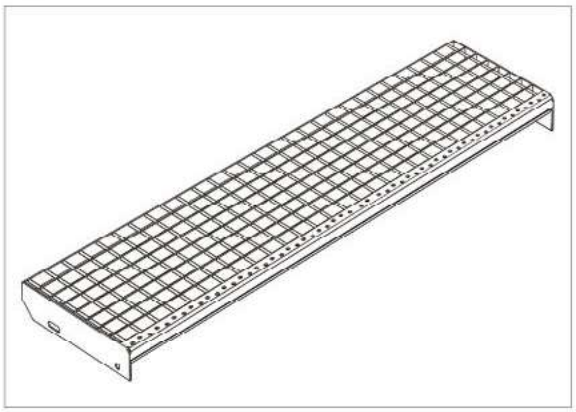


Table 5. Typical dimensions of a stair tread (mm)																										
l	600					800					900					1000					1200						
B	205	240	270	295	305	205	240	270	295	305	205	240	270	295	305	205	240	270	295	305	205	240	270	295	305	
h	Type of load bearing flat bar																									
n	120	120	150	180	180	120	120	150	180	180	120	120	150	180	180	120	120	150	180	180	120	120	150	180	180	

*on special order and for sufficient quantities, the stair treads can be produced in other than standard lengths L as well as side widths. Information on available options is available from our sales staff.

5.1. Design of a stair tread

Termetal has more than a dozen types of stair treads in its range due to the selection of the finishing elements used:

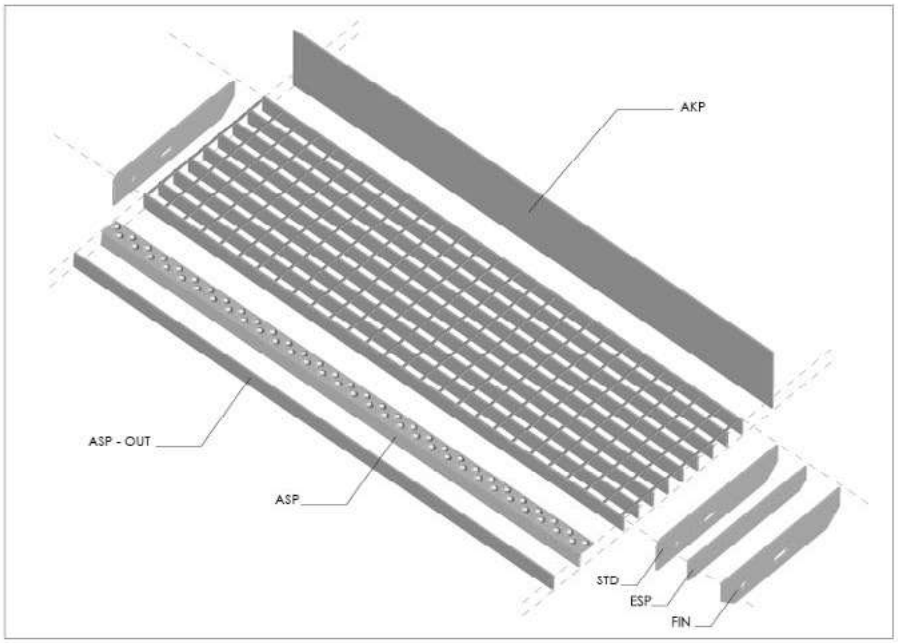


Fig. 28. Anti-slip strip (ASP)

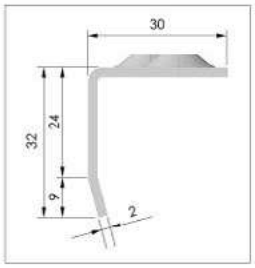
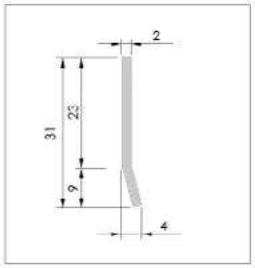


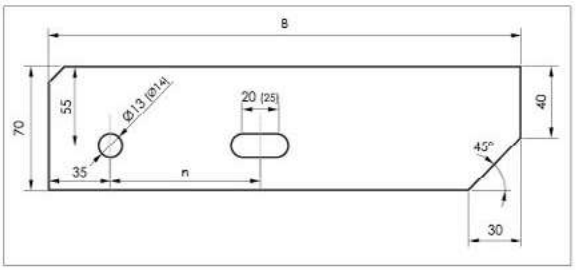
Fig. 29. ASP-OUT strip

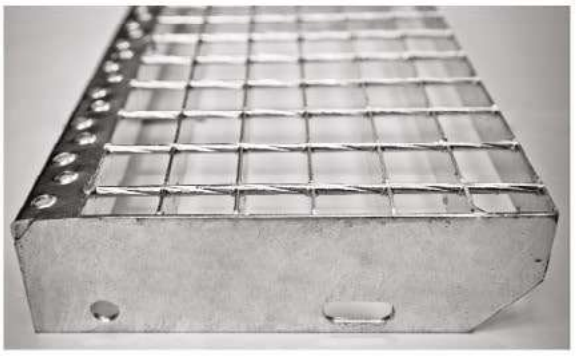


5.1.1. Standard stair tread (SOZ)

As mentioned earlier, the SOZ stair treads can be made using platform grating as a base: STD, SERR, SM, WBB, SERR-WBB, SERR-SM.
In the SOZ stair tread, there is STD side plate and an anti-slip (ASP) or ASP-OUT strip.

Fig. 30. Side of an STP stair tread

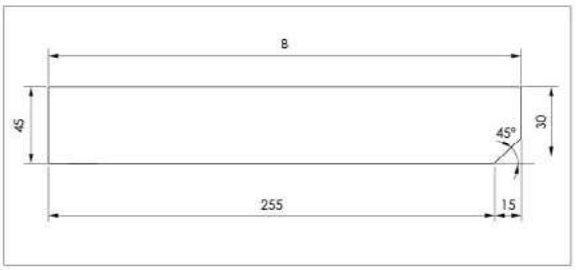




5.1.2. ESP stair tread

The ESP stair treads can also be made using platform grating as a base: STD, SERR, SM, WBB, SERR-WBB, SERR-SM.
In the ESP stair tread, there is ESP side plate and an anti-slip (ASP) or ASP-OUT strip.

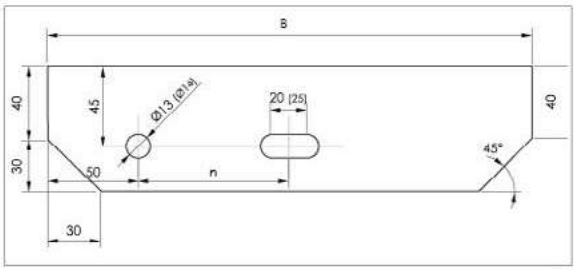
Fig. 31. Side of a ESP stair tread



5.1.3 FIN stair tread

The FIN stair treads can also be made using platform grating as a base: STD, SERR, SM, WBB, SERR-WBB, SERR-SM.
In the FIN stair tread, there is FIN side plate and an anti-slip (ASP) or ASP-OUT strip.

Fig. 32. Side of a FIN stair tread



6. Landings

The landing is similar in design to a stair tread. The main difference is the size of the grating used. The dimensions of the side framing are also usually larger, and consequently the mounting holes there have a different spacing Fig. 33.
The landings are available in the same combinations as SO7, STD, SFRR, SM, WBB, etc.

