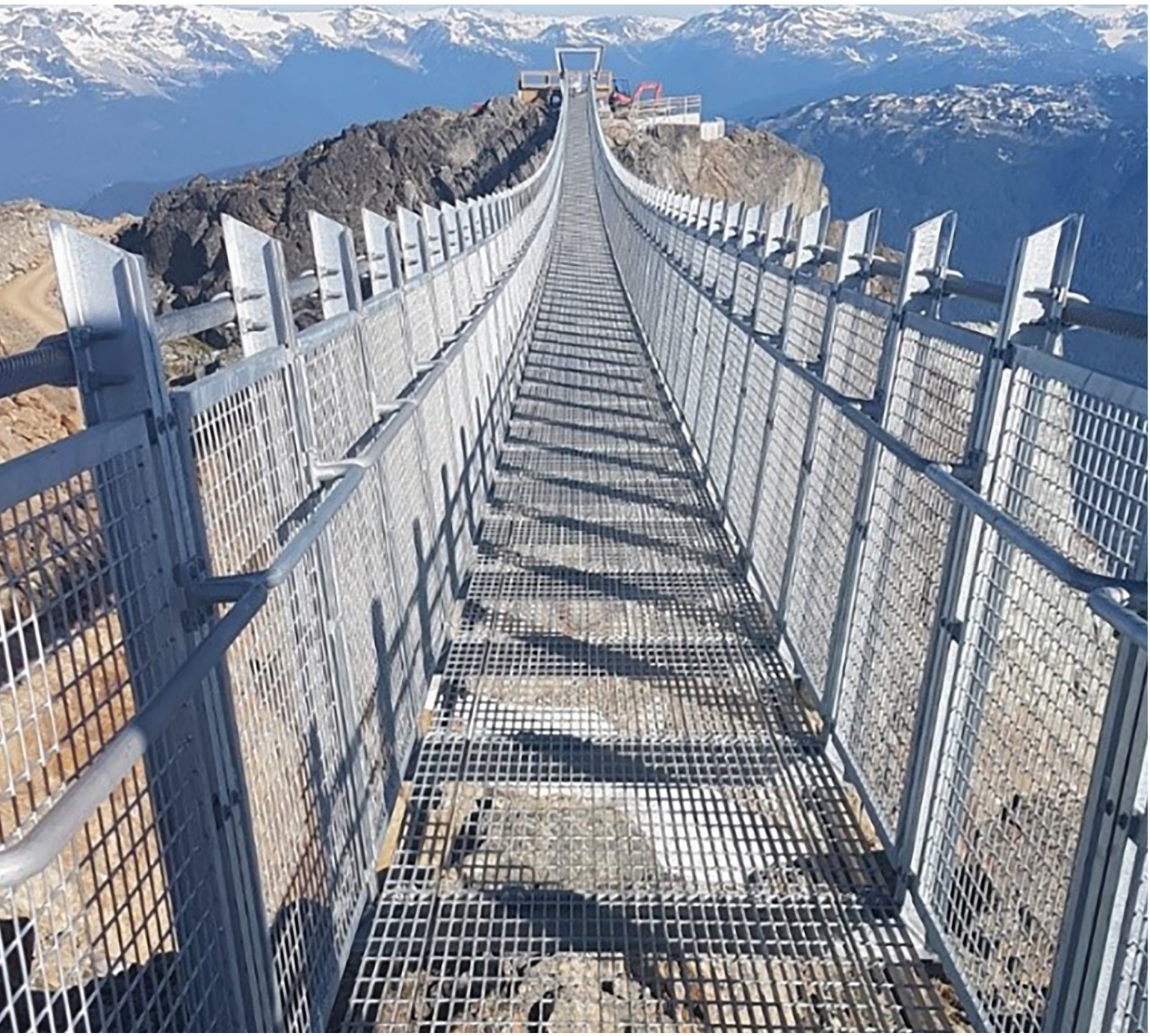
VULCRAFT®

STEEL BAR GRATING



NUCOR®
VULCRAFT

Powerful Partnerships.
Powerful Results

CONTENTS

INTRODUCTION

WHY GRATING?

- Easy Installation and Fabrication
- Adaptable to Complex Floor Layouts
- Allows Passage of Light and Air
- High Strength-to-Weight Ratio
- Durable and Long Lasting Surface

APPLICATIONS

- Industrial Flooring
- Walkways
- Bridge Decks
- Trenches
- Steel Mills
- Warehouses
- Chemical Plants
- Water Treatment Plants
- Power Plants
- Oil Refineries
- Agricultural Facilities

STANDARD DUTY (SD)

Standard Duty
Standard Duty Grating is the most common type of grating used in the industrial flooring market. The open grid construction provides for maximum passage for light, air circulation and drainage.

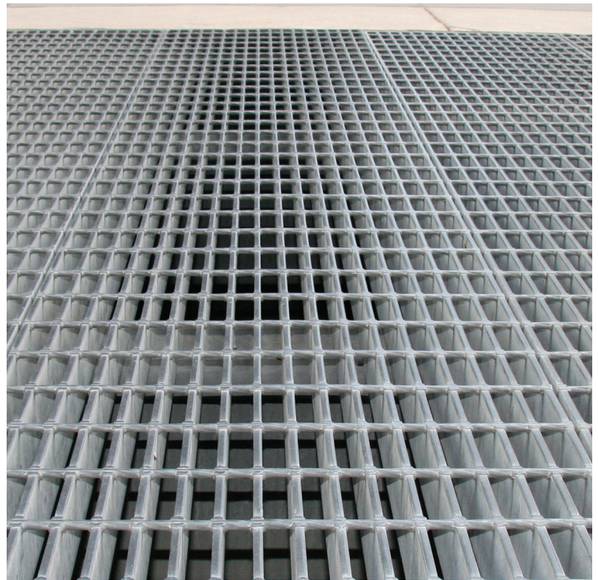
Close Mesh
When a certain bar depth must be held but standard duty is not sufficient, Close Mesh moves the bars closer to gain more strength and stiffness. This may also be warranted if the bar gap on Standard Duty is wider than desired.

ADA-Complaint
When the Grating needs to adhere to the guidelines of the Americans-with-Disabilities Act (ADA), an even-smaller bar gap is required.

Heel Friendly
Also ADA-Compliant, Heel-Friendly grating provides an even tighter bar spacing to ensure that high heels, canes, and other narrow items will be difficult to get wedged in the gaps.

HEAVY DUTY (HD)

Heavy-Duty Welded Grating has the strength for heavy-duty load areas such as airfields, industrial plants, truck and bus terminals, parking lots and railroad yards. Common uses are flooring, driveways, subway and tunnel ventilation grilles, curb inlet grates, ramps, docks, etc.



STAIR TREADS

Welded steel stair treads are the most widely used for their strength and ease of installation and are universally used in most industrial and commercial applications. Stair Treads can be ordered with a serrated surface for additional safety.

Nucor offers steel products that range from bar grating to the heaviest hot rolled beam sections produced in North America.

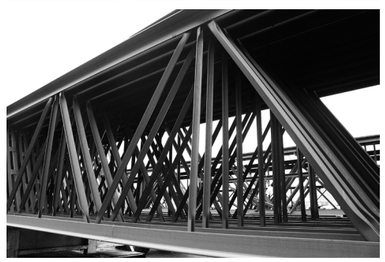
Through implementation and refinement of best practices, we continue to grow as a company. Nucor's pay-for-performance policy reflects a commitment to manufacturing the highest quality products while maintaining a safety record that is the envy of the industry.

Nucor serves the agricultural, automotive, construction, energy, furniture, machinery, metal building, railroad, recreational equipment, shipbuilding, heavy truck, and trailer industries. Which is to say, we are integral to North American industry.

Nucor and its subsidiary divisions manufacture:

- Bars (carbon and alloy steel)
- Sheets/Flatrolled
- Open Web Steel Joists
- Steel Decks
- Cold finished steel
- Metal building systems
- Steel Grating
- Wire and wire mesh
- Conduit
- Beams
- Plates
- Joist Girders
- Fabricated concrete reinforcing steel
- Steel fasteners
- Piling
- Tube



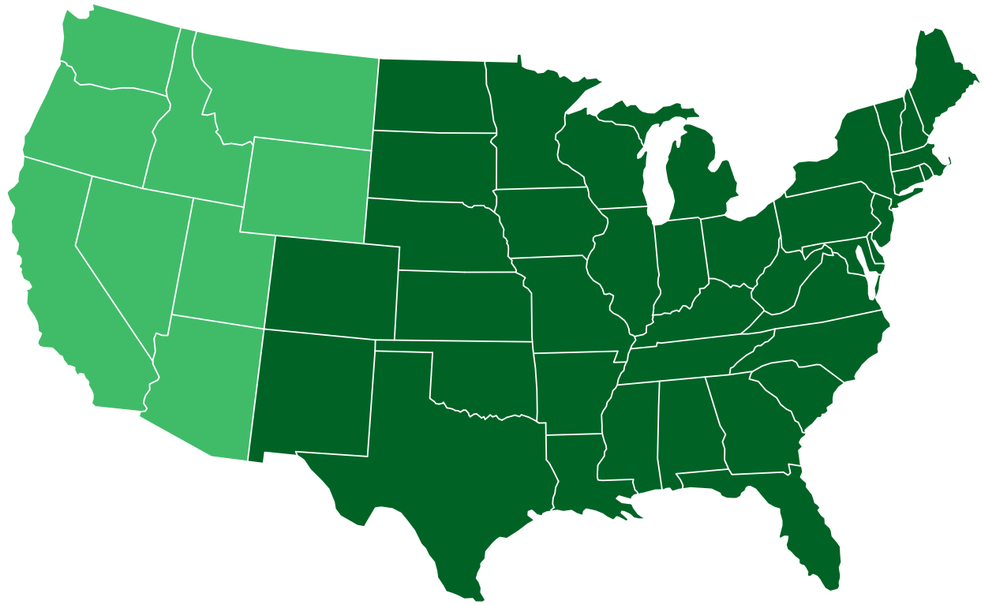


SALES CONTACTS

FOR PANEL SALES:

WEST
GratingSalesWest@vulcraft.com

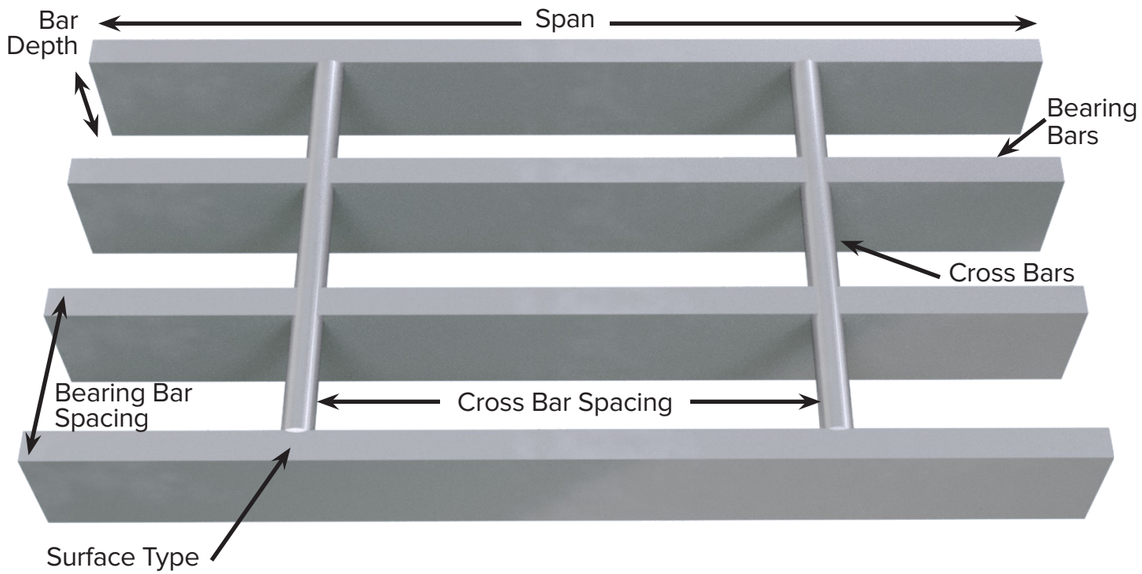
EAST
GratingSalesEast@vulcraft.com



FOR PROJECTS WITH GRATING IN PLATFORMS, WALKWAYS, STAIRS, ETC. VISIT WWW.VULCRAFT.COM/CONTACT TO FIND YOUR LOCAL VULCRAFT SALES OFFICE.

tip

If you are interested in a grating type not represented in this manual, please contact a sales representative.



Bearing Bars load carrying, span of grating
Cross Bars connecting bars, runs along width of grating
Finish coating applied-painted black, galvanized
Serrated notching process for non-slip surface
Widths overall dimension measured perpendicular to bearing bars
Span distance running along direction of bearing bars
Banding bar of the same size as bearing bar used to close open ends
Kick Plate flat bar welded to outer edge with projection above grating

Bar Spacing —
# of 1/16” from center to center of vertical bearing bars

Cross Bar —
Spacing in inches of the cross bars

Serration —
Nothing = Smooth
SER = Mechanical Serrated
MSR = Mill Serrated

19W4 1 1/4 x 3/16 SER BLK

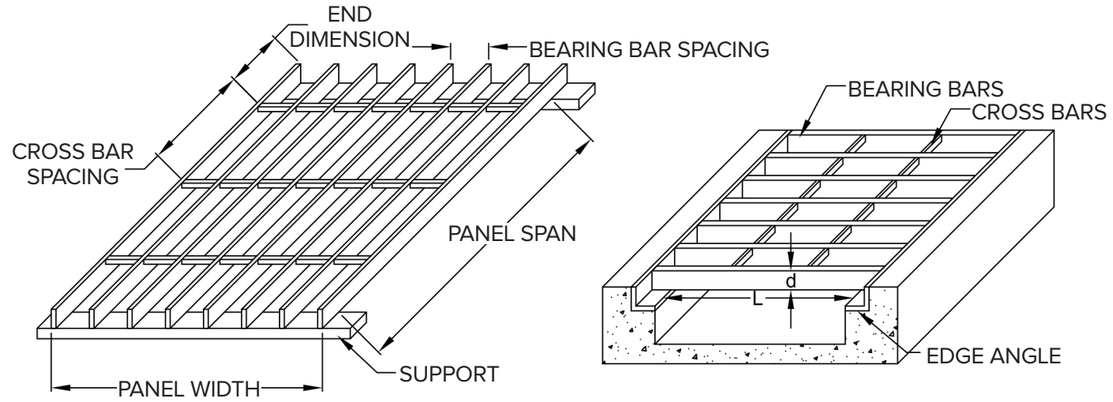
Construction Type —
W = Welded

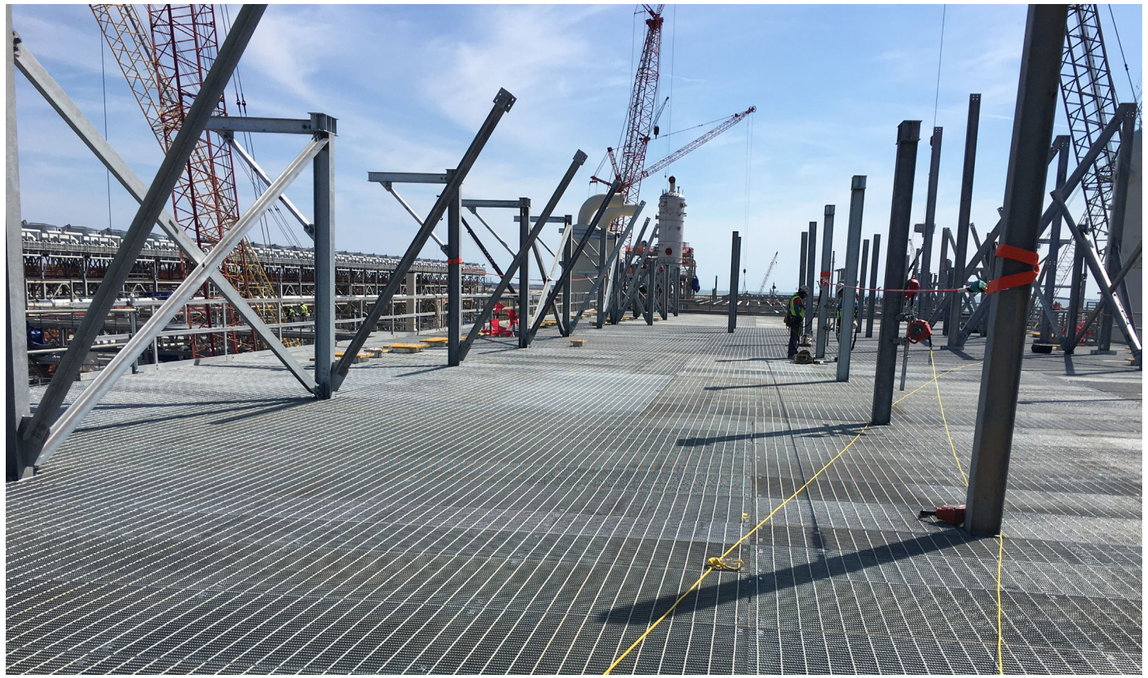
Bar Size —
Size of bearing bars

Finish —
Nothing = Unpainted
GAL = Galvanized
BLK = Black Paint

LOAD-CARRYING CAPABILITY SPAN

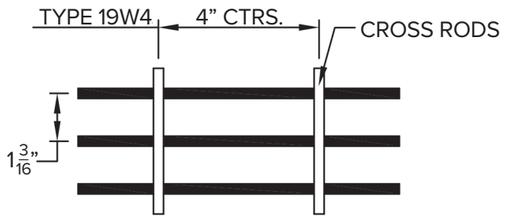
Usually this space has structural supports to carry the load. The distance between supports is called the span. Bearing bars run in the direction of the span. Deflection is generally limited to ¼-inch (6mm) only in order to limit an uncomfortable movement of the traffic surface.