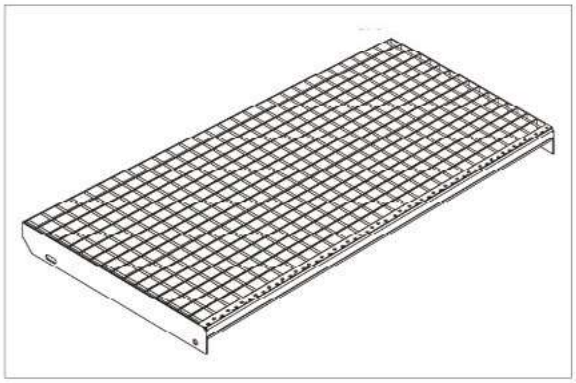
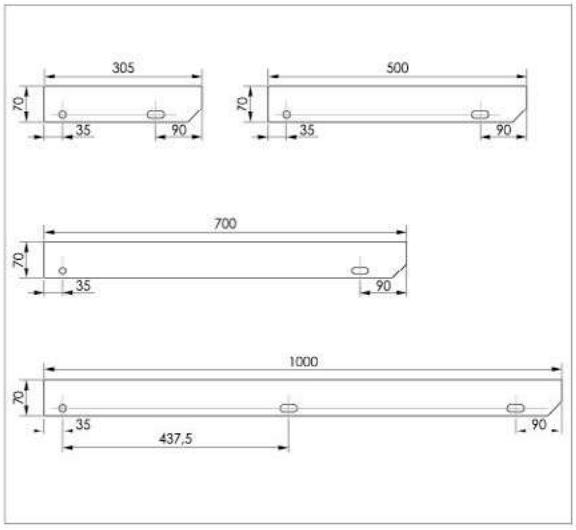


Fig. 33. Diagram showing the different side frames for the landing

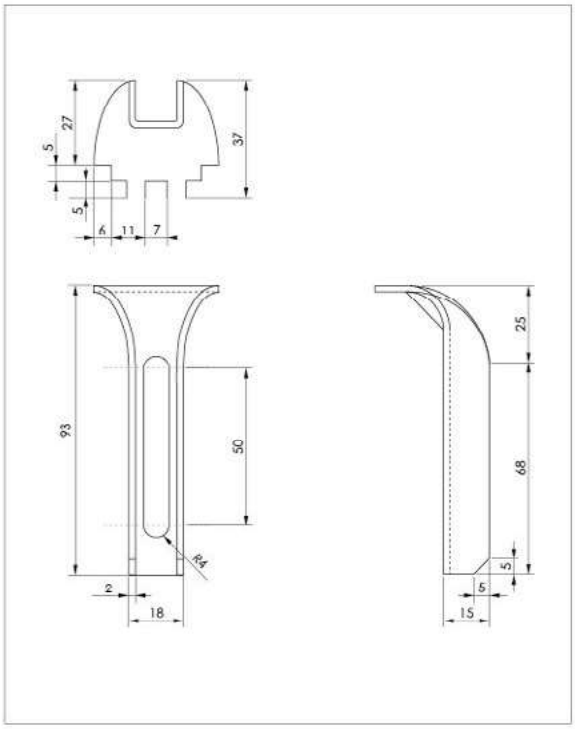


7. Grid mounting brackets

7.1. Standard bracket

Standard bracket — this is a handle for basic use. It consists of an M-shaped upper part (Fig. 35 and 36) or an insulation washer (Fig. 37), a lower part and an M8 fastening screw.

Fig. 34. Diagram of the Standard Bracket



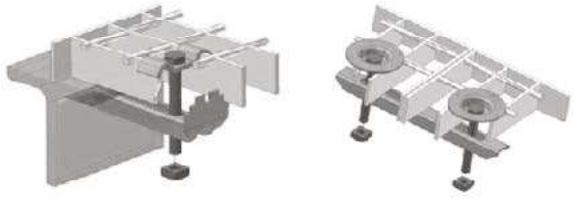


Fig. 35. Diagram of the top section of the M-shaped bracket

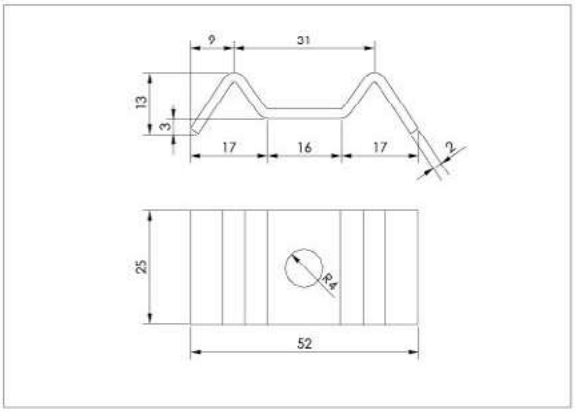


Fig. 36. Diagram of the upper part of the M-shaped bracket version II

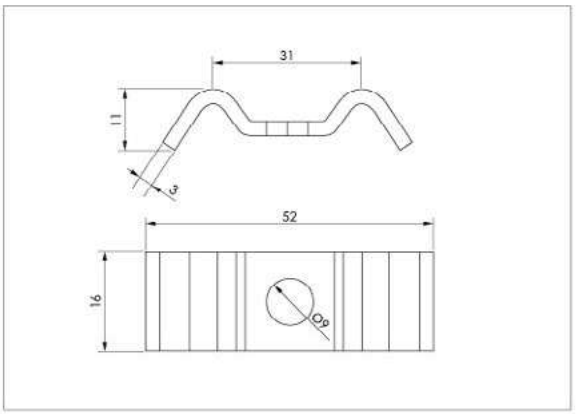


Fig. 37. Diagram of the upper part of the bracket "insulation washer"

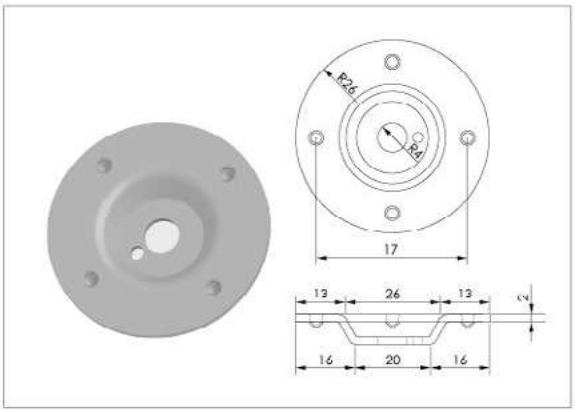
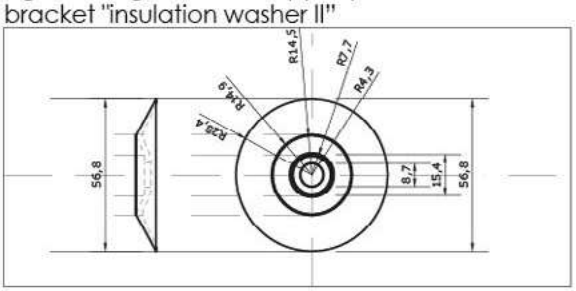


Fig. 38. Diagram of the upper part of the bracket "insulation washer II"

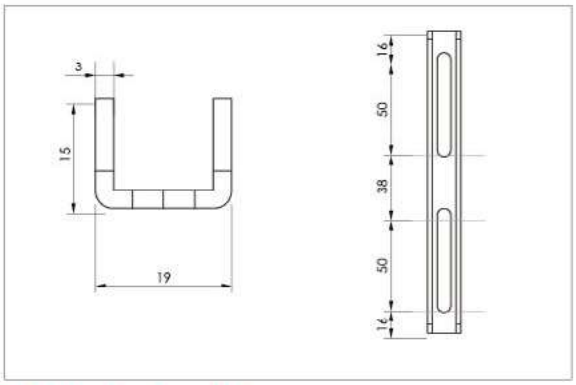


7.2. Clip-on bracket

Clip bracket — a holder used to connect gratings between each other. The use of clip holder prevents excessive bending of the grating, the so-called buckling.

The bracket consists of two upper elements one lower element and two M8 screws.