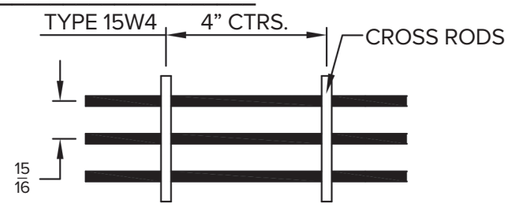
STANDARD DUTY GRATING (1/8”, 3/16” BAR THICKNESS)

Standard



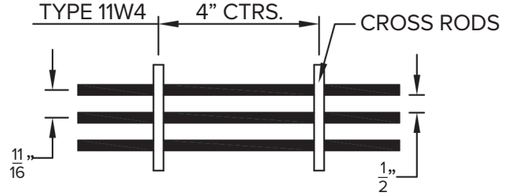
19W4 % Open Area	
1/8” Bars	80.0%
3/16” Bars	74.2%

Close-Mesh

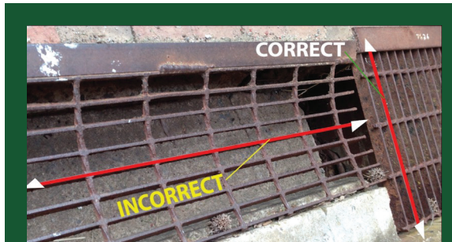


15W4 % Open Area	
1/8” Bars	76.8%
3/16” Bars	69.5%

ADA-Compliant



11W4 % Open Area	
3/16” Bars	63.3%

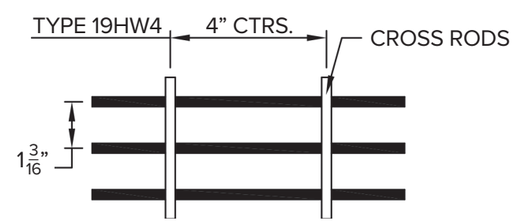


tip

Cross Bars are not load bearing
The bearing bars are the bars that carry the load and the cross bars hold the bearing bars in place creating the shape of the panel. In order to function properly, make sure that both ends of each bearing bar is supported by the load bearing structure and avoid the situation depicted in the picture to the left.

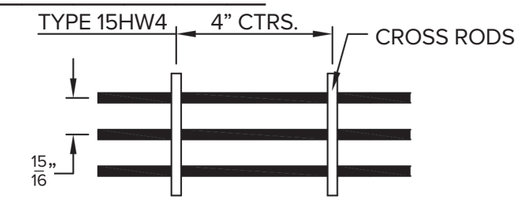
HEAVY-DUTY GRATING (1/4”, 3/8” BAR THICKNESS)

Heavy-Duty



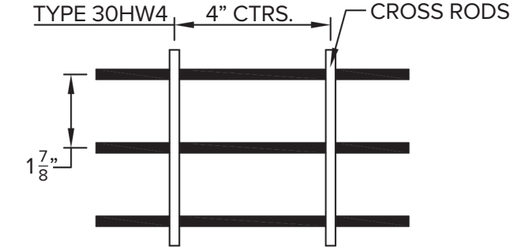
19HW4 % Open Area	
1/4” Bars	65.3%
3/8” Bars	51%

HD Close-Mesh



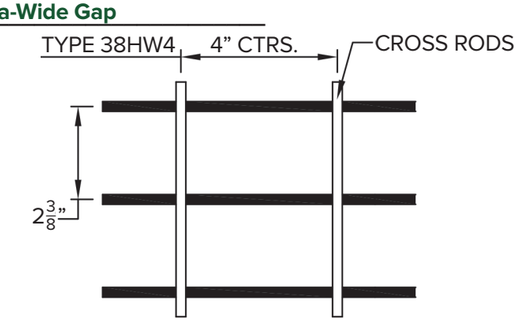
15HW4 % Open Area	
1/4” Bars	59.1%
3/8” Bars	41.7%

Wide-Gap



30HW4 % Open Area	
1/4” Bars	73.7%
3/8” Bars	63.5%

Extra-Wide Gap



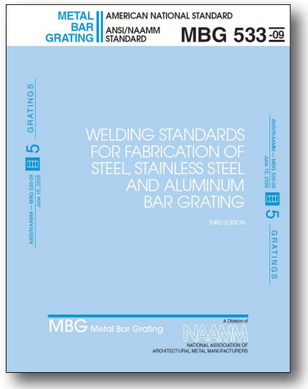
38HW4 % Open Area	
1/4” Bars	75.8%
3/8” Bars	66.7%

All specification and engineering data provided in this document is based on the below National Associations of Architectural Metal Manufacture's (NAAMM) Guides.

See the NAAMM guides for addtional information such as Standard Specifications and Code of Standard Practice.

ANSI/NAAMM HMMA MBG 531-17

Metal Bar Grating Manual, 8th Ed



ANSI/NAAMM MBG 533-09

Welding Standards for Fabrication of Steel, Stainless Steel and Aluminum Bar Grating, 3rd Ed

ANSI/NAAMM HMMA MBG 532-19

Heavy Duty Metal Bar Grating Manual, 6th Ed

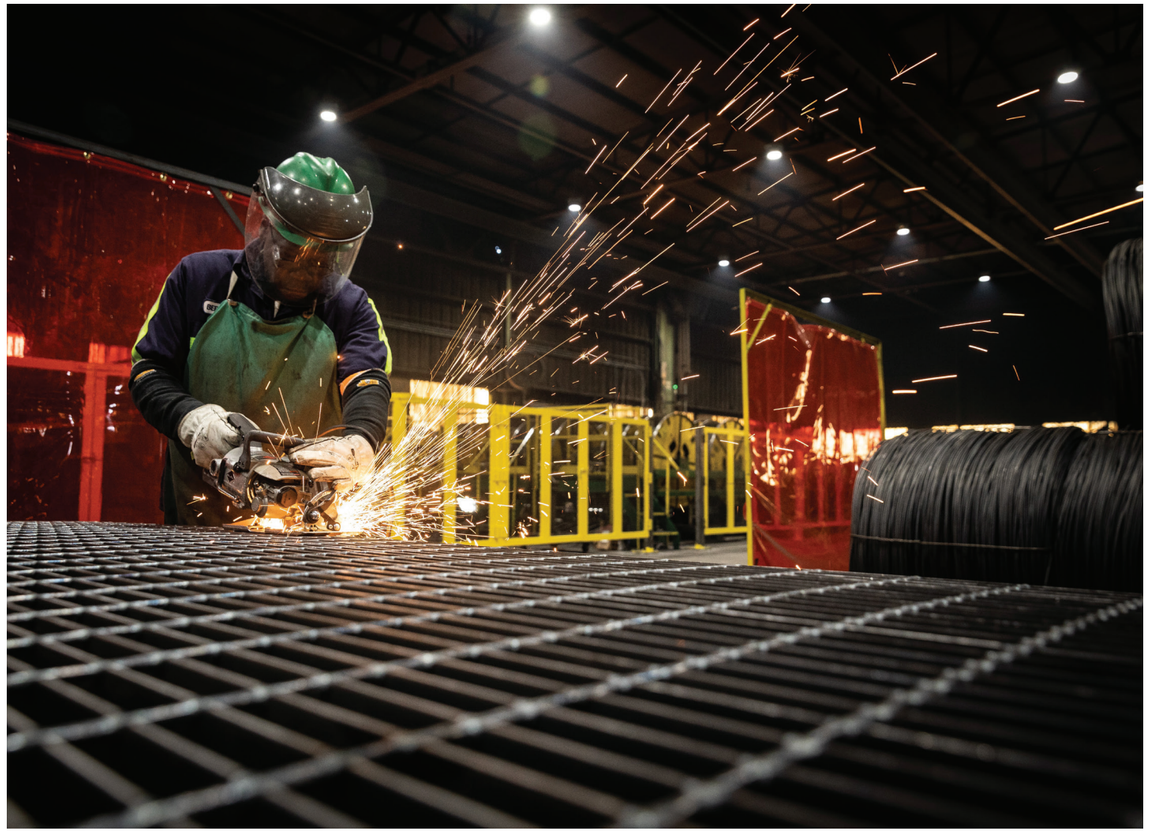
NAAMM MBG 534-14

Metal Bar Grating Engineering Design Manual

NOT JUST GRATING FABRICATION

Your partner for structural steel as well as grating detailing and fabrication. Vulcraft has the capability and capacity to handle even the toughest structural steel detailing and fabrication projects.

Contact us today with how we can assist you in meeting your customer's needs.



Standard Duty

- Description of Grating (see standard marking system on pp. 6-9)
- Drawing Showing:
  - area to be covered, with cutouts
  - span with direction of bearing
  - method of support
  - all critical dimensions
- Type of Anchorage
- Finish
- Shipping Instructions

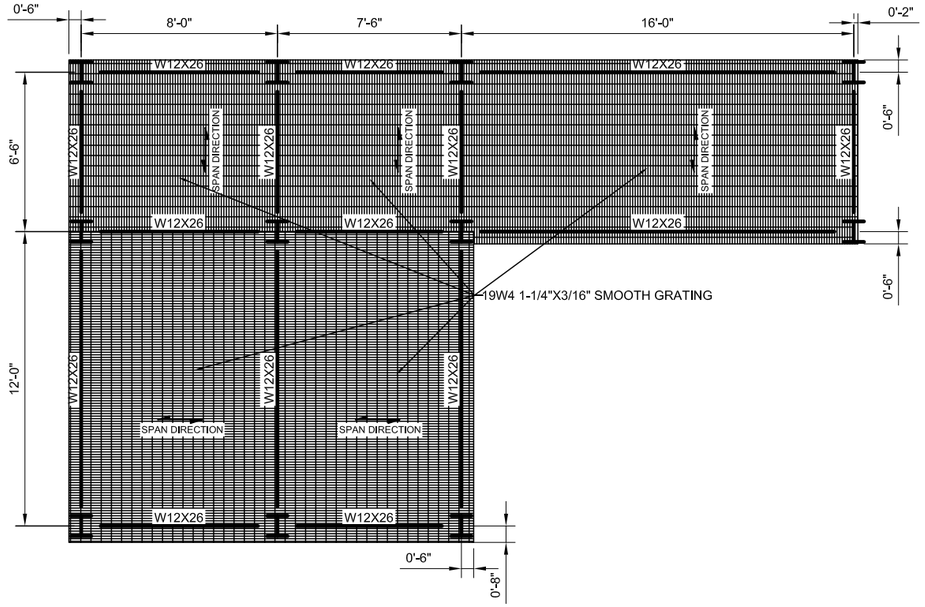
Stair Treads

- Description of Grating (see standard marking system on pp. 6-9)
- Type of Nosing
- Dimensions (length and width of tread)
- Number of Treads
- Finish
- Shipping Instructions

Heavy Duty

- Description of Grating (see standard marking system on pp. 6-9)
- Drawing Showing:
  - area to be covered, with cutouts
  - span with direction of bearing
  - method of support
  - all critical dimensions
  - serrated or plain surface
- Type of Anchorage
- Finish
- Shipping Instructions

DRAWING AND GENERAL NOTES EXAMPLE



General Notes Examples

The following are examples of suggested notes that should be included on drawings where Grating products are being specified:

Grating

Unless otherwise noted on the drawings, use steel grating consisting of 19W4 -1 1/4” deep grating, to be smooth and painted black and 1 1/2” deep grating is to be serrated and galvanized. Attachment is clip type or indicate that grating to be welded to supports.

Treads

Unless otherwise noted on the drawings, treads are to be the same grating type as walkway grating, stair treads are to have checkered plate nosing.

Edge Sections:

Edge conditions sections are a very important part of proper grating detailing and fabrication. Items to be shown in section drawings should be:

- Grating edge dimension in relation to grid line or support
- Kick Plates
- Hand Rail Conditions

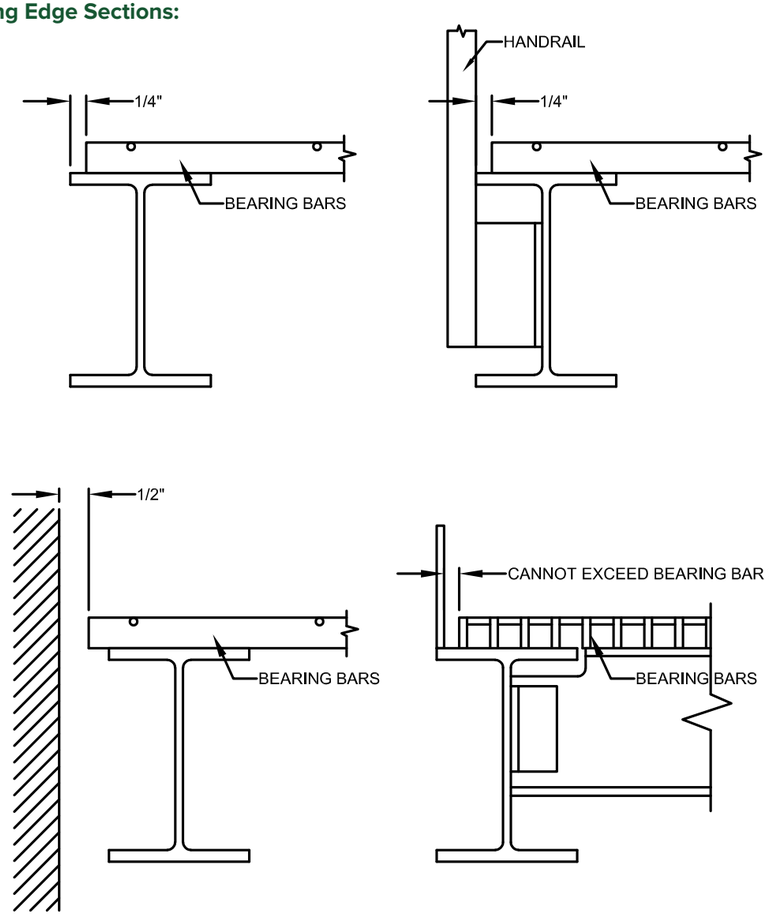
Sections should also be shown for any cutouts that need to be created in the grating panels.

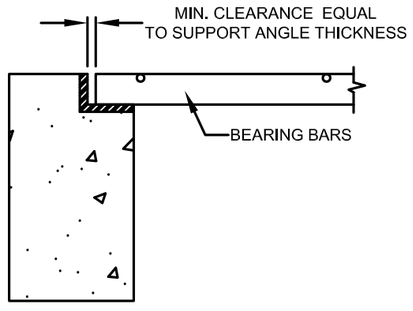
Sections can be shown as independent sections specific to grating or as a part of the typical construction section drawings, as long as the grating requirements are clearly shown.

The following pages show examples of some typical grating sections.

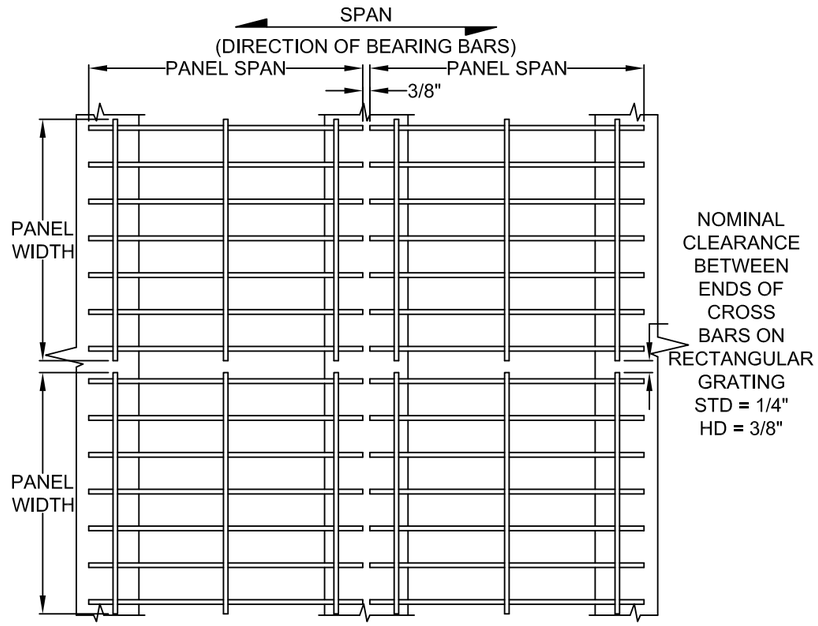
These sections can be downloaded from our website www.vulcraft.com/products/grating.

Example Grating Edge Sections:

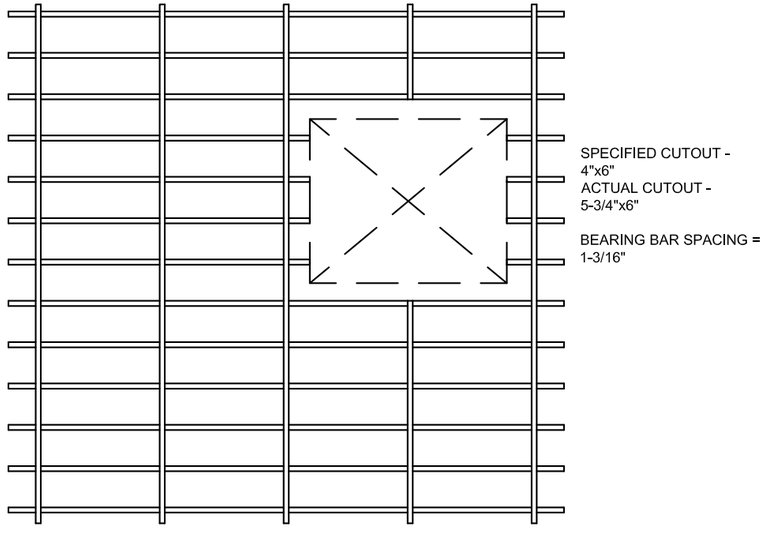




Guidance for Grating Plan View:



Guidance for Specifying Cutouts:



Grating Specification/Detailing Checklist

- ☐ **Grating Description**
  - ☐ Grating Type (19W4, 15W4, etc.)
  - ☐ Bar Size
  - ☐ Finish
  - ☐ Smooth/Serrated
  - ☐ Banding/Kick Plate/Hand Rails
- ☐ **Stair Tread Description**
  - ☐ Grating Type (19W4, 15W4, etc.)
  - ☐ Bar Size
  - ☐ Finish
  - ☐ Smooth/Serrated
  - ☐ Nosing Type
- ☐ **Attachment**
  - ☐ Clips
  - ☐ Welds
  - ☐ Lugs
- ☐ **Layout**
  - ☐ Area to be Covered (See Drawing Example)
  - ☐ Edge Conditions
  - ☐ Cutouts
  - ☐ Span
  - ☐ Supports
- ☐ **Approvals**
- ☐ **RFI's**
- ☐ **Sequencing/Shipping**

- Grating panels must be installed with cross bars on top side.
- It is NOT recommended to notch bearing bars at supports to maintain proper elevation. If notching is required for installation, manufacturer should be consulted.
- Metal should always be used for grating supports.
- A minimum of 1" bearing shall be provided for Light Duty Steel Grating. For Heavy Duty Steel Grating, 1" minimum bearing shall be provided for bearing bar depths up to 2-1/4", and 2" minimum bearing shall be provided for depths of 2-1/2" and over. This bearing surface does not include the support angle fillet radius noted on page 14.
- Banding may have less depth than bearing bars for trench grating to allow drainage. Full depth banding will be provided unless otherwise specified.
- Clearances shown in Figure 1 (below) are recommended, but may vary in accordance with dimensional tolerances.
- Standard and Heavy duty grating should be designed to have structural support under each bearing bar at cutouts.
- As shown in Figure 2 (next page), all rectangular cutouts are made to the next bearing bar beyond the penetration with a clearance not to exceed bearing bar spacing.
- Cutouts for circular obstructions are recommended to be at least 2" larger in diameter than the obstruction. It is further recommended that cutouts for all piping 4" or less be made in the field.

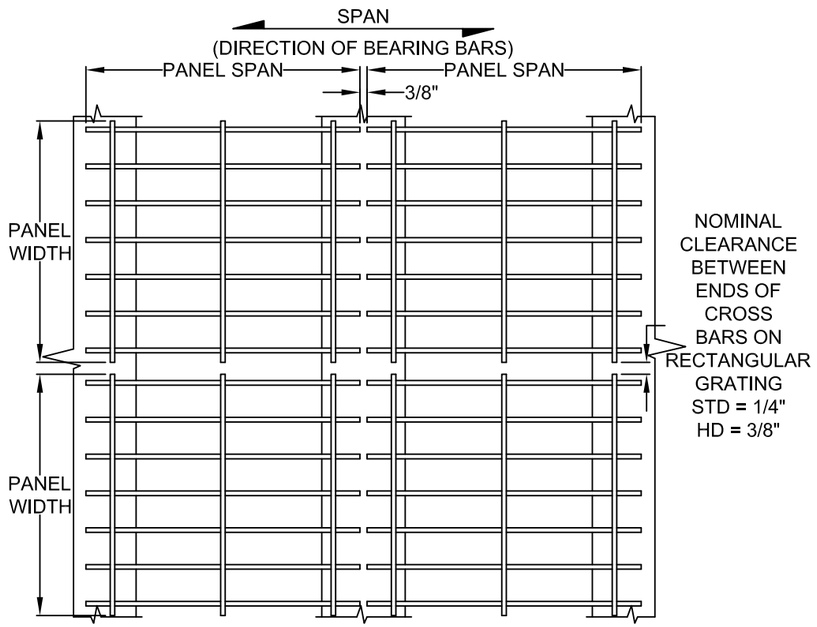


Figure 1

Guidance for Specifying Cutouts:

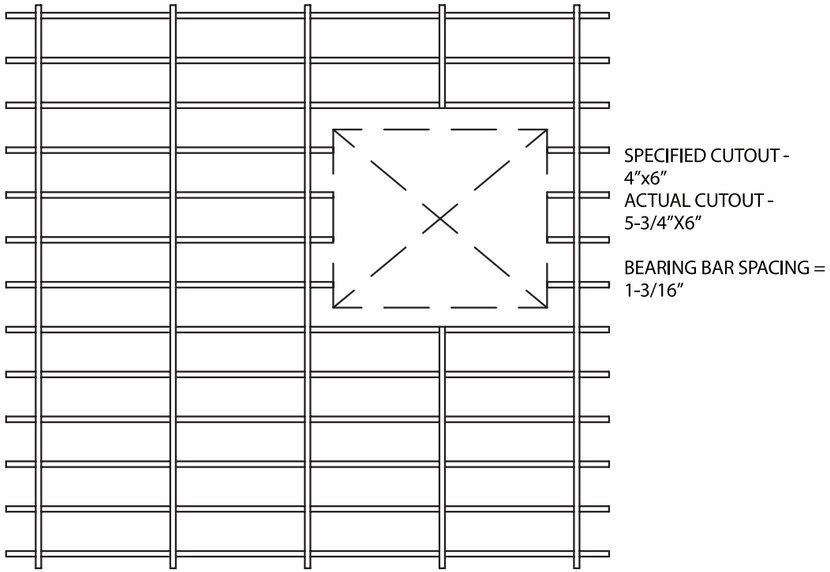
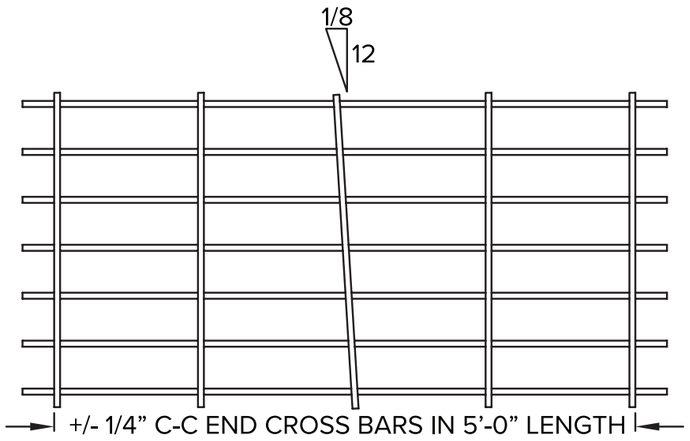


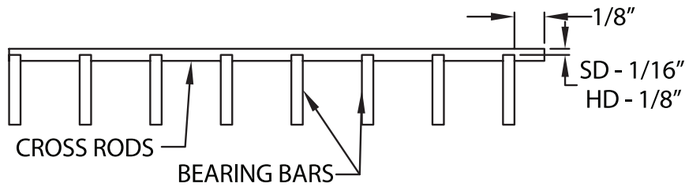
Figure 2

BEARING BAR AND CROSS ROD TOLERANCES

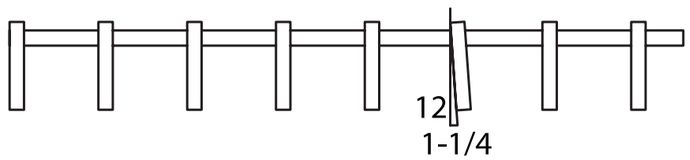
Cross Rod Spacing and Alignment
Cross rods should not vary more than a slope of ⅛" to 12" in either direction from perpendicular alignment with bearing bars. The tolerance of the cross bar spacing for 5' in length is +/- ¼"



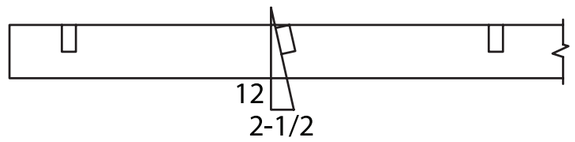
Cross Rod Position
The top the cross rod should not projected more than 1/16" above the top of the bearing bars for standard grating (⅛" for heavy-duty) and should not extend more than ⅛" from side of bearing bars.



Bearing Bar Lean
Bearing bar lean must not exceed a slope of 1-¼" to 12.

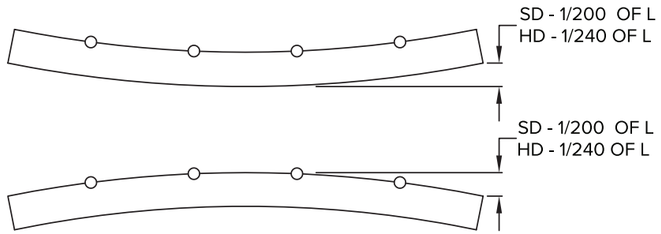


Cross Bar Lean
Cross bar lean must not exceed a slope of 2-½" to 12.

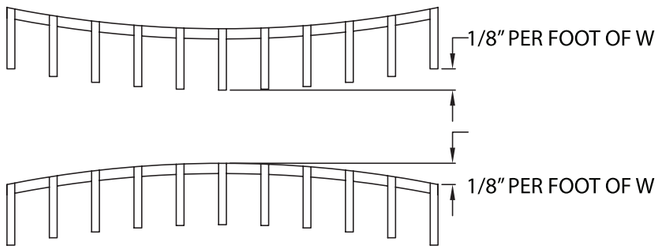


PANEL TOLERANCES

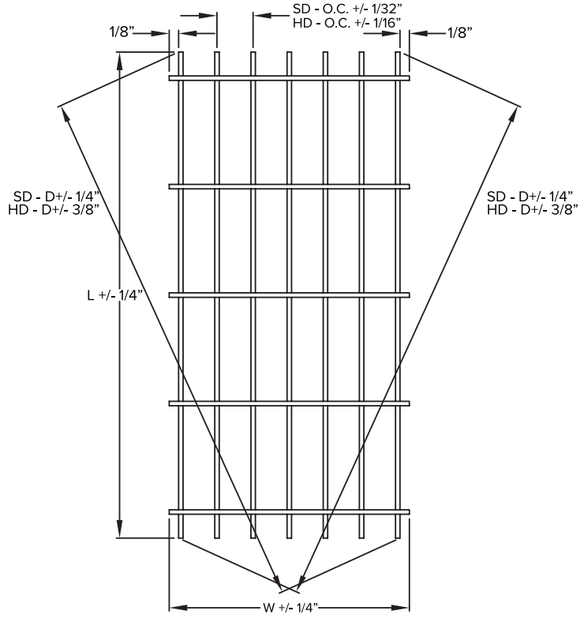
Longitudinal Bow
Longitudinal bow should be less than 1/200 of the length for the standard grating (1/240 for heavy duty).



Traverse Bow
Before banding, the traverse bow should be less than ⅛” per foot or width.

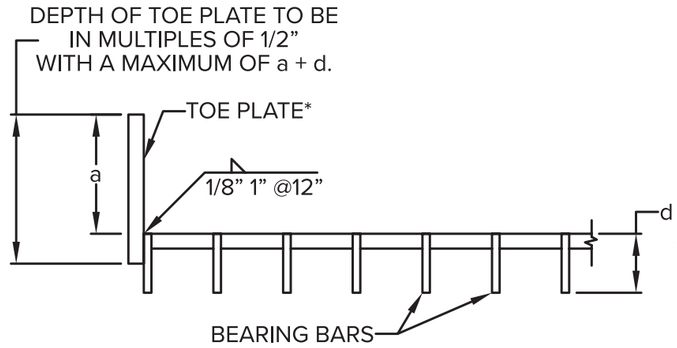


Overall Dimension and Squareness
D = Overall diagonal dimension
W = Width of panel including cross rod extensions outside of bearing bars
L = Length of bearing bars

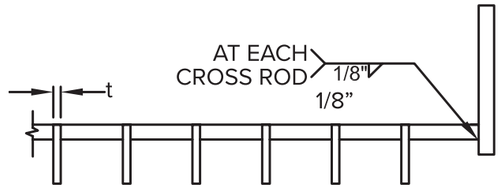


SWEEP 1/200 OF SPAN

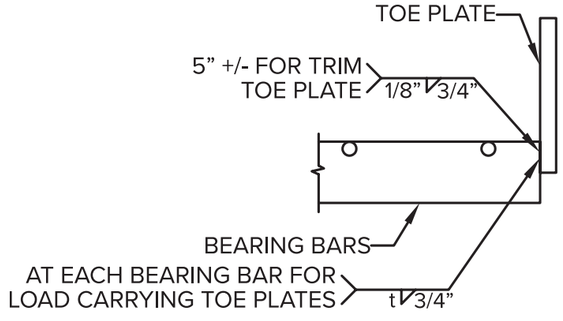
TOE PLATES



t = BEARING BAR THICKNESS
d = BEARING BAR DEPTH
*EXAMPLE SHOWN OCCURS AT A DIAGNONAL OR CIRCULAR CUTOUT

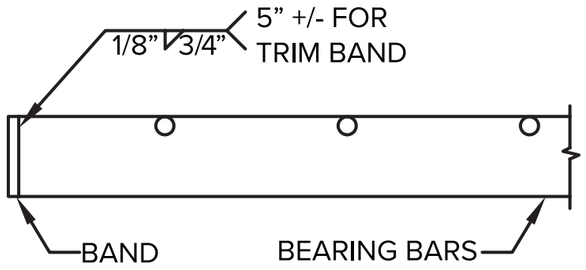


Attachment to Length of Bearing Bar
Toe plate to be welded with alternating 1/8” fillet welds, 1” long every 12.”

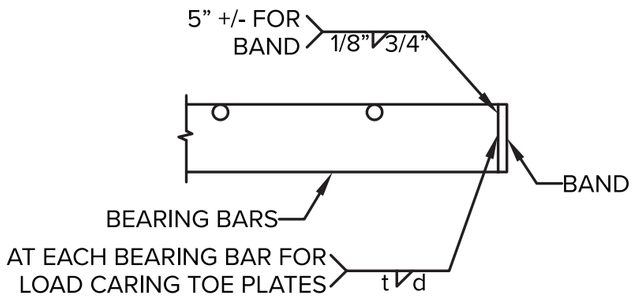


Attachment to End of Bearing Bar
Load-carrying toe plates to be welded at each bearing bar with a fillet weld the size of the bearing bar thickness (t), ¾” long. Non-load-carrying toe plates to be welded to bearing bars with ⅛” fillet weld (3⁄16” for HD), ¾” long every 5”.

BANDING

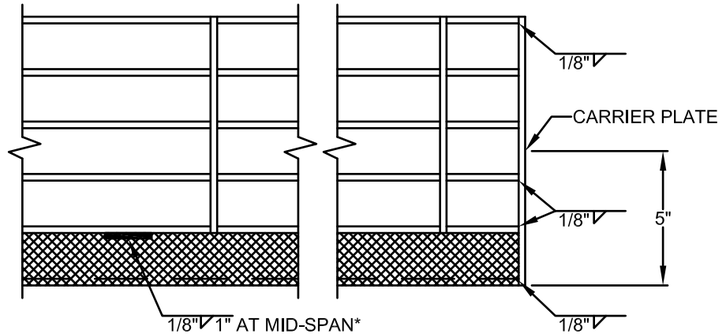


Standard Trim Band
End band to be welded with ⅛” fillet welds (3⁄16” for HD) ¾” long every 5”.