Fig. 39. Diagram of the clip-on bracket



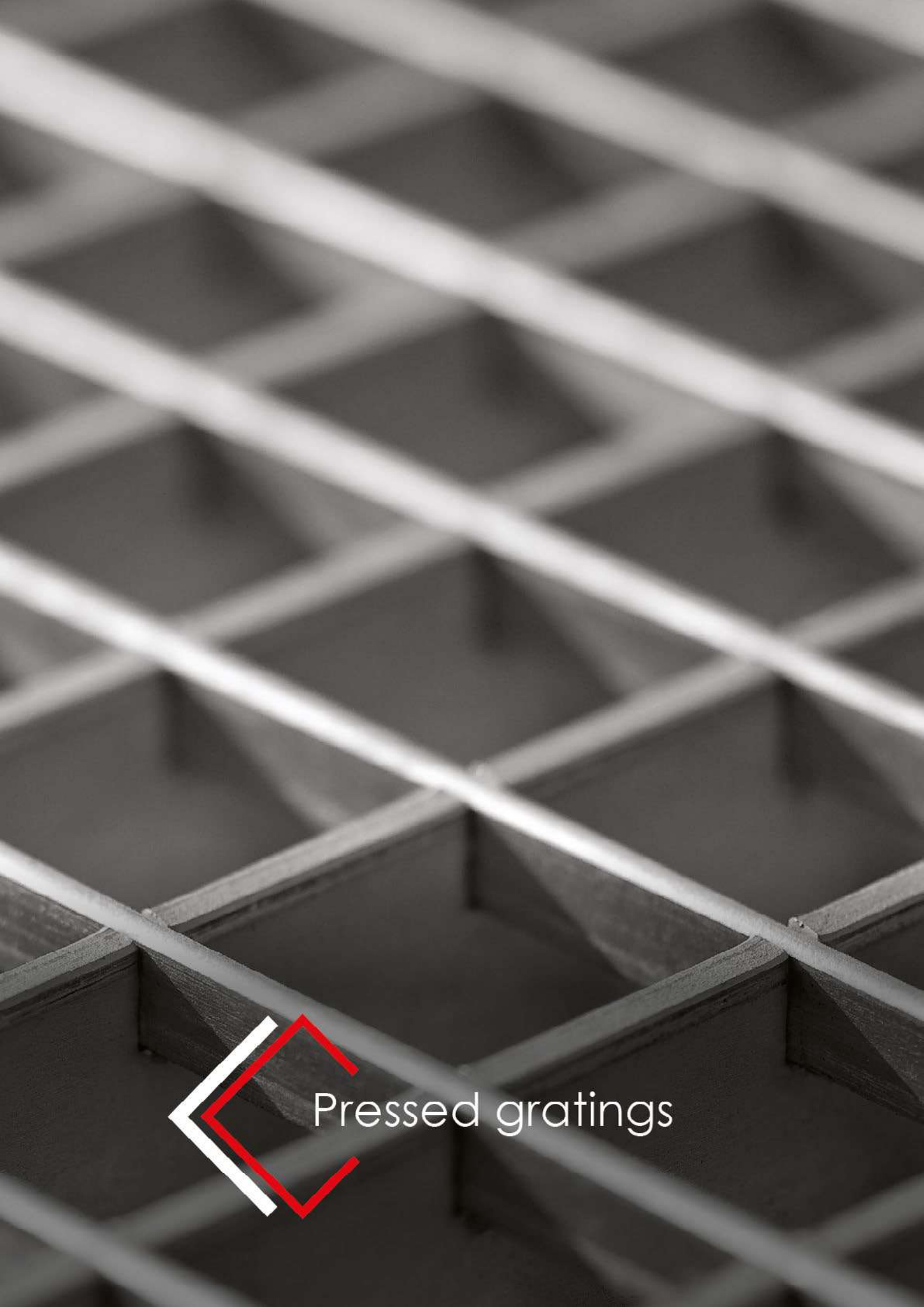
7.3. Hook bracket

This is a bracket that replaces the standard bracket when structural considerations for the load-bearing platform require it.
It consists of an M-shaped upper part or insulation washer, a lower part made with an 8 mm diameter thread, ending on one side with an M8 thread and on the other side with a suitably shaped hook.

Fig. 39. Hook bracket

7.4. Holders for pressed gratings

The pressed gratings use the same fixing elements as for welded gratings, taking into account the appropriate component sizes to fit into the mesh with the spacing of the flat bars: 11,22, 33, 44, 55 and 66.



Pressed gratings

Pressed gratings

1.1. Production technology

In 2016, Termetal started producing pressed gratings and stair treads using the latest automatic production line. In this way, the company has ensured that it is able to provide a comprehensive service to contractors and also to select the right products to meet the needs reported by the market.
The gratings have a positive assessment from the National technical approval ITB-KOT and are manufactured in accordance with DIN 24537, DIN 24531 and RAL GZ638.

The pressed grating consists of supporting flat bars and cross bars. They are formed by notching load bearing flat bars and pressing cross bars into them under pressures of up to 800 tonnes.
This method of grating production ensures an even and precise distribution of the meshes, which in turn is characterised by high manufacturing aesthetics. On the other hand, the combined load-bearing and transverse flat bars in the pressing-in process result in a very stable grating surface.
This type of grating can be used for:

- footbridges inside industrial and storage facilities,
- sewer covers and manhole protection,
- coverings of footpaths on bridges and footbridges,
- as elements of the internal and external façades of buildings,
- in recent years, there has also been an increase in the use of gratings as decorative and ornamental elements.

1.2. Materials

Similarly to welded gratings, the pressed gratings are made of S235 steel according to EN 10025:2007.
When cold-rolled flat bar is used, the material is wire rod from S235 steel and related grades.

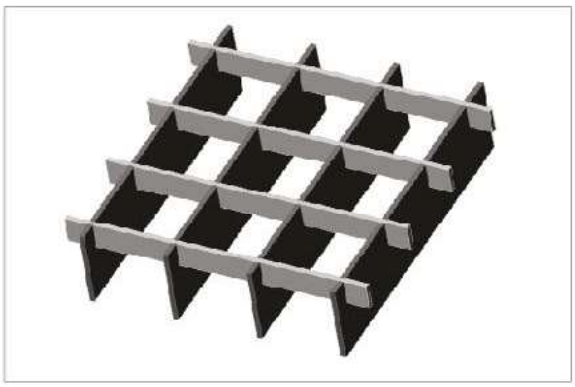
1.3. Anti-corrosion treatment

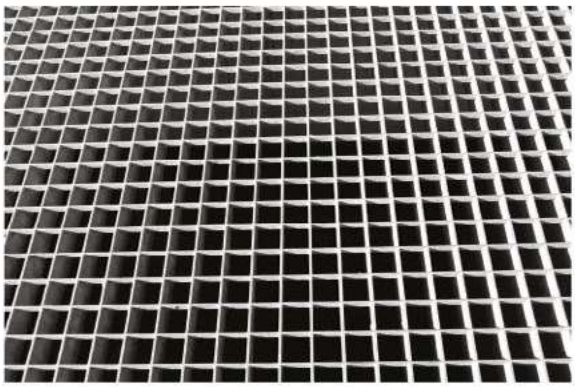
At the customer's request, the gratings are protected against corrosion using hot-dip galvanizing according to PN EN ISO 1461. We use two galvanizing plants of the Termetal Group in Piła and Grudziądz. The minimum thickness of the zinc coating for components up to 3 mm thick is not less than 45 µm and 55 µm for 35 mm thick components. The gratings can also be made without a corrosion protection coating if the customer requests it, e.g. for further processing.

2. Types of gratings

2.1. Standard pressed grating

The pressed gratings are manufactured in the dimensions agreed between the Manufacturer and the Customer at the time of ordering. As standard, however, the maximum dimensions of the pressed gratings made on the line at TERMETAL are 1700 mm wide and 3000 mm long.
Supporting flat bars used in the manufacture of pressed gratings can be 25-40 mm high and 25-40 mm thick, and are connected by 10x2 mm cross flats.