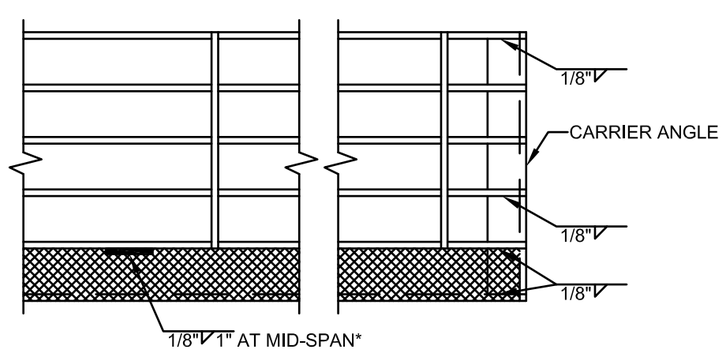
Load Banding (must specify)
Load carrying end band must be welded with fillet weld the size of bearing bar thickness (t) and the length of the bearing bar depth (d) at each bearing bar. This spec is standard for grating. Refer to NAAMM MBG 532 for HD specification.

STAIR TREADS



WHEN CARRIER PLATES ARE USED, THE BEARING BARS AND THE NOSING IN THE FRONT FIVE INCHES SHALL BE WELDED TO THE CARRIER PLATE AS SHOWN.

*TREADS SPANNING 4' OR MORE SHALL HAVE 2 WELDS, LOCATED AT THIRD POINTS.

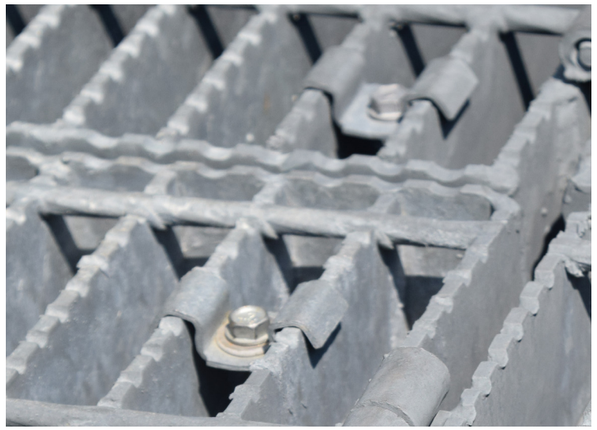


ON TREADS OVER 9-3/4" WIDE, WELD END OF CENTER BAR ALSO

ANCHORAGE TYPES

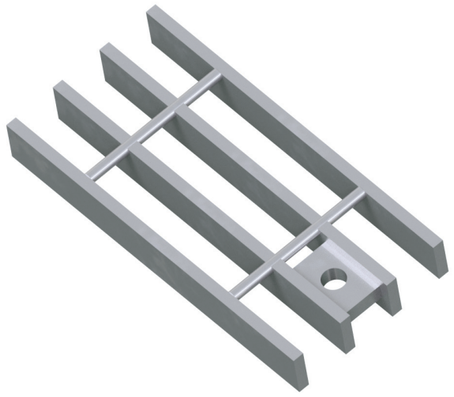
CLIP (SD)

The clip bridges two bearing bars and is attached with ¼” self-tapping bolt, ¼” self threader, ¼” weld stud or ¼” bolt and nut when hole is drilled through supporting flange. Fasteners should be specified separate from clips. (Bolts not included)



WELDED LUG (HD)

Weld lugs may be used for installations where grating is subject to removal. Weld lugs are shop fabricated and must be specified at time of grating order. Fasteners are ¼” minimum and supplied by others.



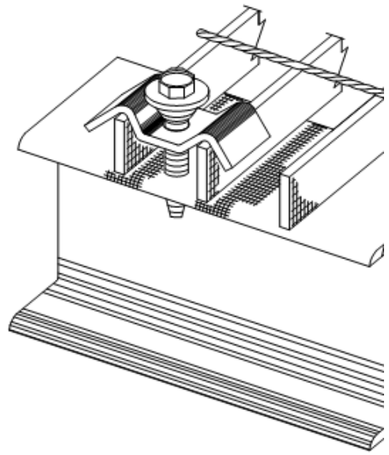
FIELD WELDED

Recommended for all permanently installed grating panels. Welds should be 3⁄16” fillet welds, ¾” long located approximately 6” from each side of panel (4 locations) and one weld in middle of panel at each intermediate support.

CLIP TYPES

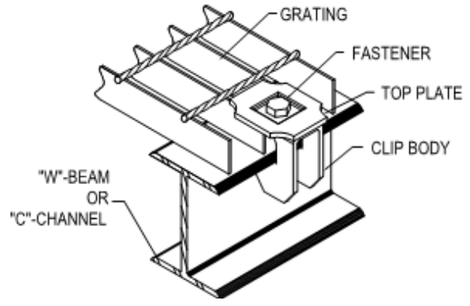
F-10 CLIPS

F-10 Clips are available for use with 19 space grating and can work with any bar depths from 1” to 6”. Different Tek-screw lengths are required for different bar depths.



G CLIPS

G Clips can be used with 11, 19, 15, 30 and 38 space grating, and can work with bar depths from 1” to 2”.



G-CLIPS

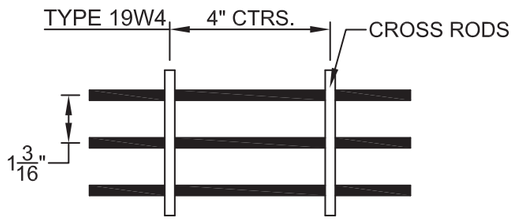
	Bar Spacing				
Bar Depth	**11**	**15**	**19**	**30**	**38**
1”	RSCGC-1A or RSCGC-2A	GN-1A or GN-2A	GG-1A or GG-2A	FFGN-1A or FFGN-2A	FFGN-1A or FFGN-2A
1¼”	RSCGC-1B or RSCGC-2B	GN-1B or GN-2B	GG-1B or GG-2B	FFGN-1B or FFGN-2B	FFGN-1B or FFGN-2B
1½”	RSCGC-1C or RSCGC-2C	GN-1C or GN-2C	GG-1C or GG-2C	FFGN-1C or FFGN-2C	FFGN-1C or FFGN-2C
1¾”	RSCGC-1D or RSCGC-2D	GN-1D or GN-2D	GG-1D or GG-2D	FFGN-1D or FFGN-2D	FFGN-1D or FFGN-2D
2”	RSCGC-1E or RSCGC-2E	GN-1E or GN-2E	GG-1E or GG-2E	FFGN-1E or FFGN-2E	FFGN-1E or FFGN-2E

“1” Clips (I.E., GG-1A) are for use with flange members up to 3/4” thick

“2” Clips (I.E., GG-2A) are for use with flange members from 3/4” to 1 1/2” thick

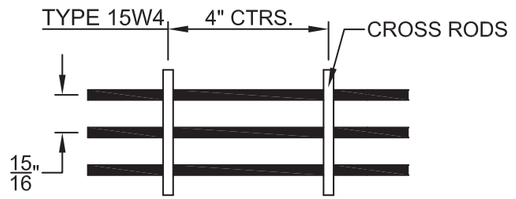
OVERVIEW

Standard



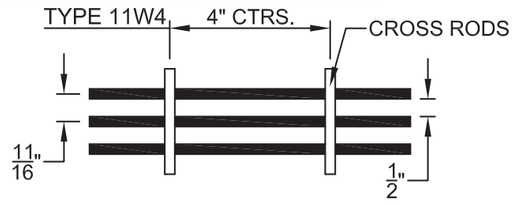
Standard Duty Grating is the most common type of grating used in the industrial flooring market. The open grid construction provides for maximum passage for light, air circulation and drainage.

Close-Mesh



When a certain bar depth must be held but standard duty is not sufficient, Close Mesh moves the bars closer to gain more strength and stiffness. This may also be warranted if the bar gap on Standard Duty is wider than desired.

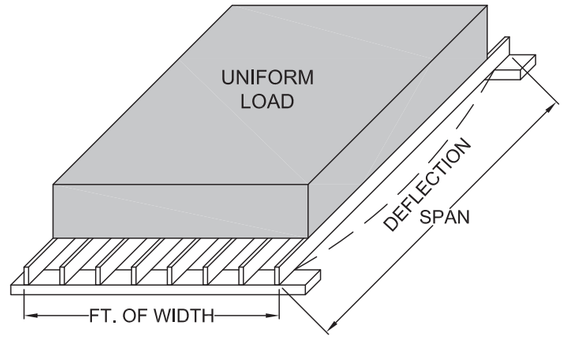
ADA-Compliant

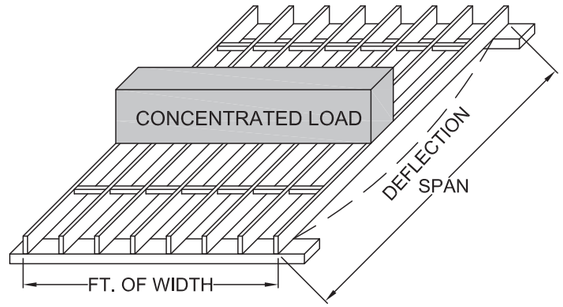


When the Grating needs to adhere to the guidelines of the Americans-with-Disabilities Act (ADA), an even-smaller bar gap is required. The ADA requires no more than a ½" opening as part of Chapter 3, Section 302.3 of the ADA Guide published by the Unites States Access Board.

DESIGN CRITERIA

The following tables of safe loads have been calculated using these design parameters:





	Uniform Load	Concentrated Load
Determine M:	$M = \frac{FS}{12}$	$M = \frac{FS}{12}$
Determine U or C:	$U = \frac{8M}{L^2}$	$C = \frac{4M}{L}$
Check D*:	$D = \frac{5UL(L \times 12)^3}{384\ EI}$	$D = \frac{C(L \times 12)^3}{48\ EI}$

*Deflection should be limited to ¼" under 100lb/ft^2 uniform load to afford pedestrian comfort.

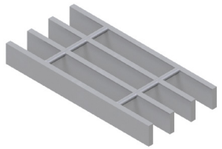
U = Uniform Load - lbs/ft^2
C = Concentrated Load - lbs/ft of grating width
S = Section Modulus - in^3/ft of grating width
I = Moment of Inertia - in^4/ft of grating width
L = Simple Clear Span - feet
D = Deflection - inches
E = Modulus of Elasticity
F = Allowable Bending Stress
M = Bending Moment

tip

Vulcraft Online Bar Grating Design Tools
If you are uncertain about which type of grating to use, try our on-line calculator. Enter your project specs and our calculator will recommend the appropriate grating. This powerful on-line tool allows you to compare alternatives so you can optimize weight, cost, or both. It saves you valuable time by eliminating manual calculations and the risk of errors. Visit **www.vulcraft.com/DesignTools/BarGratingDesignAid**

LOAD TABLES - SD

Grating Type: 19W4
Design Code: NAAMM MBG 534-19
Material: ASTM A1011CS Type B
Surface: Smooth



U = Safe Uniform Load (lbs/ft²)
D_u = Deflection Due to Safe Uniform Load (in)
C = Safe Concentrated Load (lbs/ft of grating width)
D_c = Deflection Due to Safe Concentrated Load (in)
Allowable Extreme Fiber Stress = 18 ksi

Bearing Bar Size (inches)	Approx. Weight (lbs/ft²)	Ped. Span (inches)	Load / Deflection	Span (ft -in) 2' - 0"	2' - 6"	3' - 0"	3' - 6"	4' - 0"	4' - 6"	5' - 0"	5' - 6"	6' - 0"	6' - 6"	7' - 0"	7' - 6"	8' - 0"	Section Properties S_x (in³)/ft	I_x (in⁴)/ft
1" x ⅛"	5.14	51	U	632	404	281	206	158	125								0.211	
			D_u	0.07	0.12	0.17	0.23	0.30	0.38									0.105
			C	632	505	421	361	316	281									
			D_c	0.06	0.09	0.13	0.18	0.24	0.30									
1" x 3/16"	7.33	57	U	947	606	421	309	237	187	152							0.316	
			D_u	0.07	0.12	0.17	0.23	0.30	0.38	0.47								0.158
			C	947	758	632	541	474	421	379								
			D_c	0.06	0.09	0.13	0.18	0.24	0.30	0.37								
1 ¼" x ⅛"	6.23	61	U	987	632	439	322	247	195	158	130						0.329	
			D_u	0.06	0.09	0.13	0.18	0.24	0.30	0.37	0.45							0.206
			C	987	789	658	564	493	439	395	359							
			D_c	0.05	0.07	0.11	0.15	0.19	0.24	0.30	0.36							
1 ¼" x 3/16"	8.98	67	U	1,480	947	658	483	370	292	237	196	164					0.493	
			D_u	0.06	0.09	0.13	0.18	0.24	0.30	0.37	0.45	0.54						0.308
			C	1,480	1,184	987	846	740	658	592	538	493						
			D_c	0.05	0.07	0.11	0.15	0.19	0.24	0.30	0.36	0.43						
1 ½" x ⅛"	7.33	70	U	1,421	909	632	464	355	281	227	188	158					0.474	
			D_u	0.05	0.08	0.11	0.15	0.20	0.25	0.31	0.38	0.45						0.355
			C	1,421	1,137	947	812	711	632	568	517	474						
			D_c	0.04	0.06	0.09	0.12	0.16	0.20	0.25	0.30	0.36						
1 ½" x 3/16"	10.63	77	U	2,132	1,364	947	696	533	421	341	282	237	202				0.711	
			D_u	0.05	0.08	0.11	0.15	0.20	0.25	0.31	0.38	0.45	0.52					0.533
			C	2,132	1,705	1,421	1,218	1,066	947	853	775	711	656					
			D_c	0.04	0.06	0.09	0.12	0.16	0.20	0.25	0.30	0.36	0.42					
1 ¾" x 3/16"	12.27	87	U	2,901	1,857	1,289	947	725	573	464	384	322	275	237	206		0.967	
			D_u	0.04	0.07	0.10	0.13	0.17	0.22	0.27	0.32	0.38	0.45	0.52	0.60			0.846
			C	2,901	2,321	1,934	1,658	1,451	1,289	1,161	1,055	967	893	829	774			
			D_c	0.03	0.05	0.08	0.10	0.14	0.17	0.21	0.26	0.31	0.36	0.42	0.48			
2" x 3/16"	13.92	96	U	3,789	2,425	1,684	1,237	947	749	606	501	421	359	309	269	237	1.263	
			D_u	0.04	0.06	0.08	0.11	0.15	0.19	0.23	0.28	0.34	0.39	0.46	0.52	0.60		1.263
			C	3,789	3,032	2,526	2,165	1,895	1,684	1,516	1,378	1,263	1,166	1,083	1,011	947		
			D_c	0.03	0.05	0.07	0.09	0.12	0.15	0.19	0.23	0.27	0.31	0.36	0.42	0.48		
2 ½" x 3/16"	17.21	113	U	5,921	3,789	2,632	1,933	1,480	1,170	947	783	658	561	483	421	370	1.974	
			D_u	0.03	0.05	0.07	0.09	0.12	0.15	0.19	0.23	0.27	0.31	0.36	0.42	0.48		2.467
			C	5,921	4,737	3,947	3,383	2,961	2,632	2,368	2,153	1,974	1,822	1,692	1,579	1,480		
			D_c	0.02	0.04	0.05	0.07	0.10	0.12	0.15	0.18	0.21	0.25	0.29	0.34	0.38		

Spans and loads in red exceed a deflection of ¼" for uniform loads of 100 lbs./sq. ft. Experience has shown that ¼" deflection is the maximum deflection to give pedestrian comfort, but can be exceeded for other types of loads at the discretion of the specifying professional.