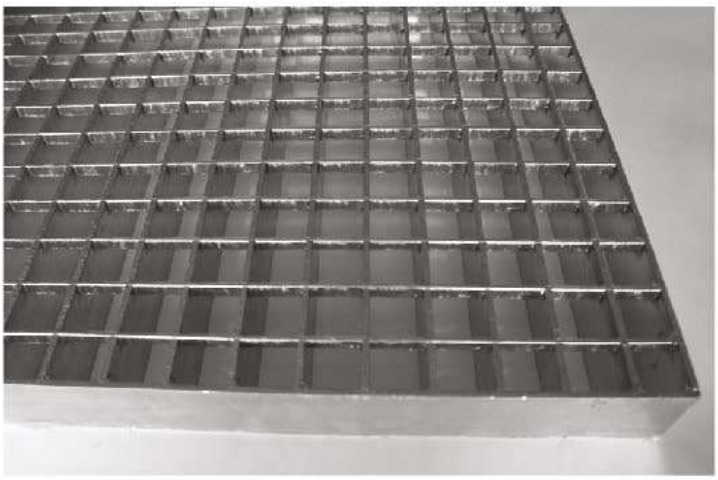




3. Types of framing

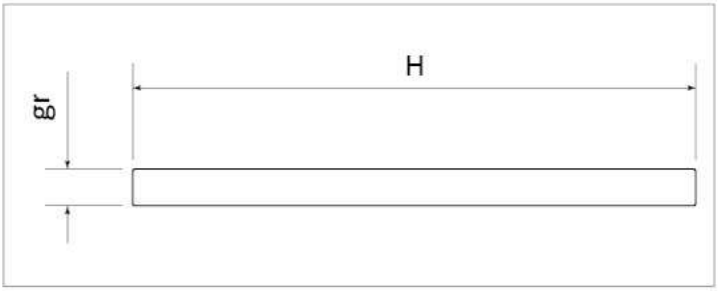
Both pressed-in and welded frames can be used for pressed gratings.

A pressed grating with welded frame.



Welded framing.

Fig. 41. Cross-section of the welded frame



4. Types of mesh

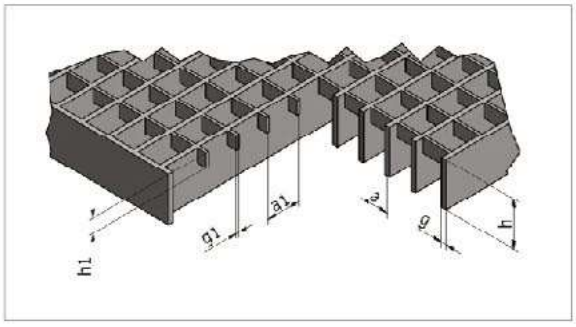
The mesh division used in pressed gratings is given below:

		a - L (PN)								
		22,2	33,3	44,4	55,5	66,6	77,7	88,8	99,9	111,1
b - (PP)	11,1	x	x	x	x	x	x	x	x	x
	22,2	x	x	x	x	x	x	x	x	x
	33,3	x	x	x	x	x	x	x	x	x
	44,4	x	x	x	x	x	x	x	x	x
	55,5	x	x	x	x	x	x	x	x	x
	66,6	x	x	x	x	x	x	x	x	x
	77,7	x	x	x	x	x	x	x	x	x
	88,8	x	x	x	x	x	x	x	x	x
	99,9	x	x	x	x	x	x	x	x	x
	111	x	x	x	x	x	x	x	x	x

where:
a — axial spacing of load-bearing flat bars,
b — axial spacing of transverse flat bars.

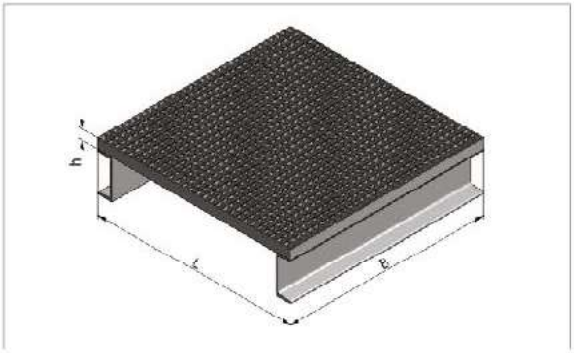
We can also manufacture TERMETAL gratings and stair treads in a different module than the specified basic modules with a multiple of 11.1 mm.

Fig. 42. Selection of TERMETAL pressed gratings in terms of mesh size



a — mesh of load-bearing flat bar
a1 — mesh of transverse flat bar
h — height of load-bearing flat bar
g — thickness of load-bearing flat bar
hl — height of transverse flat bar
gl — thickness of transverse flat bar

Fig. 43. Platform grating



B — width of grating (transverse flat bar)
L — length of grating (supporting flat bars)
h — height of supporting flat bars

5. Gratings load table

Characteristic load bearing parameters of TERMETAL pressed gratings for pitch a = 33.3 mm

Table 1.

Flat bar	Para-meter	Grating span (length), dimension L in mm																				
		500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	2500
25×2	Fv	3110	2160	1587	1215	960	777	643	540	460	397	346	304	269	240	215	194	176	161	147	135	124
	fv	0,16	0,23	0,31	0,41	0,51	0,63	0,77	0,91	1,07	1,24	1,43	1,63	1,83	2,06	2,29	2,54	2,8	3,07	3,36	3,66	3,97
	Fp	267	214	178	153	134	119	107	97	89	82	76	71	67	63	59	56	53	51	49	46	45
	fp	0,15	0,21	0,28	0,36	0,45	0,55	0,67	0,79	0,92	1,06	1,21	1,38	1,55	1,73	1,93	2,13	2,34	2,57	2,8	3,04	3,3
25×3	Fv	4665	3239	2380	1822	1440	1166	964	810	690	595	518	456	404	360	323	292	264	241	220	202	187
	fv	0,16	0,23	0,31	0,41	0,51	0,63	0,77	0,91	1,07	1,24	1,43	1,63	1,83	2,06	2,29	2,54	2,8	3,07	3,36	3,66	3,97
	Fp	401	321	267	229	201	178	160	146	134	123	115	107	100	94	89	84	80	76	73	70	67
	fp	0,15	0,21	0,28	0,36	0,45	0,55	0,67	0,79	0,92	1,06	1,21	1,38	1,55	1,73	1,93	2,13	2,34	2,57	2,8	3,04	3,3
30×2	Fv	4478	3110	2285	1749	1382	1120	925	777	662	571	498	437	387	346	310	280	254	231	212	194	179
	fv	0,13	0,19	0,26	0,34	0,43	0,53	0,64	0,76	0,89	1,04	1,19	1,35	1,53	1,71	1,91	2,12	2,33	2,56	2,8	3,05	3,31
	Fp	382	306	255	218	191	170	153	139	127	118	109	102	96	90	85	80	76	73	69	66	64
	fp	0,12	0,17	0,23	0,3	0,38	0,46	0,55	0,66	0,77	0,88	1,01	1,15	1,29	1,44	1,6	1,77	1,95	2,14	2,33	2,54	2,75
30×3	Fv	6717	4665	3427	2624	2073	1679	1388	1166	994	857	746	656	581	518	465	420	381	347	317	292	269
	fv	0,13	0,19	0,26	0,34	0,43	0,53	0,64	0,76	0,89	1,04	1,19	1,35	1,53	1,71	1,91	2,12	2,33	2,56	2,8	3,05	3,31
	Fp	573	459	382	328	287	255	229	208	191	176	164	153	143	135	127	121	115	109	104	100	96
	fp	0,12	0,17	0,23	0,3	0,38	0,46	0,55	0,66	0,77	0,88	1,01	1,15	1,29	1,44	1,6	1,77	1,95	2,14	2,33	2,54	2,75
40×2	Fv	7961	5529	4062	3110	2457	1990	1645	1382	1178	1015	885	777	689	614	551	498	451	411	376	346	318
	fv	0,1	0,14	0,19	0,25	0,32	0,4	0,48	0,57	0,67	0,78	0,89	1,02	1,15	1,29	1,43	1,59	1,75	1,92	2,1	2,29	2,48
	Fp	668	535	445	382	334	297	267	243	223	206	191	178	167	157	148	141	134	127	121	116	111
	fp	0,09	0,13	0,17	0,23	0,28	0,35	0,42	0,49	0,57	0,66	0,76	0,86	0,97	1,08	1,2	1,33	1,46	1,6	1,75	1,9	2,06
40×3	Fv	11942	8293	6093	4665	3686	2985	2467	2073	1767	1523	1327	1166	1033	921	827	746	677	617	564	518	478
	fv	0,1	0,14	0,19	0,25	0,32	0,4	0,48	0,57	0,67	0,78	0,89	1,02	1,15	1,29	1,43	1,59	1,75	1,92	2,1	2,29	2,48
	Fp	1002	802	668	573	501	445	401	364	334	308	286	267	251	236	223	211	200	191	182	174	167
		0,09	0,13	0,17	0,23	0,28	0,35	0,42	0,49	0,57	0,66	0,76	0,86	0,97	1,08	1,2	1,33	1,46	1,6	1,75	1,9	2,06

5. Gratings load table

Fv — continuous load value, daN/m
Fp — value of concentrated load per 200x200 mm area, daN
fv — deflection from Fv load, cm,
fp — deflection from Fp load, cm

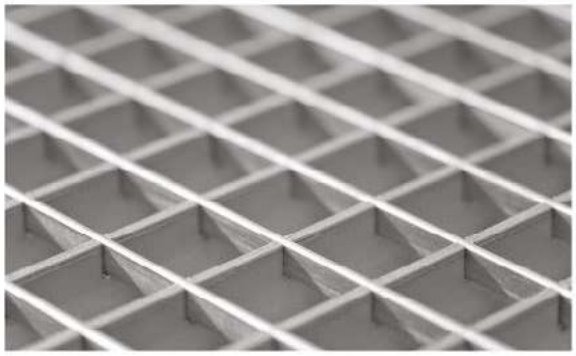
Table 2. Coefficients for the calculation of load values for gratings with pitch "a"						
Pitch a	11,1	22,2	33,3	44,4	55,5	66,6
Coefficients for calculating the forces Γv and Γp	**2,93**	**1,48**	**1**	**0,74**	**0,61**	**0,52**

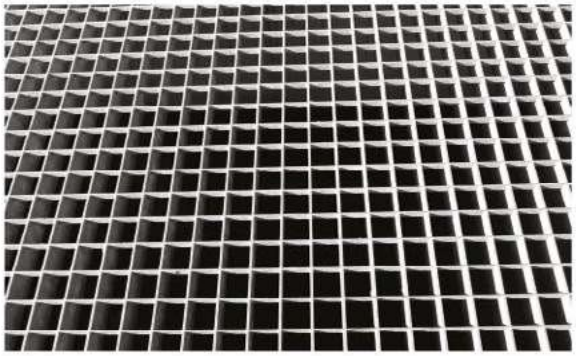
Legend to Table 2:
Fv — continuous load valuc, daN/m²
Fp value of concentrated load per 200*200 mm area, daN

The strength values of gratings with a pitch other than 33.3 mm should be calculated according to the following scheme:

strength value for the graling with pitch a=33.3 X according to table	X	coefficient for the selected pitch	=	strength value for the grating of the selected pitch

Fv — continuous load value, daN/m2
Fp value of concentrated load on the surface 200*200 mm daN, fv deflection from load Fv, cm
fp — deflection from load Fp, cm

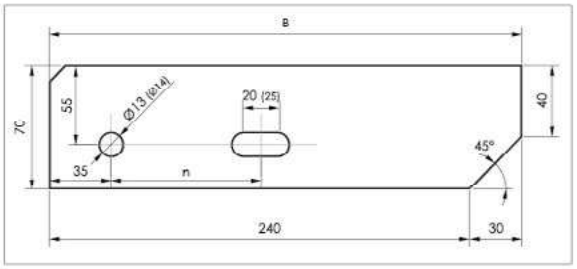




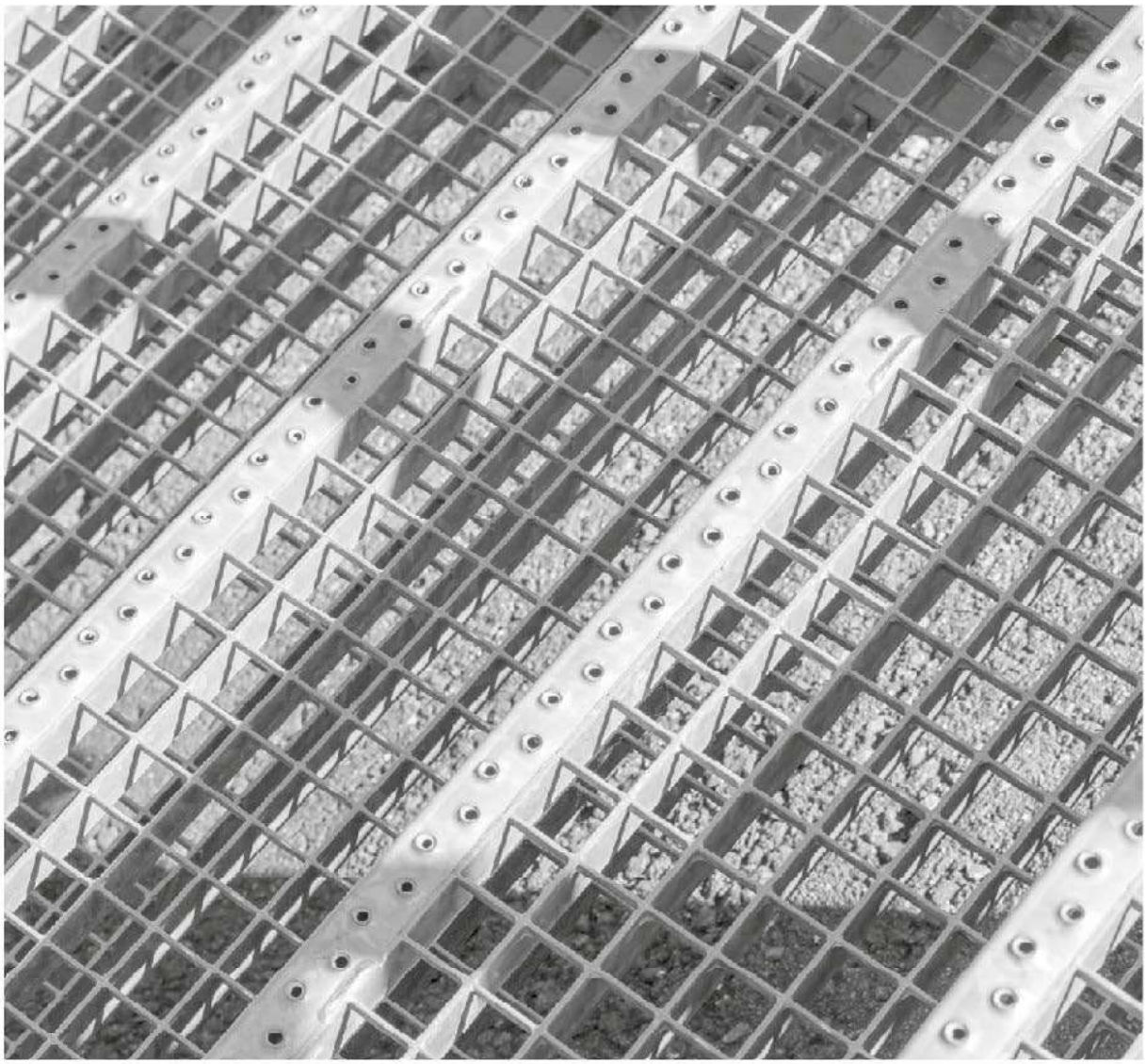
6. Stair tread

The stair treads made of pressed gratings can be manufactured in the available range of meshes and supporting flat bars in agreement with the manufacturer. Similarly to the stair treads placed on the welded grating, they are equipped with a side frame, the so called "side plate", which enab les quick and easy assembly to the supporting structure. They also have an anti-slip face strip, which fulfils its properties thanks to a special perfo-ration on the upper surface.