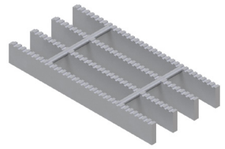
19W4 (in)

# of Bars	2	3	4	5	6	7	8	9	10	11
3/16" Bars	1-3/8	2-9/16	3-3/4	4-15/16	6-1/8	7-5/16	8-1/2	9-11/16	10-7/8	12-1/16
# of Bars	12	13	14	15	16	17	18	19	20	21
3/16" Bars	13-1/4	14-7/16	15-5/8	16-13/16	18	19-3/16	20-3/8	21-9/16	22-3/4	23-15/16
# of Bars	22	23	24	25	26	27	28	29	30	31
3/16" Bars	25-1/8	26-5/16	27-1/2	28-11/16	29-7/8	31-1/16	32-1/4	33-7/16	34-5/8	35-13/16

Deduct 1/16" for 1/8" bearing bars

LOAD TABLES - SD

Grating Type: 19W4
Design Code: NAAMM MBG 534-19
Material: ASTM A1011CS Type B
Surface: Serrated



U = Safe Uniform Load (lbs/ft²)
D_u = Deflection Due to Safe Uniform Load (in)
C = Safe Concentrated Load (lbs/ft of grating width)
D_c = Deflection Due to Safe Concentrated Load (in)
Allowable Extreme Fiber Stress = 18 ksi

Bearing Bar Size (inches)	Approx. Weight (lbs/ft²)	Ped. Span (inches)	Load / Deflection	Span (ft -in) 2' - 0"	2' - 6"	3' - 0"	3' - 6"	4' - 0"	4' - 6"	5' - 0"	5' - 6"	6' - 0"	6' - 6"	7' - 0"	7' - 6"	8' - 0"	Section Properties S_x (in³)/ft	I_x (in⁴)/ft
1" x ⅛"	5.14	42	U	355	227	158	116										0.118	
			D_u	0.10	0.16	0.22	0.30											0.044
			C	355	284	237	203											
			D_c	0.08	0.12	0.18	0.24											
1" x 3/16"	7.33	46	U	533	341	237	174	133									0.178	
			D_u	0.10	0.16	0.22	0.30	0.40										0.067
			C	533	426	355	305	266										
			D_c	0.08	0.12	0.18	0.24	0.32										
1 ¼" x ⅛"	6.23	51	U	632	404	281	206	158	125								0.211	
			D_u	0.07	0.12	0.17	0.23	0.30	0.38									0.105
			C	632	505	421	361	316	281									
			D_c	0.06	0.09	0.13	0.18	0.24	0.30									
1 ¼" x 3/16"	8.98	57	U	947	606	421	309	237	187	152							0.316	
			D_u	0.07	0.12	0.17	0.23	0.30	0.38	0.47								0.158
			C	947	758	632	541	474	421	379								
			D_c	0.06	0.09	0.13	0.18	0.24	0.30	0.37								
1 ½" x ⅛"	7.33	61	U	987	632	439	322	247	195	158	130						0.329	
			D_u	0.06	0.09	0.13	0.18	0.24	0.30	0.37	0.45							0.206
			C	987	789	658	564	493	439	395	359							
			D_c	0.05	0.07	0.11	0.15	0.19	0.24	0.30	0.36							
1 ½" x 3/16"	10.63	67	U	1,480	947	658	483	370	292	237	196	164					0.493	
			D_u	0.06	0.09	0.13	0.18	0.24	0.30	0.37	0.45	0.54						0.308
			C	1,480	1,184	987	846	740	658	592	538	493						
			D_c	0.05	0.07	0.11	0.15	0.19	0.24	0.30	0.36	0.43						
1 ¾" x 3/16"	12.27	77	U	2,132	1,364	947	696	533	421	341	282	237	202				0.711	
			D_u	0.05	0.08	0.11	0.15	0.20	0.25	0.31	0.38	0.45	0.52					0.533
			C	2,132	1,705	1,421	1,218	1,066	947	853	775	711	656					
			D_c	0.04	0.06	0.09	0.12	0.16	0.20	0.25	0.30	0.36	0.42					
2" x 3/16"	13.92	87	U	2,901	1,857	1,289	947	725	573	464	384	322	275	237	206		0.967	
			D_u	0.04	0.07	0.10	0.13	0.17	0.22	0.27	0.32	0.38	0.45	0.52	0.60			0.846
			C	2,901	2,321	1,934	1,658	1,451	1,289	1,161	1,055	967	893	829	774			
			D_c	0.03	0.05	0.08	0.10	0.14	0.17	0.21	0.26	0.31	0.36	0.42	0.48			
2 ½" x 3/16"	17.21	105	U	4,796	3,069	2,132	1,566	1,199	947	767	634	533	454	392	341	300	1.599	
			D_u	0.03	0.05	0.07	0.10	0.13	0.17	0.21	0.25	0.30	0.35	0.41	0.47	0.53		1.799
			C	4,796	3,837	3,197	2,741	2,398	2,132	1,918	1,744	1,599	1,476	1,370	1,279	1,199		
			D_c	0.03	0.04	0.06	0.08	0.11	0.13	0.17	0.20	0.24	0.28	0.32	0.37	0.42		

Spans and loads in red exceed a deflection of ¼" for uniform loads of 100 lbs./sq. ft. Experience has shown that ¼" deflection is the maximum deflection to give pedestrian comfort, but can be exceeded for other types of loads at the discretion of the specifying professional.

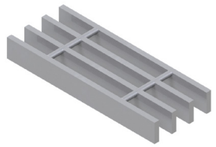
19W4 (in)

# of Bars	2	3	4	5	6	7	8	9	10	11
3/16" Bars	1-3/8	2-9/16	3-3/4	4-15/16	6-1/8	7-5/16	8-1/2	9-11/16	10-7/8	12-1/16
# of Bars	12	13	14	15	16	17	18	19	20	21
3/16" Bars	13-1/4	14-7/16	15-5/8	16-13/16	18	19-3/16	20-3/8	21-9/16	22-3/4	23-15/16
# of Bars	22	23	24	25	26	27	28	29	30	31
3/16" Bars	25-1/8	26-5/16	27-1/2	28-11/16	29-7/8	31-1/16	32-1/4	33-7/16	34-5/8	35-13/16

Deduct 1/16" for 1/8" bearing bars

LOAD TABLES - CLOSE-MESH

Grating Type: 15W4
Design Code: NAAMM MBG 534-19
Material: ASTM A1011CS Type B
Surface: Smooth



U = Safe Uniform Load (lbs/ft²)
D_u = Deflection Due to Safe Uniform Load (in)
C = Safe Concentrated Load (lbs/ft of grating width)
D_c = Deflection Due to Safe Concentrated Load (in)
Allowable Extreme Fiber Stress = 18 ksi

Bearing Bar Size (inches)	Approx. Weight (lbs/ft²)	Ped. Span (inches)	Load / Deflection	Span (ft -in) 2' - 0"	2' - 6"	3' - 0"	3' - 6"	4' - 0"	4' - 6"	5' - 0"	5' - 6"	6' - 0"	6' - 6"	7' - 0"	7' - 6"	8' - 0"	Section Properties S_x (in³)/ft	I_x (in⁴)/ft
1" x ⅛"	6.27	55	U	800	512	356	261	200	158	128							0.267	
			D_u	0.07	0.12	0.17	0.23	0.30	0.38	0.47								0.133
			C	800	640	533	457	400	356	320								
			D_c	0.06	0.09	0.13	0.18	0.24	0.30	0.37								
1" x 3/16"	9.03	60	U	1,200	768	533	392	300	237	192							0.400	
			D_u	0.07	0.12	0.17	0.23	0.30	0.38	0.47								0.200
			C	1,200	960	800	686	600	533	480								
			D_c	0.06	0.09	0.13	0.18	0.24	0.30	0.37								
1 ¼" x ⅛"	7.65	65	U	1,250	800	556	408	313	247	200	165						0.417	
			D_u	0.06	0.09	0.13	0.18	0.24	0.30	0.37	0.45							0.260
			C	1,250	1,000	833	714	625	556	500	455							
			D_c	0.05	0.07	0.11	0.15	0.19	0.24	0.30	0.36							
1 ¼" x 3/16"	11.10	71	U	1,875	1,200	833	612	469	370	300	248	208					0.625	
			D_u	0.06	0.09	0.13	0.18	0.24	0.30	0.37	0.45	0.54						0.391
			C	1,875	1,500	1,250	1,071	938	833	750	682	625						
			D_c	0.05	0.07	0.11	0.15	0.19	0.24	0.30	0.36	0.43						
1 ½" x ⅛"	9.03	74	U	1,800	1,152	800	588	450	356	288	238	200	170				0.600	
			D_u	0.05	0.08	0.11	0.15	0.20	0.25	0.31	0.38	0.45	0.52					0.450
			C	1,800	1,440	1,200	1,029	900	800	720	655	600	554					
			D_c	0.04	0.06	0.09	0.12	0.16	0.20	0.25	0.30	0.36	0.42					
1 ½" x 3/16"	13.18	82	U	2,700	1,728	1,200	882	675	533	432	357	300	256	220			0.900	
			D_u	0.05	0.08	0.11	0.15	0.20	0.25	0.31	0.38	0.45	0.52	0.61				0.675
			C	2,700	2,160	1,800	1,543	1,350	1,200	1,080	982	900	831	771				
			D_c	0.04	0.06	0.09	0.12	0.16	0.20	0.25	0.30	0.36	0.42	0.49				
1 ¾" x 3/16"	15.25	92	U	3,675	2,352	1,633	1,200	919	726	588	486	408	348	300	261	230	1.225	
			D_u	0.04	0.07	0.10	0.13	0.17	0.22	0.27	0.32	0.38	0.45	0.52	0.60	0.68		1.072
			C	3,675	2,940	2,450	2,100	1,838	1,633	1,470	1,336	1,225	1,131	1,050	980	919		
			D_c	0.03	0.05	0.08	0.10	0.14	0.17	0.21	0.26	0.31	0.36	0.42	0.48	0.54		
2" x 3/16"	17.32	102	U	4,800	3,072	2,133	1,567	1,200	948	768	635	533	454	392	341	300	1.600	
			D_u	0.04	0.06	0.08	0.11	0.15	0.19	0.23	0.28	0.34	0.39	0.46	0.52	0.60		1.600
			C	4,800	3,840	3,200	2,743	2,400	2,133	1,920	1,745	1,600	1,477	1,371	1,280	1,200		
			D_c	0.03	0.05	0.07	0.09	0.12	0.15	0.19	0.23	0.27	0.31	0.36	0.42	0.48		
2 ½" x 3/16"	21.46	120	U	7,500	4,800	3,333	2,449	1,875	1,481	1,200	992	833	710	612	533	469	2.500	
			D_u	0.03	0.05	0.07	0.09	0.12	0.15	0.19	0.23	0.27	0.31	0.36	0.42	0.48		3.125
			C	7,500	6,000	5,000	4,286	3,750	3,333	3,000	2,727	2,500	2,308	2,143	2,000	1,875		
			D_c	0.02	0.04	0.05	0.07	0.10	0.12	0.15	0.18	0.21	0.25	0.29	0.34	0.38		

Spans and loads in red exceed a deflection of 1/4" for uniform loads of 100 lbs./sq. ft. Experience has shown that 1/4" deflection is the maximum deflection to give pedestrian comfort, but can be exceeded for other types of loads at the discretion of the specifying professional.

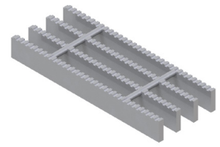
15W4 (in)

# of Bars	2	3	4	5	6	7	8	9	10	11
3/16" Bars	1-1/8	2-1/16	3	3-15/16	4-7/8	5-13/16	6-3/4	7-11/16	8-5/8	9-9/16
# of Bars	12	13	14	15	16	17	18	19	20	21
3/16" Bars	10-1/2	11-7/16	12-3/8	13-5/16	14-1/4	15-3/16	16-1/8	17-1/16	18	18-15/16
# of Bars	22	23	24	25	26	27	28	29	30	31
3/16" Bars	19-7/8	20-13/16	21-3/4	22-11/16	23-5/8	24-9/16	25-1/2	26-7/16	27-3/8	28-5/16
# of Bars	32	33	34	35	36	37	38	39	40	41
3/16" Bars	29-1/4	30-3/16	31-1/8	32-1/16	33	33-15/16	34-7/8	35-13/16	36-3/4	37-11/16

Deduct 1/16" for 1/8" bearing bars

LOAD TABLES - CLOSE-MESH

Grating Type: 15W4
Design Code: NAAMM MBG 534-19
Material: ASTM A1011CS Type B
Surface: Serrated



U = Safe Uniform Load (lbs/ft²)
D_u = Deflection Due to Safe Uniform Load (in)
C = Safe Concentrated Load (lbs/ft of grating width)
D_c = Deflection Due to Safe Concentrated Load (in)
Allowable Extreme Fiber Stress = 18 ksi

Bearing Bar Size (inches)	Approx. Weight (lbs/ft²)	Ped. Span (inches)	Load / Deflection	Span (ft -in) 2' - 0"	2' - 6"	3' - 0"	3' - 6"	4' - 0"	4' - 6"	5' - 0"	5' - 6"	6' - 0"	6' - 6"	7' - 0"	7' - 6"	8' - 0"	Section Properties S_x (in³)/ft	I_x (in⁴)/ft
1" x ⅛"	6.27	44	U	450	288	200	147	113									0.150	
			D_u	0.10	0.16	0.22	0.30	0.40										0.056
			C	450	360	300	257	225										
			D_c	0.08	0.12	0.18	0.24	0.32										
1" x 3/16"	9.03	49	U	675	432	300	220	169	133								0.225	
			D_u	0.10	0.16	0.22	0.30	0.40	0.50									0.084
			C	675	540	450	386	338	300									
			D_c	0.08	0.12	0.18	0.24	0.32	0.40									
1 ¼" x ⅛"	7.65	55	U	800	512	356	261	200	158	128							0.267	
			D_u	0.07	0.12	0.17	0.23	0.30	0.38	0.47								0.133
			C	800	640	533	457	400	356	320								
			D_c	0.06	0.09	0.13	0.18	0.24	0.30	0.37								
1 ¼" x 3/16"	11.10	60	U	1,200	768	533	392	300	237	192							0.400	
			D_u	0.07	0.12	0.17	0.23	0.30	0.38	0.47								0.200
			C	1,200	960	800	686	600	533	480								
			D_c	0.06	0.09	0.13	0.18	0.24	0.30	0.37								
1 ½" x ⅛"	9.03	65	U	1,250	800	556	408	313	247	200	165						0.417	
			D_u	0.06	0.09	0.13	0.18	0.24	0.30	0.37	0.45							0.260
			C	1,250	1,000	833	714	625	556	500	455							
			D_c	0.05	0.07	0.11	0.15	0.19	0.24	0.30	0.36							
1 ½" x 3/16"	13.18	71	U	1,875	1,200	833	612	469	370	300	248	208					0.625	
			D_u	0.06	0.09	0.13	0.18	0.24	0.30	0.37	0.45	0.54						0.391
			C	1,875	1,500	1,250	1,071	938	833	750	682	625						
			D_c	0.05	0.07	0.11	0.15	0.19	0.24	0.30	0.36	0.43						
1 ¾" x 3/16"	15.25	82	U	2,700	1,728	1,200	882	675	533	432	357	300	256	220			0.900	
			D_u	0.05	0.08	0.11	0.15	0.20	0.25	0.31	0.38	0.45	0.52	0.61				0.675
			C	2,700	2,160	1,800	1,543	1,350	1,200	1,080	982	900	831	771				
			D_c	0.04	0.06	0.09	0.12	0.16	0.20	0.25	0.30	0.36	0.42	0.49				
2" x 3/16"	17.32	92	U	3,675	2,352	1,633	1,200	919	726	588	486	408	348	300	261	230	1.225	
			D_u	0.04	0.07	0.10	0.13	0.17	0.22	0.27	0.32	0.38	0.45	0.52	0.60	0.68		1.072
			C	3,675	2,940	2,450	2,100	1,838	1,633	1,470	1,336	1,225	1,131	1,050	980	919		
			D_c	0.03	0.05	0.08	0.10	0.14	0.17	0.21	0.26	0.31	0.36	0.42	0.48	0.54		
2 ½" x 3/16"	21.46	111	U	6,075	3,888	2,700	1,984	1,519	1,200	972	803	675	575	496	432	380	2.025	
			D_u	0.03	0.05	0.07	0.10	0.13	0.17	0.21	0.25	0.30	0.35	0.41	0.47	0.53		2.278
			C	6,075	4,860	4,050	3,471	3,038	2,700	2,430	2,209	2,025	1,869	1,736	1,620	1,519		
			D_c	0.03	0.04	0.06	0.08	0.11	0.13	0.17	0.20	0.24	0.28	0.32	0.37	0.42		

Spans and loads in red exceed a deflection of 1/4" for uniform loads of 100 lbs./sq. ft. Experience has shown that 1/4" deflection is the maximum deflection to give pedestrian comfort, but can be exceeded for other types of loads at the discretion of the specifying professional.