Fig. 4. Standard side plate on a stair tread



Pressed stair tread range (mm)																																
L	600					800					900					1000					1200					1400							
B	200	240	270	295	305	200	240	270	295	305	200	240	270	295	305	200	240	270	295	305	200	240	270	295	305	200	240	270	295	305		
h	Type of load bearing flat bar																															
n	120	120	150	180	180	120	120	150	180	180	120	120	150	180	180	120	120	150	180	180	120	120	150	180	180	120	120	150	180	180		



Flat bar

Flat bar

Since July 2012, we have had the most modern line in Poland for the production of PN EN 10139 cold-rolled narrow strip, commonly referred to as cold-rolled flat bar. Ensures excellent quality parameters through constant monitoring of actual dimensions and automatic corrections during the rolling process. Thanks to the technology used, we are able to carry out production orders that are precisely tailored to the customer's needs.

1. Production program

We offer cold-rolled narrow strip — cold-rolled flat bar, which meets the dimensional and shape tolerance requirements according to PN EN 10140. The flat bar is made from a steel grade according to the customer's needs.

The product range includes the following products:

Cold-rolled flat bar with the following dimensions:

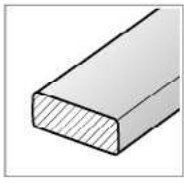
10x2, 15x2, 20x2, 25x2, 30x2 mm
10x3, 15x3, 20x3, 25x3, 30x3 mm
10x4, 15x4, 20x4, 25x4, 30x4 mm
10x5, 15x5, 20x5, 25x5, 30x5 mm
10x6, 15x6, 20x6, 25x6

and any intermediate dimension in between.

The minimum dimension of the flat bars available: 9x1.9 mm.

2. Types of flat bar edges

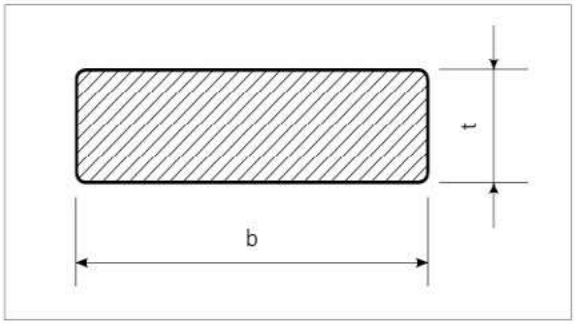
The edges of the flat bar can be rounded or straight.



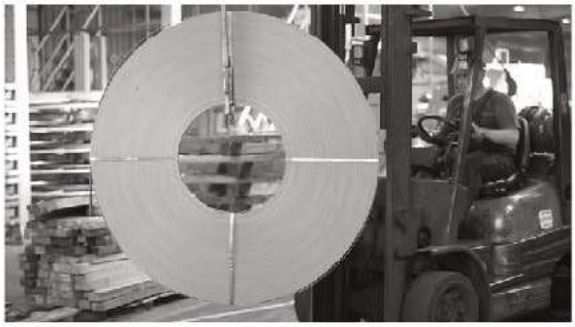
3. Tolerances

The products are manufactured to the following dimensional tolerances for width and thickness in accordance with PN EN 10140:

b ± 0,20 mm
t ± 0,045 mm



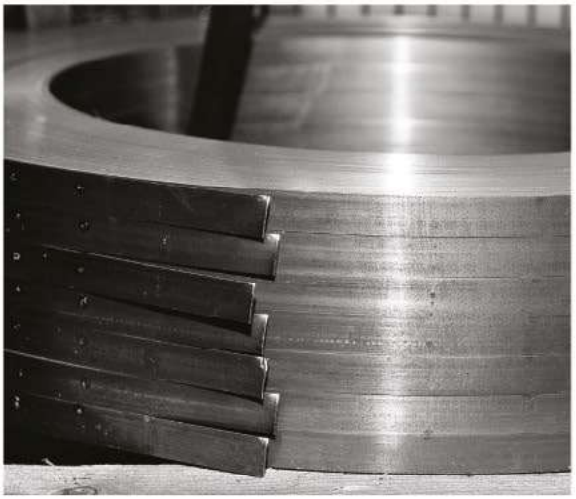
We can produce the flat bar in a different tolerance agreed in advance.



4. Confectioning

The flat bars are prepared and packaged as follows:

- in coils with an inner diameter of 600 mm and an outer diameter of max. 1800 mm, the weight of a single coil does not exceed 0.4 Mg (t)
- in spools (the weight of a single spool to be agreed individually)
- in any length L not exceeding 3500 mm



5. Weight of cold-rolled flat bars

Width b (mm)		Thickness t (mm)			
		2	3	4	5
		Theoretical mass 1 m (kg)			
flat bar	10	0,16	0,24	0,31	0,39
	15	0,24	0,35	0,47	0,59
	20	0,31	0,47	0,63	0,79
	25	0,39	0,59	0,79	0,98
	30	0,47	0,71	0,94	1,18
Density assumed for calculation 7.85 kg/dm^3					

6. Commercial terms

Contract-completion date:
- products in stock up to 48 hours
- products requiring production from 3 to 21 days.

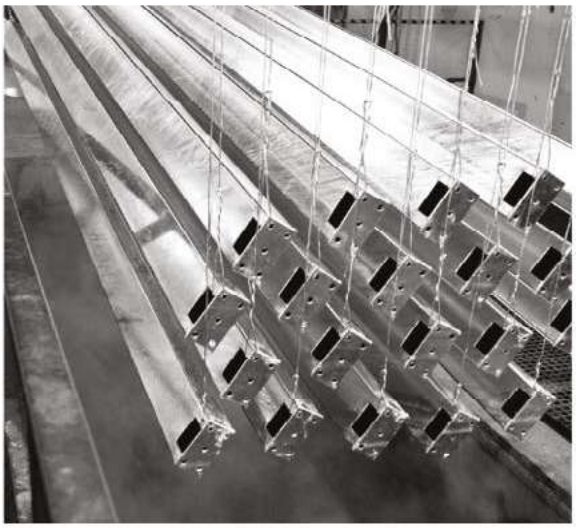
Special orders require individual arrangements.


Zinc coating

Zinc coating

1. Corrosion protection

Corrosion, in other words the oxidation of iron in steel, is a well-known and troublesome one as long as steel products are used. When steel products are inadequately protected against external influences are characterised by a reduced service life due to safety or aesthetic reasons. Various methods are used in practice to prevent these adverse effects. However, they all have relatively short-lived effectiveness as well as failing to meet all expectations under certain conditions. It is difficult to select an anticorrosive product so that it is resistant to most external environmental factors, has a certain resistance to physical factors such as abrasion, temperature differences and many others, and makes the product aesthetically pleasing in terms of its external appearance.

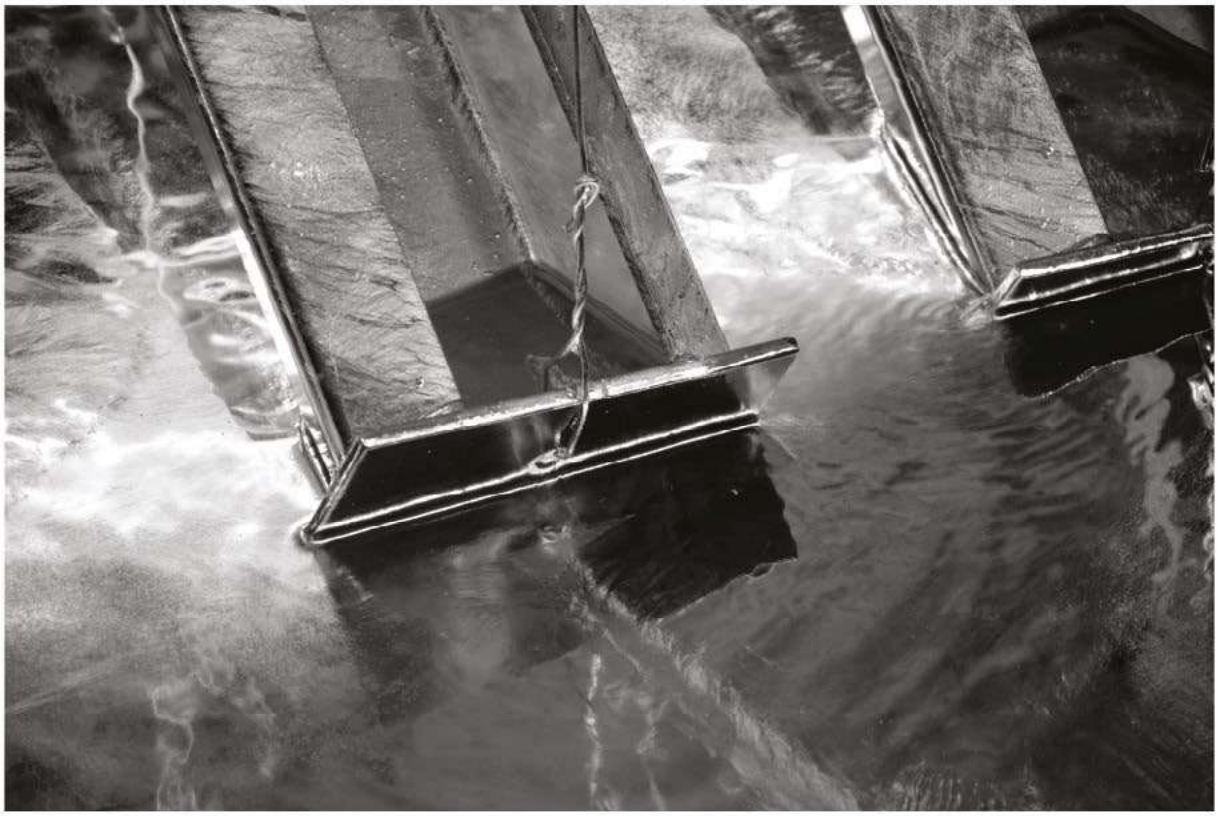


Of all the currently known methods for corrosion protection of steel products, hot-dip galvanization (so-called dip galvanization) is proving to be the best. By comparison of all the advantages and costs associated with hot-dip galvanizing, it can be said that it is currently the cheapest and most effective way of preventing corrosion.
Paint coatings, which are often aesthetically pleasing, are in practice very costly and do not have a high level of resistance to mechanical damage, rust spots appear if the substrate is not properly prepared and the coating begins to flake off. Surface lubrication with oils or greases has limited applicability for practical reasons and short shelf life.

... hot-dip galvanizing then

Here is some basic information about protective zinc coating:

- Its lifetime under average environmental conditions in Poland varies between 3 to 100 years, with natural attrition due to atmospheric effects ranging from about 0.1-2.5 pm/year in a rural atmosphere; to more than 10 pm/year in an aggressive atmosphere
- The galvanization of the product surface is the result of chemical and metallurgical reactions occurring during galvanization technology, and the effect is the diffusion of zinc particles into the outer layer of the steel, forming a strong intermolecular bond of FeZn. After galvanizing, there is a layer of pure zinc left on the top layer of the product, which hardens naturally after a certain period, making it highly resistant to mechanical damage; it is also relatively resistant to a range of chemical agents
- The accuracy of the surface preparation for the hot-dip galvanizing process is achieved through complex chemical processes, the fact that the product is galvanized is the best proof of its high quality, as in the case of insufficient cleaning of the product surface from impurities of any origin, there remain areas not covered with zinc
- The aesthetics of a hot-dip galvanized product are very high, although hot-dip galvanization is all about the effectiveness of the corrosion protection of the product. The components of the zinc bath and the method and technical equipment used in the TERMETAL galvanizing plant, combined with the experience of the staff, make the products highly aesthetic
- Currently, there are already known methods to adjust the aesthetics of the galvanized product by painting, the TERMETAL galvanizing plant is prepared to galvanize the products to be further refined by painting



2. Zinc alloys used in the TERMETAL Group's galvanizing plants

HOT DIP GALVANIZING	Anti-corrosion protection of steel surfaces by immersion in 450°C zinc

We use the highest quality materials and raw materials and our technological process is based on the latest developments in knowledge. TERMETAL galvanizing plant cooperates with many galvanizing centres in the country as well as with the NYRSTAR GROUP from Belgium and France and BOLIDEN from Scandinavia. Special quality SHG zinc with a purity of not less than 99.995% Zn is used as the basic component of the zinc bath, additional components include alloy called TECHNIGALVA + Bi, containing Nickel and Bismuth additives, and Galva 5 alloy containing aluminium additives.

The special care over the quality of the zinc bath means that the coating applied in our galvanizing plant is characterised by:

- performance according to EN ISO 1461
- shine lasting up to 3 months after galvanizing
- high aesthetics
- homogeneity and uniformity of distribution over the entire surface
- increased adhesion to the product due to the careful selection of bath components
- increased resistance to abrasion and other mechanical damage
- greater flexibility
- we are DAST Guideline 022 certified

3. General technical conditions for receipt and acceptance of steel products to be galvanized

The prerequisites for a satisfactory quality of the zinc coating include the following:

- the use of a material whose chemical composition enables the proper course of the pickling and galvanizing process
- proper construction of the product
- supply of material free from impurities that hinder or even prevent the pickling or galvanizing process
- selection of the right hot dip galvanizing technology and method

An important element to ensure the ultimate success of galvanizing is the cooperation of the supplier of the steel construction or other metal product to be galvanized with the specialists at our galvanizing plant, who will clarify any doubts in a professional manner.

4. Basic information for our contractors

4.1. Material grade

Products made of structural steel with grades St3S, St3SX, St4S, St4SX, 18G2, 18G2A or their equivalents, e.g.: S2353RG2, S2753R, S3553R can be galvanized. However, an essential prerequisite for obtaining a bright, smooth and homogeneous zinc coating is the selection of the steel according to chemical composition according to the following requirements.

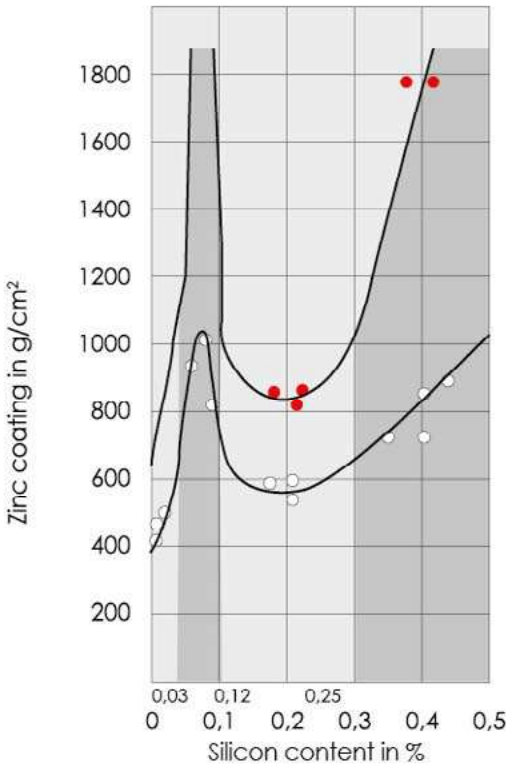
The silicon content of the steel to be hot-dip galvanized must be less than 0.03% or between 0.12 and 0.25%. Due to the properties of the phosphorus and silicon contained in the steel, their equivalent value must be checked according to the formula:

$$Esi = Si+2,5 \cdot P$$

- Si and P indicates the percentage of silicon and phosphorus content in the steel.