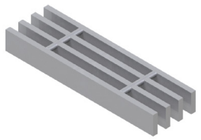
15W4 (in)

# of Bars	2	3	4	5	6	7	8	9	10	11
3/16" Bars	1-1/8	2-1/16	3	3-15/16	4-7/8	5-13/16	6-3/4	7-11/16	8-5/8	9-9/16
# of Bars	12	13	14	15	16	17	18	19	20	21
3/16" Bars	10-1/2	11-7/16	12-3/8	13-5/16	14-1/4	15-3/16	16-1/8	17-1/16	18	18-15/16
# of Bars	22	23	24	25	26	27	28	29	30	31
3/16" Bars	19-7/8	20-13/16	21-3/4	22-11/16	23-5/8	24-9/16	25-1/2	26-7/16	27-3/8	28-5/16
# of Bars	32	33	34	35	36	37	38	39	40	41
3/16" Bars	29-1/4	30-3/16	31-1/8	32-1/16	33	33-15/16	34-7/8	35-13/16	36-3/4	37-11/16

Deduct 1/16" for 1/8" bearing bars

LOAD TABLES - ADA

Grating Type: 11W4
Design Code: NAAMM MBG 534-19
Material: ASTM A1011CS Type B
Surface: Smooth



U = Safe Uniform Load (lbs/ft²)
D_u = Deflection Due to Safe Uniform Load (in)
C = Safe Concentrated Load (lbs/ft of grating width)
D_c = Deflection Due to Safe Concentrated Load (in)
Allowable Extreme Fiber Stress = 18 ksi

Bearing Bar Size (inches)	Approx. Weight (lbs/ft²)	Ped. Span (inches)	Load / Deflection	Span (ft -in) 2' - 0"	2' - 6"	3' - 0"	3' - 6"	4' - 0"	4' - 6"	5' - 0"	5' - 6"	6' - 0"	6' - 6"	7' - 0"	7' - 6"	8' - 0"	Section Properties S_x (in³)/ft	I_x (in⁴)/ft
1" x ⅛"	8.25	59	U	1,091	698	485	356	273	215	175								0.364
			D_u	0.07	0.12	0.17	0.23	0.30	0.38	0.47								
			C	1,091	873	727	623	545	485	436								0.182
			D_c	0.06	0.09	0.13	0.18	0.24	0.30	0.37								
1 ¼" x 3/16"	14.82	77	U	2,557	1,636	1,136	835	639	505	409	338	284	242					0.852
			D_u	0.06	0.09	0.13	0.18	0.24	0.30	0.37	0.45	0.54	0.63					
			C	2,557	2,045	1,705	1,461	1,278	1,136	1,023	930	852	787					0.533
			D_c	0.05	0.07	0.11	0.15	0.19	0.24	0.30	0.36	0.43	0.50					
1 ½" x 3/16"	17.64	89	U	3,682	2,356	1,636	1,202	920	727	589	487	409	349	301	262			1.227
			D_u	0.05	0.08	0.11	0.15	0.20	0.25	0.31	0.38	0.45	0.52	0.61	0.70			
			C	3,682	2,945	2,455	2,104	1,841	1,636	1,473	1,339	1,227	1,133	1,052	982			0.920
			D_c	0.04	0.06	0.09	0.12	0.16	0.20	0.25	0.30	0.36	0.42	0.49	0.56			
1 ¾" x 3/16"	20.45	99	U	5,011	3,207	2,227	1,636	1,253	990	802	663	557	474	409	356	313		1.670
			D_u	0.04	0.07	0.10	0.13	0.17	0.22	0.27	0.32	0.38	0.45	0.52	0.60	0.68		
			C	5,011	4,009	3,341	2,864	2,506	2,227	2,005	1,822	1,670	1,542	1,432	1,336	1,253		1.462
			D_c	0.03	0.05	0.08	0.10	0.14	0.17	0.21	0.26	0.31	0.36	0.42	0.48	0.54		
2" x 3/16"	23.27	110	U	6,545	4,189	2,909	2,137	1,636	1,293	1,047	866	727	620	534	465	409		2.182
			D_u	0.04	0.06	0.08	0.11	0.15	0.19	0.23	0.28	0.34	0.39	0.46	0.52	0.60		
			C	6,545	5,236	4,364	3,740	3,273	2,909	2,618	2,380	2,182	2,014	1,870	1,745	1,636		2.182
			D_c	0.03	0.05	0.07	0.09	0.12	0.15	0.19	0.23	0.27	0.31	0.36	0.42	0.48		
2 ½" x 3/16"	28.90	130	U	10,227	6,545	4,545	3,340	2,557	2,020	1,636	1,352	1,136	968	835	727	639		3.409
			D_u	0.03	0.05	0.07	0.09	0.12	0.15	0.19	0.23	0.27	0.31	0.36	0.42	0.48		
			C	10,227	8,182	6,818	5,844	5,114	4,545	4,091	3,719	3,409	3,147	2,922	2,727	2,557		4.261
			D_c	0.02	0.04	0.05	0.07	0.10	0.12	0.15	0.18	0.21	0.25	0.29	0.34	0.38		

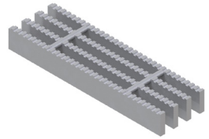
Spans and loads in red exceed a deflection of ¼" for uniform loads of 100 lbs./sq. ft. Experience has shown that ¼" deflection is the maximum deflection to give pedestrian comfort, but can be exceeded for other types of loads at the discretion of the specifying professional.

11W4 (in)

# of Bars	2	3	4	5	6	7	8	9	10	11
3/16" Bars	7/8	1-9/16	2-1/4	2-15/16	3-5/8	4-5/16	5	5-11/16	6-3/8	7-1/16
# of Bars	12	13	14	15	16	17	18	19	20	21
3/16" Bars	7-3/4	8-7/16	9-1/8	9-13/16	10-1/2	11-3/16	11-7/8	12-9/16	13-1/4	13-15/16
# of Bars	22	23	24	25	26	27	28	29	30	31
3/16" Bars	14-5/8	15-5/16	16	16-11/16	17-3/8	18-1/16	18-3/4	19-7/16	20-1/8	20-13/16
# of Bars	32	33	34	35	36	37	38	39	40	41
3/16" Bars	21-1/2	22-3/16	22-7/8	23-9/16	24-1/4	24-15/16	24-15/16	26-5/16	27	27-11/16

LOAD TABLES - ADA

Grating Type: 11W4
Design Code: NAAMM MBG 534-19
Material: ASTM A1011CS Type B
Surface: Serrated



U = Safe Uniform Load (lbs/ft²)
D_u = Deflection Due to Safe Uniform Load (in)
C = Safe Concentrated Load (lbs/ft of grating width)
D_c = Deflection Due to Safe Concentrated Load (in)
Allowable Extreme Fiber Stress = 18 ksi

Bearing Bar Size (inches)	Approx. Weight (lbs/ft²)	Ped. Span (inches)	Load / Deflection	Span (ft -in) 2' - 0"	2' - 6"	3' - 0"	3' - 6"	4' - 0"	4' - 6"	5' - 0"	5' - 6"	6' - 0"	6' - 6"	7' - 0"	7' - 6"	8' - 0"	Section Properties S_x (in³)/ft	I_x (in⁴)/ft
1" x ⅛"	8.25	48	U	614	393	273	200	153										0.205
			D_u	0.10	0.16	0.22	0.30	0.40										
			C	614	491	409	351	307										0.077
			D_c	0.08	0.12	0.18	0.24	0.32										
1 ¼" x 3/16"	14.82	65	U	1,636	1,047	727	534	409	323	262	216							0.545
			D_u	0.07	0.12	0.17	0.23	0.30	0.38	0.47	0.56							
			C	1,636	1,309	1,091	935	818	727	655	595							0.273
			D_c	0.06	0.09	0.13	0.18	0.24	0.30	0.37	0.45							
1 ½" x 3/16"	17.64	77	U	2,557	1,636	1,136	835	639	505	409	338	284	242					0.852
			D_u	0.06	0.09	0.13	0.18	0.24	0.30	0.37	0.45	0.54	0.63					
			C	2,557	2,045	1,705	1,461	1,278	1,136	1,023	930	852	787					0.533
			D_c	0.05	0.07	0.11	0.15	0.19	0.24	0.30	0.36	0.43	0.50					
1 ¾" x 3/16"	20.45	89	U	3,682	2,356	1,636	1,202	920	727	589	487	409	349	301	262			1.227
			D_u	0.05	0.08	0.11	0.15	0.20	0.25	0.31	0.38	0.45	0.52	0.61	0.70			
			C	3,682	2,945	2,455	2,104	1,841	1,636	1,473	1,339	1,227	1,133	1,052	982			0.920
			D_c	0.04	0.06	0.09	0.12	0.16	0.20	0.25	0.30	0.36	0.42	0.49	0.56			
2" x 3/16"	23.27	99	U	5,011	3,207	2,227	1,636	1,253	990	802	663	557	474	409	356	313		1.670
			D_u	0.04	0.07	0.10	0.13	0.17	0.22	0.27	0.32	0.38	0.45	0.52	0.60	0.68		
			C	5,011	4,009	3,341	2,864	2,506	2,227	2,005	1,822	1,670	1,542	1,432	1,336	1,253		1.462
			D_c	0.03	0.05	0.08	0.10	0.14	0.17	0.21	0.26	0.31	0.36	0.42	0.48	0.54		
2 ½" x 3/16"	28.90	120	U	8,284	5,302	3,682	2,705	2,071	1,636	1,325	1,095	920	784	676	589	518		2.761
			D_u	0.03	0.05	0.07	0.10	0.13	0.17	0.21	0.25	0.30	0.35	0.41	0.47	0.53		
			C	8,284	6,627	5,523	4,734	4,142	3,682	3,314	3,012	2,761	2,549	2,367	2,209	2,071		3.107
			D_c	0.03	0.04	0.06	0.08	0.11	0.13	0.17	0.20	0.24	0.28	0.32	0.37	0.42		

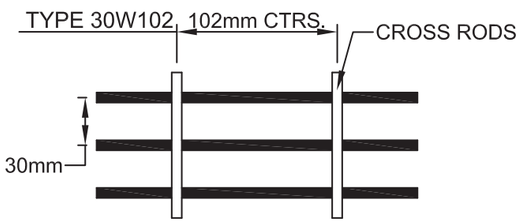
Spans and loads in red exceed a deflection of ¼" for uniform loads of 100 lbs./sq. ft. Experience has shown that ¼" deflection is the maximum deflection to give pedestrian comfort, but can be exceeded for other types of loads at the discretion of the specifying professional.

11W4 (in)

# of Bars	2	3	4	5	6	7	8	9	10	11
3/16" Bars	7/8	1-9/16	2-1/4	2-15/16	3-5/8	4-5/16	5	5-11/16	6-3/8	7-1/16
# of Bars	12	13	14	15	16	17	18	19	20	21
3/16" Bars	7-3/4	8-7/16	9-1/8	9-13/16	10-1/2	11-3/16	11-7/8	12-9/16	13-1/4	13-15/16
# of Bars	22	23	24	25	26	27	28	29	30	31
3/16" Bars	14-5/8	15-5/16	16	16-11/16	17-3/8	18-1/16	18-3/4	19-7/16	20-1/8	20-13/16
# of Bars	32	33	34	35	36	37	38	39	40	41
3/16" Bars	21-1/2	22-3/16	22-7/8	23-9/16	24-1/4	24-15/16	24-15/16	26-5/16	27	27-11/16

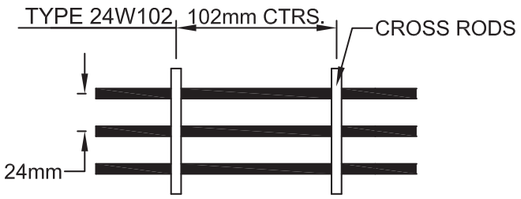
OVERVIEW

Standard



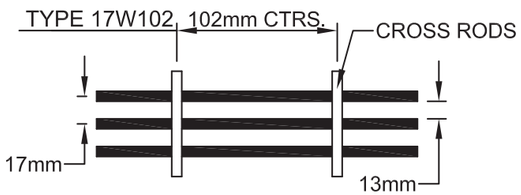
Standard Duty Grating is the most common type of grating used in the industrial flooring market. The open grid construction provides for maximum passage for light, air circulation and drainage.

Close-Mesh



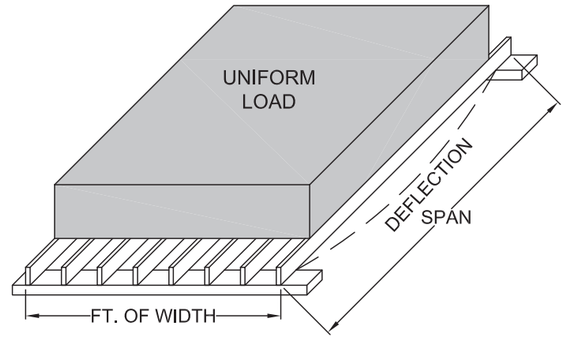
When a certain bar depth must be held but standard duty is not sufficient, Close Mesh moves the bars closer to gain more strength and stiffness. This may also be warranted if the bar gap on Standard Duty is wider than desired.

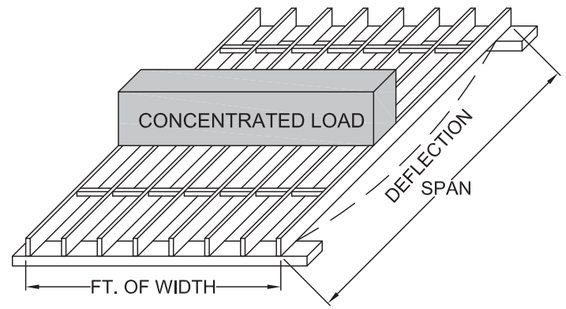
ADA-Compliant



When the Grating needs to adhere to the guidelines of the Americans-with-Disabilities Act (ADA), an even-smaller bar gap is required. The ADA requires no more than a 13mm opening as part of Chapter 3, Section 302.3 of the ADA Guide published by the Unites States Access Board.

DESIGN CRITERIA





	Uniform Load	Concentrated Load
Determine M:	$M = \frac{FS}{12}$	$M = \frac{FS}{12}$
Determine U or C:	$U = \frac{8M}{L^2}$	$C = \frac{4M}{L}$
Check D*:	$D = \frac{5UL*L^3}{384\ EI}$	$D = \frac{C*L^3}{48\ EI}$

*Deflection should be limited to 7mm under .45kN uniform load to afford pedestrian comfort.

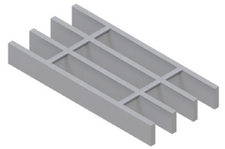
U = Uniform Load - kPa
C = Concentrated Load - kN/m of grating width
S = Section Modulus - mm^3/m of grating width
I = Moment of Inertia - mm^4/m of grating width
L = Simple Clear Span - m
D = Deflection - mm
E = Modulus of Elasticity - kPa
F = Allowable Bending Stress - kPa
M = Bending Moment - kN-m

tip

Vulcraft Online Bar Grating Design Tools
If you are uncertain about which type of grating to use, try our on-line calculator. Enter your project specs and our calculator will recommend the appropriate grating. This powerful on-line tool allows you to compare alternatives so you can optimize weight, cost, or both. It saves you valuable time by eliminating manual calculations and the risk of errors. Visit **www.vulcraft.com/DesignTools/BarGratingDesignAid**

LOAD TABLES - SD

Grating Type: 30W102
Design Code: NAAMM MBG 534-19
Material: ASTM A1011CS Type B
Surface: Smooth



U = Safe Uniform Load (kPa)
D_u = Deflection Due to Safe Uniform Load (mm)
C = Safe Concentrated Load (kN/meter of grating width)
D_c = Deflection Due to Safe Concentrated Load (mm)
Allowable Extreme Fiber Stress = 124.11 MPa

Bearing Bar Size (mm)	Approx. Weight (kg/m²)	Ped. Span (mm)	Load / Deflection	SPAN (mm) 610	762	915	1067	1220	1372	1524	1677	1829	1982	2134	2286	2438	Section Properties S_x (mm³)/m / I_x (mm⁴)/m
25 x 3	25.0	1,312.00	U	30.6	19.6	13.6	10.0	7.7	6.0								11,470
			D_u	1.9	3.0	4.3	5.8	7.6	9.6								
			C	9.3	7.5	6.2	5.3	4.7	4.2								145.66E+3
			D_c	1.5	2.4	3.4	4.6	6.1	7.7								
25 x 5	35.9	1,452.00	U	45.9	29.4	20.4	15.0	11.5	9.1	7.4							17,200
			D_u	1.9	3.0	4.3	5.8	7.6	9.6	11.8							
			C	14.0	11.2	9.3	8.0	7.0	6.2	5.6							218.49E+3
			D_c	1.5	2.4	3.4	4.6	6.1	7.7	9.5							
32 x 3	30.5	1,552.00	U	48.0	30.7	21.3	15.7	12.0	9.5	7.7	6.3						17,980
			D_u	1.5	2.4	3.4	4.6	6.0	7.7	9.4	11.4						
			C	14.6	11.7	9.8	8.4	7.3	6.5	5.9	5.3						285.84E+3
			D_c	1.2	1.9	2.7	3.7	4.8	6.1	7.6	9.1						
32 x 5	44.1	1,718.00	U	72.0	46.1	32.0	23.5	18.0	14.2	11.5	9.5	8.0					26,970
			D_u	1.5	2.4	3.4	4.6	6.0	7.7	9.4	11.4	13.6					
			C	21.9	17.6	14.6	12.5	11.0	9.8	8.8	8.0	7.3					428.77E+3
			D_c	1.2	1.9	2.7	3.7	4.8	6.1	7.6	9.1	10.9					
38 x 3	39.0	1,778.00	U	68.9	44.1	30.6	22.5	17.2	13.6	11.0	9.1	7.7					25,810
			D_u	1.3	2.0	2.8	3.9	5.0	6.4	7.9	9.5	11.4					
			C	21.0	16.8	14.0	12.0	10.5	9.3	8.4	7.6	7.0					491.61E+3
			D_c	1.0	1.6	2.3	3.1	4.0	5.1	6.3	7.6	9.1					
38 x 5	52.1	1,967.00	U	103.3	66.1	45.9	33.7	25.8	20.4	16.5	13.7	11.5	9.8				38,710
			D_u	1.3	2.0	2.8	3.9	5.0	6.4	7.9	9.5	11.4	13.3				
			C	31.5	25.2	21.0	18.0	15.8	14.0	12.6	11.5	10.5	9.7				737.42E+3
			D_c	1.0	1.6	2.3	3.1	4.0	5.1	6.3	7.6	9.1	10.7				
45 x 5	60.3	2,210.00	U	140.9	90.2	62.7	46.0	35.2	27.9	22.6	18.6	15.7	13.4	11.5	10.0		52,810
			D_u	1.1	1.7	2.4	3.3	4.3	5.5	6.8	8.2	9.7	11.4	13.2	15.2		
			C	43.0	34.4	28.7	24.6	21.5	19.1	17.2	15.6	14.3	13.2	12.3	11.5		1.17E+6
			D_c	0.9	1.4	1.9	2.6	3.5	4.4	5.4	6.5	7.8	9.1	10.6	12.1		
51 x 5	68.4	2,441.00	U	183.6	117.6	81.6	60.0	45.9	36.3	29.4	24.3	20.4	17.4	15.0	13.1	11.5	68,820
			D_u	0.9	1.5	2.1	2.9	3.8	4.8	5.9	7.2	8.5	10.0	11.6	13.3	15.1	
			C	56.0	44.8	37.3	32.0	28.0	24.9	22.4	20.4	18.7	17.2	16.0	14.9	14.0	1.75E+6
			D_c	0.8	1.2	1.7	2.3	3.0	3.8	4.7	5.7	6.8	8.0	9.3	10.6	12.1	
64 x 5	84.7	2,886.00	U	286.9	183.7	127.6	93.7	71.8	56.7	45.9	38.0	31.9	27.2	23.4	20.4	18.0	107,530
			D_u	0.8	1.2	1.7	2.3	3.0	3.8	4.7	5.7	6.8	8.0	9.3	10.6	12.1	
			C	87.5	70.0	58.4	50.0	43.8	38.9	35.0	31.8	29.2	26.9	25.0	23.3	21.9	3.41E+6
			D_c	0.6	0.9	1.4	1.9	2.4	3.1	3.8	4.6	5.4	6.4	7.4	8.5	9.7	

Spans and loads in red exceed a deflection of 6mm for uniform loads of 5kPa. Experience has shown that 6mm deflection is the maximum deflection to give pedestrian comfort, but can be exceeded for other types of loads at the discretion of the specifying professional.