The Esi equivalent value must meet the requirements defined above for the silicon content of the steel. To fully illustrate the influence of the chemical composition of the steel on the galvanizing effects, it should also be added that the total silicon and carbon content in the steel should not exceed 0.5%.

4.2. Sandelin effect



If the zinc coating is applied to products made of steel with a different chemical composition, the resulting zinc coating will be grey, dull, rough, uneven and inhomogeneous, and in extreme cases impossible to apply. Similar effects might occur when the steel has a varying chemical composition especially in the surface layer.

4.3. Surface condition

The correct surface preparation of the workpiece by the supplier has a fundamental influence on the quality of the zinc coating. The surface of items delivered for galvanizing should be free of oils, grease, old paint coatings, etc., as well as coarse rust and scale. Additionally, the quality of the zinc coating can be adversely affected by auxiliary agents used in welding techniques, e.g: "SILSPAW", etc. Any metallurgical defects, also invisible to the naked eye, such as flaking, rolling, roughness, pitting, etc. will become visible and may cause local cracking of the zinc coating.

4.4. Design requirements

- the shape of the product must allow excess liquid (molten) zinc to flow freely when the article is lifted out of the bath
- all members of the structure which are permanently connected to each other should be made of a single grade of steel and of as nearly identical material thickness as possible
- the design must take into account the consequences of the release of stresses due to the temperature of approx. 450°C
- the products must not have the characteristics of a closed space, and venting and drainage holes must be provided in closed profiles or containers; failure to do so may lead to mechanical damage to the product
- objects should have handles or holes to enable them to be attached to means of technological transport
- When galvanizing parts with holes for bolts or axles, allow an allowance of 1 to 2 mm
- the product should be free of sharp, ungraded edges
- detailed information on the structural requirements of products intended for galvanizing are specified in the Technical Conditions, available from galvanizing plant representatives and on our website

Dimensions of a hollow section in mm			Smallest hole diameter in mm for the number of holes respectively		
○	□	▭	1	2	4
less than:					
15	15	20x10	8		
20	20	30x15	10		
30	30	40x20	12	10	
40	40	50x30	14	12	
50	50	60x40	16	12	10
60	60	80x40	20	12	10
80	80	100x10	20	16	12
100	100	120x80	25	20	12
120	120	160x80	30	25	20
160	160	200x120	40	25	20
200	200	260x140	50	30	25

4.5. Additional instructions

- it is necessary to agree in advance the dates and technical conditions for the delivery of the products to be galvanized with the specialists at the galvanizing plant
- If the products will be further refined after the galvanizing process, e.g. by paint coating, this must be agreed with the galvanizing plant in advance
- for products with special purpose such as e.g. drinking water pipes and others, the galvanizing plant has to be informed in advance and the galvanizing conditions have to be agreed
- for products with complex design, it is recommended to galvanize a test batch in order to avoid possible deformations
- The information contained herein is for reference use only, all details are available in the General Terms And Conditions Of Galvanizing Services, while the rules of cooperation are regulated in the Cooperation Agreement. You can read both documents on our website or in the sales department

Layer thickness and zinc mass related to the product surface according to EN ISO 1461

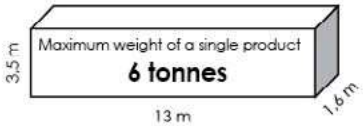
Semi-finished product group	Average values according to DIN 1461		average coating thickness in µm
	local film thickness in µm	minimum average coating weight g/m²	
Steel parts up to 1.5 mm thick	35	325	45
Steel parts from 1.5 mm to 3.0 mm thick	45	395	55
Steel parts from 3.0 mm to 6.0 mm thick	55	505	70
Steel parts more than 6.0 mm thick	70	610	85
Cast iron castings larger or equal to 6.0 mm	70	575	80
Cast iron castings < 6.0 mm	60	505	70

If you have any questions, our specialists are available on the telephone numbers listed on the last page of this folder. We also provide advice on site at the galvanizing plant.

5. Technological possibilities in the galvanizing plants of the TERMETAL Group

We have three galvanizing plants: in Piła, Grudziądz and Dębska Wola.

Piła and Dębska Wola



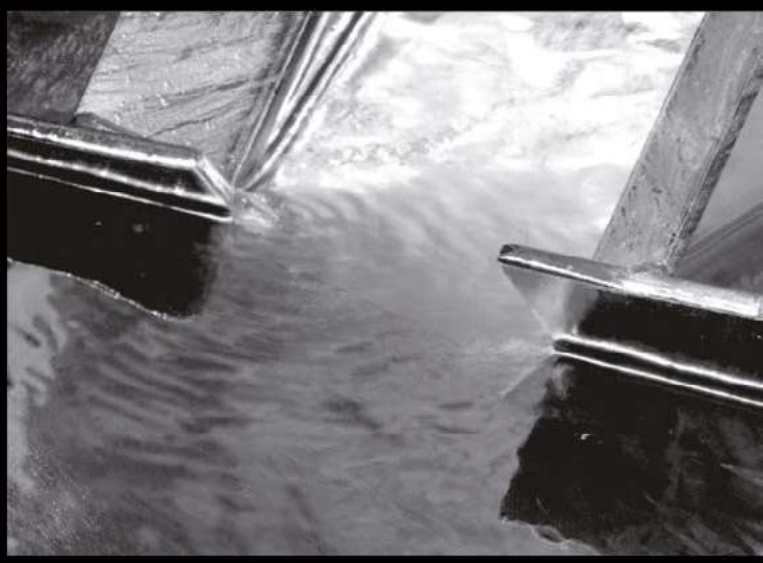
A single load suspended from the crosshead should not exceed 6 tonnes.

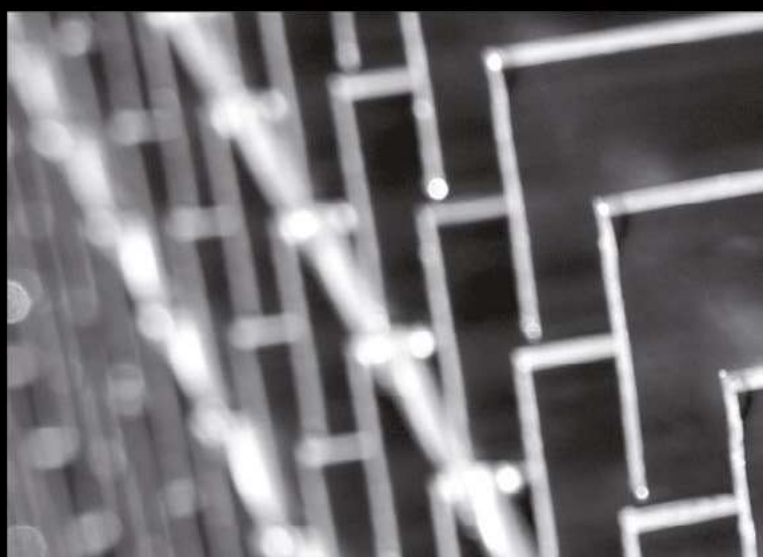
Grudziądz

A single load suspended from the crosshead should not exceed 6 tonnes.

The galvanizing plants in Dębska Wola, Grudziądz and Piła are DASt-Guideline 022 certified.
The products are suspended on crossheads, which means that the components do not come into contact with each other during the galvanization procedure.
It is possible to galvanise products with other dimensions and weights than those specified above, but in such cases additional agreements with the specialists at the galvanizing plant are required.

You can find detailed information on our website www.termetal.pl





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