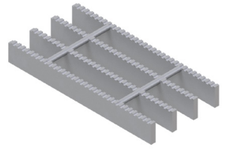
30W102 (mm)

# of Bars	2	3	4	5	6	7	8	9	10	11
5mm Bars	35	65	95	125	155	185	215	245	275	305
# of Bars	12	13	14	15	16	17	18	19	20	21
5mm Bars	335	365	395	425	455	485	515	545	575	605
# of Bars	22	23	24	25	26	27	28	29	30	31
5mm Bars	635	665	695	725	755	785	815	845	875	905

Deduct 1.5mm for 3mm bearing bars

LOAD TABLES - SD

Grating Type: 30W102
Design Code: NAAMM MBG 534-19
Material: ASTM A1011CS Type B
Surface: Serrated



U = Safe Uniform Load (kPa)
D_u = Deflection Due to Safe Uniform Load (mm)
C = Safe Concentrated Load (kN/meter of grating width)
D_c = Deflection Due to Safe Concentrated Load (mm)
Allowable Extreme Fiber Stress = 124.11 MPa

Bearing Bar Size (mm)	Approx. Weight (kg/m²)	Ped. Span (mm)	Load / Deflection	SPAN (mm) 610	762	915	1067	1220	1372	1524	1677	1829	1982	2134	2286	2438	Section Properties S_x (mm³)/m / I_x (mm⁴)/m
25 x 3	25.0	1,055.00	U	17.1	11.0	7.6											6,420
			D_u	2.5	4.0	5.7											
			C	5.2	4.2	3.5											60.97E+3
			D_c	2.0	3.2	4.6											
25 x 5	35.9	1,168.00	U	25.7	16.4	11.4	8.4	6.4									9,630
			D_u	2.5	4.0	5.7	7.7	10.1									
			C	7.8	6.3	5.2	4.5	3.9									91.45E+3
			D_c	2.0	3.2	4.6	6.2	8.1									
32 x 3	30.5	1,312.00	U	30.6	19.6	13.6	10.0	7.7	6.0								11,470
			D_u	1.9	3.0	4.3	5.8	7.6	9.6								
			C	9.3	7.5	6.2	5.3	4.7	4.2								145.66E+3
			D_c	1.5	2.4	3.4	4.6	6.1	7.7								
32 x 5	44.1	1,452.00	U	45.9	29.4	20.4	15.0	11.5	9.1	7.4							17,200
			D_u	1.9	3.0	4.3	5.8	7.6	9.6	11.8							
			C	14.0	11.2	9.3	8.0	7.0	6.2	5.6							218.49E+3
			D_c	1.5	2.4	3.4	4.6	6.1	7.7	9.5							
38 x 3	35.9	1,549.00	U	47.7	30.5	21.2	15.6	11.9	9.4	7.6	6.3						17,870
			D_u	1.5	2.4	3.4	4.6	6.1	7.7	9.5	11.5						
			C	14.5	11.6	9.7	8.3	7.3	6.5	5.8	5.3						283.16E+3
			D_c	1.2	1.9	2.7	3.7	4.9	6.1	7.6	9.2						
38 x 5	52.1	1,714.00	U	71.5	45.8	31.8	23.4	17.9	14.1	11.4	9.5	8.0					26,800
			D_u	1.5	2.4	3.4	4.6	6.1	7.7	9.5	11.5	13.6					
			C	21.8	17.4	14.5	12.5	10.9	9.7	8.7	7.9	7.3					424.73E+3
			D_c	1.2	1.9	2.7	3.7	4.9	6.1	7.6	9.2	10.9					
45 x 5	60.3	1,967.00	U	103.3	66.1	45.9	33.7	25.8	20.4	16.5	13.7	11.5	9.8				38,710
			D_u	1.3	2.0	2.8	3.9	5.0	6.4	7.9	9.5	11.4	13.3				
			C	31.5	25.2	21.0	18.0	15.8	14.0	12.6	11.5	10.5	9.7				737.42E+3
			D_c	1.0	1.6	2.3	3.1	4.0	5.1	6.3	7.6	9.1	10.7				
51 x 5	68.4	2,207.00	U	140.3	89.8	62.4	45.8	35.1	27.7	22.5	18.6	15.6	13.3	11.5	10.0		52,570
			D_u	1.1	1.7	2.4	3.3	4.3	5.5	6.8	8.2	9.7	11.4	13.3	15.2		
			C	42.8	34.2	28.5	24.5	21.4	19.0	17.1	15.6	14.3	13.2	12.2	11.4		1.17E+6
			D_c	0.9	1.4	1.9	2.7	3.5	4.4	5.4	6.5	7.8	9.1	10.6	12.2		
64 x 5	84.7	2,665.00	U	232.0	148.5	103.2	75.8	58.0	45.9	37.1	30.7	25.8	22.0	19.0	16.5	14.5	86,940
			D_u	0.8	1.3	1.9	2.6	3.4	4.3	5.3	6.4	7.6	8.9	10.3	11.8	13.5	
			C	70.8	56.6	47.2	40.4	35.4	31.5	28.3	25.7	23.6	21.8	20.2	18.9	17.7	2.48E+6
			D_c	0.7	1.1	1.5	2.1	2.7	3.4	4.2	5.1	6.1	7.1	8.2	9.5	10.8	

Spans and loads in red exceed a deflection of 6mm for uniform loads of 5kPa. Experience has shown that 6mm deflection is the maximum deflection to give pedestrian comfort, but can be exceeded for other types of loads at the discretion of the specifying professional.

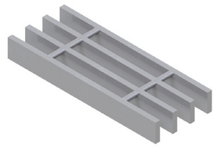
30W102 (mm)

# of Bars	2	3	4	5	6	7	8	9	10	11
5mm Bars	35	65	95	125	155	185	215	245	275	305
# of Bars	12	13	14	15	16	17	18	19	20	21
5mm Bars	335	365	395	425	455	485	515	545	575	605
# of Bars	22	23	24	25	26	27	28	29	30	31
5mm Bars	635	665	695	725	755	785	815	845	875	905

Deduct 1.5mm for 3mm bearing bars

LOAD TABLES - CLOSE-MESH

Grating Type: 24W102
Design Code: NAAMM MBG 534-19
Material: ASTM A1011CS Type B
Surface: Smooth



U = Safe Uniform Load (kPa)
D_u = Deflection Due to Safe Uniform Load (mm)
C = Safe Concentrated Load (kN/meter of grating width)
D_c = Deflection Due to Safe Concentrated Load (mm)
Allowable Extreme Fiber Stress = 124.11 MPa

Bearing Bar Size (mm)	Approx. Wieght (kg/m²)	Ped. Span (mm)	Load / Deflection	SPAN (mm) 610	762	915	1067	1220	1372	1524	1677	1829	1982	2134	2286	2438	Section Properties S_x (mm³)/m / I_x (mm⁴)/m
25 x 3	30.1	1,387.00	U	38.3	24.5	17.0	12.5	9.6	7.6	6.1							14,340
			D_u	1.9	3.0	4.3	5.8	7.6	9.6	11.8							
			C	11.7	9.3	7.8	6.7	5.8	5.2	4.7							182.08E+3
			D_c	1.5	2.4	3.4	4.6	6.1	7.7	9.5							
25 x 5	43.5	1,535.00	U	57.4	36.7	25.5	18.7	14.4	11.3	9.2	7.6						21,510
			D_u	1.9	3.0	4.3	5.8	7.6	9.6	11.8	14.3						
			C	17.5	14.0	11.7	10.0	8.8	7.8	7.0	6.4						273.12E+3
			D_c	1.5	2.4	3.4	4.6	6.1	7.7	9.5	11.4						
32 x 3	36.9	1,641.00	U	60.0	38.4	26.7	19.6	15.0	11.9	9.6	7.9						22,470
			D_u	1.5	2.4	3.4	4.6	6.0	7.7	9.4	11.4						
			C	18.3	14.6	12.2	10.5	9.1	8.1	7.3	6.7						357.31E+3
			D_c	1.2	1.9	2.7	3.7	4.8	6.1	7.6	9.1						
32 x 5	53.7	1,817.00	U	89.9	57.6	40.0	29.4	22.5	17.8	14.4	11.9	10.0					33,710
			D_u	1.5	2.4	3.4	4.6	6.0	7.7	9.4	11.4	13.6					
			C	27.4	21.9	18.3	15.7	13.7	12.2	11.0	10.0	9.1					535.96E+3
			D_c	1.2	1.9	2.7	3.7	4.8	6.1	7.6	9.1	10.9					
38 x 3	46.7	1,880.00	U	86.1	55.1	38.3	28.1	21.5	17.0	13.8	11.4	9.6	8.2				32,260
			D_u	1.3	2.0	2.8	3.9	5.0	6.4	7.9	9.5	11.4	13.3				
			C	26.3	21.0	17.5	15.0	13.1	11.7	10.5	9.6	8.8	8.1				614.52E+3
			D_c	1.0	1.6	2.3	3.1	4.0	5.1	6.3	7.6	9.1	10.7				
38 x 5	63.6	2,080.00	U	129.1	82.7	57.4	42.2	32.3	25.5	20.7	17.1	14.4	12.2	10.5			48,390
			D_u	1.3	2.0	2.8	3.9	5.0	6.4	7.9	9.5	11.4	13.3	15.5			
			C	39.4	31.5	26.3	22.5	19.7	17.5	15.8	14.3	13.1	12.1	11.3			921.77E+3
			D_c	1.0	1.6	2.3	3.1	4.0	5.1	6.3	7.6	9.1	10.7	12.4			
45 x 5	73.8	2,337.00	U	176.1	112.8	78.3	57.5	44.1	34.8	28.2	23.3	19.6	16.7	14.4	12.5	11.0	66,010
			D_u	1.1	1.7	2.4	3.3	4.3	5.5	6.8	8.2	9.7	11.4	13.2	15.2	17.3	
			C	53.7	43.0	35.8	30.7	26.9	23.9	21.5	19.5	17.9	16.5	15.4	14.3	13.4	1.47E+6
			D_c	0.9	1.4	1.9	2.6	3.5	4.4	5.4	6.5	7.8	9.1	10.6	12.1	13.8	
51 x 5	83.7	2,581.00	U	229.5	146.9	102.1	75.0	57.4	45.4	36.8	30.4	25.5	21.8	18.8	16.3	14.4	86,020
			D_u	0.9	1.5	2.1	2.9	3.8	4.8	5.9	7.2	8.5	10.0	11.6	13.3	15.1	
			C	70.0	56.0	46.7	40.0	35.0	31.1	28.0	25.5	23.3	21.6	20.0	18.7	17.5	2.18E+6
			D_c	0.8	1.2	1.7	2.3	3.0	3.8	4.7	5.7	6.8	8.0	9.3	10.6	12.1	
64 x 5	103.8	3,052.00	U	358.6	229.6	159.5	117.2	89.7	70.9	57.4	47.5	39.9	34.0	29.3	25.5	22.5	134,410
			D_u	0.8	1.2	1.7	2.3	3.0	3.8	4.7	5.7	6.8	8.0	9.3	10.6	12.1	
			C	109.4	87.5	72.9	62.5	54.7	48.6	43.8	39.8	36.5	33.7	31.3	29.2	27.4	4.27E+6
			D_c	0.6	0.9	1.4	1.9	2.4	3.1	3.8	4.6	5.4	6.4	7.4	8.5	9.7	

Spans and loads in red exceed a deflection of 6mm for uniform loads of 5kPa. Experience has shown that 6mm deflection is the maximum deflection to give pedestrian comfort, but can be exceeded for other types of loads at the discretion of the specifying professional.

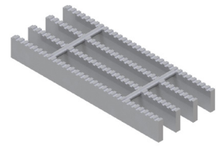
24W102 (mm)

# of Bars	2	3	4	5	6	7	8	9	10	11
5mm Bars	29	53	77	101	125	149	173	197	221	245
# of Bars	12	13	14	15	16	17	18	19	20	21
5mm Bars	269	293	317	341	365	389	413	437	461	485
# of Bars	22	23	24	25	26	27	28	29	30	31
5mm Bars	509	533	557	581	605	629	653	677	701	725
# of Bars	32	33	34	35	36	37	38	39	40	41
5mm Bars	749	773	797	821	845	869	869	917	941	965

Deduct 1.5mm for 3mm bearing bars

LOAD TABLES - CLOSE-MESH

Grating Type: 24W102
Design Code: NAAMM MBG 534-19
Material: ASTM A1011CS Type B
Surface: Serrated



U = Safe Uniform Load (kPa)
D_u = Deflection Due to Safe Uniform Load (mm)
C = Safe Concentrated Load (kN/meter of grating width)
D_c = Deflection Due to Safe Concentrated Load (mm)
Allowable Extreme Fiber Stress = 124.11 MPa

Bearing Bar Size (mm)	Approx. Wieght (kg/m²)	Ped. Span (mm)	Load / Deflection	SPAN (mm) 610	762	915	1067	1220	1372	1524	1677	1829	1982	2134	2286	2438	Section Properties S_x (mm³)/m / I_x (mm⁴)/m
25 x 3	30.1	1,116.00	U	21.4	13.7	9.5	7.0	5.4									8,020
			D_u	2.5	4.0	5.7	7.7	10.1									
			C	6.5	5.2	4.4	3.7	3.3									76.21E+3
			D_c	2.0	3.2	4.6	6.2	8.1									
25 x 5	43.5	1,235.00	U	32.1	20.6	14.3	10.5	8.0	6.3								12,030
			D_u	2.5	4.0	5.7	7.7	10.1	12.8								
			C	9.8	7.8	6.5	5.6	4.9	4.4								114.32E+3
			D_c	2.0	3.2	4.6	6.2	8.1	10.2								
32 x 3	36.9	1,387.00	U	38.3	24.5	17.0	12.5	9.6	7.6	6.1							14,340
			D_u	1.9	3.0	4.3	5.8	7.6	9.6	11.8							
			C	11.7	9.3	7.8	6.7	5.8	5.2	4.7							182.08E+3
			D_c	1.5	2.4	3.4	4.6	6.1	7.7	9.5							
32 x 5	53.7	1,535.00	U	57.4	36.7	25.5	18.7	14.4	11.3	9.2	7.6						21,510
			D_u	1.9	3.0	4.3	5.8	7.6	9.6	11.8	14.3						
			C	17.5	14.0	11.7	10.0	8.8	7.8	7.0	6.4						273.12E+3
			D_c	1.5	2.4	3.4	4.6	6.1	7.7	9.5	11.4						
38 x 3	43.5	1,638.00	U	59.6	38.1	26.5	19.5	14.9	11.8	9.5	7.9						22,330
			D_u	1.5	2.4	3.4	4.6	6.1	7.7	9.5	11.5						
			C	18.2	14.5	12.1	10.4	9.1	8.1	7.3	6.6						353.95E+3
			D_c	1.2	1.9	2.7	3.7	4.9	6.1	7.6	9.2						
38 x 5	63.6	1,812.00	U	89.4	57.2	39.7	29.2	22.4	17.7	14.3	11.8	9.9					33,500
			D_u	1.5	2.4	3.4	4.6	6.1	7.7	9.5	11.5	13.6					
			C	27.3	21.8	18.2	15.6	13.6	12.1	10.9	9.9	9.1					530.92E+3
			D_c	1.2	1.9	2.7	3.7	4.9	6.1	7.6	9.2	10.9					
45 x 5	73.8	2,080.00	U	129.1	82.7	57.4	42.2	32.3	25.5	20.7	17.1	14.4	12.2	10.5			48,390
			D_u	1.3	2.0	2.8	3.9	5.0	6.4	7.9	9.5	11.4	13.3	15.5			
			C	39.4	31.5	26.3	22.5	19.7	17.5	15.8	14.3	13.1	12.1	11.3			921.77E+3
			D_c	1.0	1.6	2.3	3.1	4.0	5.1	6.3	7.6	9.1	10.7	12.4			
51 x 5	83.7	2,333.00	U	175.3	112.2	78.0	57.3	43.9	34.7	28.1	23.2	19.5	16.6	14.3	12.5	11.0	65,710
			D_u	1.1	1.7	2.4	3.3	4.3	5.5	6.8	8.2	9.7	11.4	13.3	15.2	17.3	
			C	53.5	42.8	35.7	30.6	26.7	23.8	21.4	19.5	17.8	16.5	15.3	14.3	13.4	1.46E+6
			D_c	0.9	1.4	1.9	2.7	3.5	4.4	5.4	6.5	7.8	9.1	10.6	12.2	13.8	
64 x 5	103.8	2,818.00	U	290.0	185.6	128.9	94.7	72.5	57.3	46.4	38.4	32.2	27.5	23.7	20.6	18.2	108,680
			D_u	0.8	1.3	1.9	2.6	3.4	4.3	5.3	6.4	7.6	8.9	10.3	11.8	13.5	
			C	88.4	70.8	59.0	50.6	44.2	39.3	35.4	32.2	29.5	27.2	25.3	23.6	22.1	3.10E+6
			D_c	0.7	1.1	1.5	2.1	2.7	3.4	4.2	5.1	6.1	7.1	8.2	9.5	10.8	

Spans and loads in red exceed a deflection of 6mm for uniform loads of 5kPa. Experience has shown that 6mm deflection is the maximum deflection to give pedestrian comfort, but can be exceeded for other types of loads at the discretion of the specifying professional.

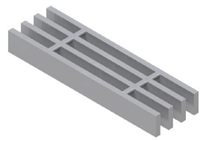
24W102 (mm)

# of Bars	2	3	4	5	6	7	8	9	10	11
5mm Bars	29	53	77	101	125	149	173	197	221	245
# of Bars	12	13	14	15	16	17	18	19	20	21
5mm Bars	269	293	317	341	365	389	413	437	461	485
# of Bars	22	23	24	25	26	27	28	29	30	31
5mm Bars	509	533	557	581	605	629	653	677	701	725
# of Bars	32	33	34	35	36	37	38	39	40	41
5mm Bars	749	773	797	821	845	869	869	917	941	965

Deduct 1.5mm for 3mm bearing bars

LOAD TABLES - ADA

Grating Type: 17W102
Design Code: NAAMM MBG 534-19
Material: ASTM A1011CS Type B
Surface: Smooth



U = Safe Uniform Load (kPa)
D_u = Deflection Due to Safe Uniform Load (mm)
C = Safe Concentrated Load (kN/meter of grating width)
D_c = Deflection Due to Safe Concentrated Load (mm)
Allowable Extreme Fiber Stress = 124.11 MPa

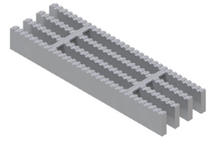
Bearing Bar Size (mm)	Approx. Weight (kg/m^2)	Ped. Span (mm)	Load / Deflection	SPAN (mm) 610	762	915	1067	1220	1372	1524	1677	1829	1982	2134	2286	2438	Section Properties S_x (mm^3)/m	I_x (mm^4)/m
25 x 5	59.8	1,673.00	U	81.0	51.9	36.0	26.5	20.3	16.0	13.0	10.7							30,360
			D_u	1.9	3.0	4.3	5.8	7.6	9.6	11.8	14.3							
			C	24.7	19.8	16.5	14.1	12.4	11.0	9.9	9.0							385.58E+3
			D_c	1.5	2.4	3.4	4.6	6.1	7.7	9.5	11.4							
32 x 5	74.0	1,980.00	U	127.0	81.3	56.5	41.5	31.8	25.1	20.3	16.8	14.1	12.0					47,590
			D_u	1.5	2.4	3.4	4.6	6.0	7.7	9.4	11.4	13.6	16.0					
			C	38.7	31.0	25.8	22.1	19.4	17.2	15.5	14.1	12.9	11.9					756.65E+3
			D_c	1.2	1.9	2.7	3.7	4.8	6.1	7.6	9.1	10.9	12.8					
38 x 5	88.0	2,268.00	U	182.3	116.7	81.0	59.6	45.6	36.0	29.2	24.1	20.3	17.3	14.9	13.0			68,310
			D_u	1.3	2.0	2.8	3.9	5.0	6.4	7.9	9.5	11.4	13.3	15.5	17.7			
			C	55.6	44.5	37.1	31.8	27.8	24.7	22.2	20.2	18.5	17.1	15.9	14.8			1.30E+6
			D_c	1.0	1.6	2.3	3.1	4.0	5.1	6.3	7.6	9.1	10.7	12.4	14.2			
45 x 5	102.3	2,548.00	U	248.7	159.2	110.6	81.2	62.2	49.2	39.8	32.9	27.7	23.6	20.3	17.7	15.6		93,190
			D_u	1.1	1.7	2.4	3.3	4.3	5.5	6.8	8.2	9.7	11.4	13.2	15.2	17.3		
			C	75.8	60.7	50.6	43.3	37.9	33.7	30.3	27.6	25.3	23.3	21.7	20.2	19.0		2.07E+6
			D_c	0.9	1.4	1.9	2.6	3.5	4.4	5.4	6.5	7.8	9.1	10.6	12.1	13.8		
51 x 5	116.3	2,814.00	U	324.0	207.4	144.1	105.9	81.1	64.1	51.9	42.9	36.0	30.7	26.5	23.1	20.3		121,440
			D_u	0.9	1.5	2.1	2.9	3.8	4.8	5.9	7.2	8.5	10.0	11.6	13.3	15.1		
			C	98.8	79.1	65.9	56.5	49.4	43.9	39.5	36.0	33.0	30.4	28.3	26.4	24.7		3.08E+6
			D_c	0.8	1.2	1.7	2.3	3.0	3.8	4.7	5.7	6.8	8.0	9.3	10.6	12.1		
64 x 5	144.5	3,326.00	U	506.3	324.1	225.1	165.4	126.7	100.1	81.1	67.0	56.3	48.0	41.4	36.0	31.7		189,750
			D_u	0.8	1.2	1.7	2.3	3.0	3.8	4.7	5.7	6.8	8.0	9.3	10.6	12.1		
			C	154.4	123.6	103.0	88.3	77.2	68.7	61.8	56.2	51.5	47.5	44.1	41.2	38.6		6.02E+6
			D_c	0.6	0.9	1.4	1.9	2.4	3.1	3.8	4.6	5.4	6.4	7.4	8.5	9.7		

Spans and loads in red exceed a deflection of 6mm for uniform loads of 5kPa. Experience has shown that 6mm deflection is the maximum deflection to give pedestrian comfort, but can be exceeded for other types of loads at the discretion of the specifying professional.

17W102 (mm)										
# of Bars	2	3	4	5	6	7	8	9	10	11
5mm Bars	22	39	56	73	90	107	124	141	158	175
# of Bars	12	13	14	15	16	17	18	19	20	21
5mm Bars	192	209	226	243	260	277	294	311	328	345
# of Bars	22	23	24	25	26	27	28	29	30	31
5mm Bars	362	379	396	413	430	447	464	481	498	515
# of Bars	32	33	34	35	36	37	38	39	40	41
5mm Bars	532	549	566	583	600	617	617	651	668	685

LOAD TABLES - ADA

Grating Type: 17W102
Design Code: NAAMM MBG 534-19
Material: ASTM A1011CS Type B
Surface: Serrated



U = Safe Uniform Load (kPa)
D_u = Deflection Due to Safe Uniform Load (mm)
C = Safe Concentrated Load (kN/meter of grating width)
D_c = Deflection Due to Safe Concentrated Load (mm)
Allowable Extreme Fiber Stress = 124.11 MPa

Bearing Bar Size (mm)	Approx. Weight (kg/m^2)	Ped. Span (mm)	Load / Deflection	SPAN (mm) 610	762	915	1067	1220	1372	1524	1677	1829	1982	2134	2286	2438	Section Properties S_x (mm^3)/m	I_x (mm^4)/m
25 x 5	59.8	1,346.00	U	45.3	29.0	20.2	14.8	11.3	9.0									16,990
			D_u	2.5	4.0	5.7	7.7	10.1	12.8									
			C	13.8	11.1	9.2	7.9	6.9	6.1									161.39E+3
			D_c	2.0	3.2	4.6	6.2	8.1	10.2									
32 x 5	74.0	1,673.00	U	81.0	51.9	36.0	26.5	20.3	16.0	13.0	10.7							30,360
			D_u	1.9	3.0	4.3	5.8	7.6	9.6	11.8	14.3							
			C	24.7	19.8	16.5	14.1	12.4	11.0	9.9	9.0							385.58E+3
			D_c	1.5	2.4	3.4	4.6	6.1	7.7	9.5	11.4							
38 x 5	88.0	1,976.00	U	126.2	80.8	56.1	41.2	31.6	24.9	20.2	16.7	14.0	12.0					47,290
			D_u	1.5	2.4	3.4	4.6	6.1	7.7	9.5	11.5	13.6	16.0					
			C	38.5	30.8	25.7	22.0	19.2	17.1	15.4	14.0	12.8	11.8					749.53E+3
			D_c	1.2	1.9	2.7	3.7	4.9	6.1	7.6	9.2	10.9	12.8					
45 x 5	102.3	2,268.00	U	182.3	116.7	81.0	59.6	45.6	36.0	29.2	24.1	20.3	17.3	14.9	13.0			68,310
			D_u	1.3	2.0	2.8	3.9	5.0	6.4	7.9	9.5	11.4	13.3	15.5	17.7			
			C	55.6	44.5	37.1	31.8	27.8	24.7	22.2	20.2	18.5	17.1	15.9	14.8			1.30E+6
			D_c	1.0	1.6	2.3	3.1	4.0	5.1	6.3	7.6	9.1	10.7	12.4	14.2			
51 x 5	116.3	2,543.00	U	247.5	158.5	110.1	80.9	61.9	48.9	39.6	32.8	27.5	23.5	20.2	17.6	15.5		92,770
			D_u	1.1	1.7	2.4	3.3	4.3	5.5	6.8	8.2	9.7	11.4	13.3	15.2	17.3		
			C	75.5	60.4	50.3	43.2	37.8	33.6	30.2	27.5	25.2	23.2	21.6	20.1	18.9		2.06E+6
			D_c	0.9	1.4	1.9	2.7	3.5	4.4	5.4	6.5	7.8	9.1	10.6	12.2	13.8		
64 x 5	144.5	3,072.00	U	409.4	262.1	182.0	133.8	102.4	80.9	65.6	54.2	45.5	38.8	33.5	29.1	25.6		153,430
			D_u	0.8	1.3	1.9	2.6	3.4	4.3	5.3	6.4	7.6	8.9	10.3	11.8	13.5		
			C	124.9	99.9	83.3	71.4	62.5	55.5	50.0	45.4	41.6	38.4	35.7	33.3	31.2		4.38E+6
			D_c	0.7	1.1	1.5	2.1	2.7	3.4	4.2	5.1	6.1	7.1	8.2	9.5	10.8		

Spans and loads in red exceed a deflection of 6mm for uniform loads of 5kPa. Experience has shown that 6mm deflection is the maximum deflection to give pedestrian comfort, but can be exceeded for other types of loads at the discretion of the specifying professional.

17W102 (mm)										
# of Bars	2	3	4	5	6	7	8	9	10	11
5mm Bars	22	39	56	73	90	107	124	141	158	175
# of Bars	12	13	14	15	16	17	18	19	20	21
5mm Bars	192	209	226	243	260	277	294	311	328	345
# of Bars	22	23	24	25	26	27	28	29	30	31
5mm Bars	362	379	396	413	430	447	464	481	498	515
# of Bars	32	33	34	35	36	37	38	39	40	41
5mm Bars	532	549	566	583	600	617	617	651	668	685

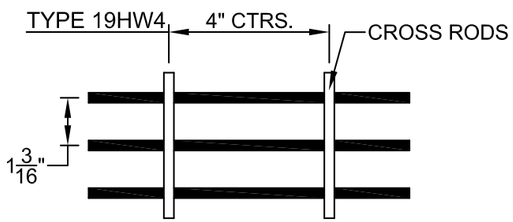
OVERVIEW

Heavy-Duty Welded Grating has the strength for heavy-duty load areas such as airfields, industrial plants, truck and bus terminals, parking lots and railroad yards. Common uses are flooring, driveways, subway and tunnel ventilation grilles, curb inlet grates, ramps, docks, etc.

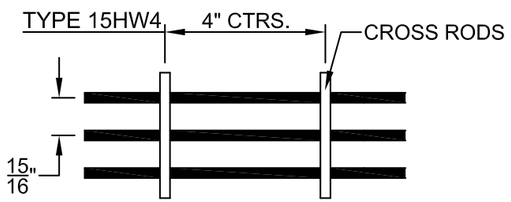
It is a sturdy grating to carry loads and maintain the same level over many years of use. Whenever rolling wheel loads are to be used over the grating, we recommend that the grating be load banded to add lateral strength. Serrations are available on bars up to ⅜" thick to provide additional traction for rolling loads.

Standard heavy-duty bar grating is resistance-welded for durability, strength and safety using an automated electric/hydraulic welding process. High temperatures, combined with high pressure fuse the bearing bars and cross bars together to form a permanent joint.

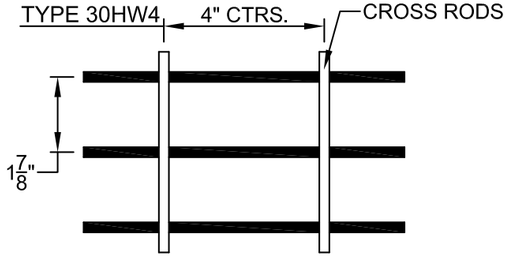
Heavy-Duty



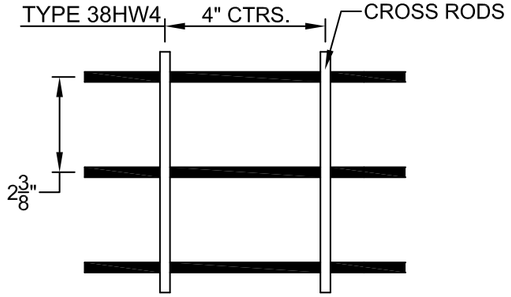
HD Close-Mesh



Wide-Gap



Extra-Wide-Gap



DESIGN CRITERIA

The load and deflection tables on the following pages have been prepared to provide the designer with a convenient reference for the load carrying capabilities of typical heavy duty grating.

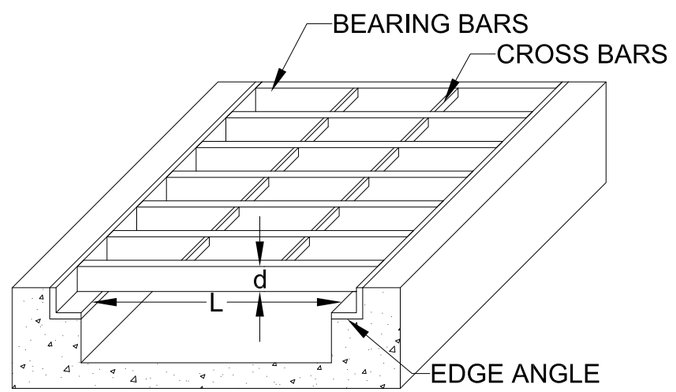
Static Loads

Uniform loads and concentrated loads per foot of grating width are given on six inch increments for simple spans ranging from one foot to eight feet. Metric tables provide loads per meter of grating width in 152.4 millimeters increments for spans from 304.8 millimeters to 2438.4 millimeters. The values in these load tables are based on allowable stresses for static loads.

Determine M:	$M = \frac{FS}{12}$
Substituting for M, solve for L:	(i) a > L $M = \frac{PL^2}{8ab}$ (ii) a > L $M = \frac{P(.25L - .125a)}{b}$
Check D*:	$D = \frac{P_1[(2L^3) - (a^2L) + (a^3/4)]}{96EI}$

*Deflection should be limited to 1/400 span.

M = Bending Moment
S = Section Modulus - in^3/ft of grating width
I = Moment of Inertia - in^4/ft of grating width
E = Modulus of Elasticity
F = Allowable Bending Stress
L = Simple Clear Span - inches
D = Deflection - inches
a = Partial Load Contact Parallel to Span - inches
s = Center-to-Center Spacing Between Bars - inches
b = Partial Load Contact Dimension at 90° to span - inches
b = a + (2s)
P = Total Wheel of Partial Load Including Impact - lbs.
P_1 = P per bearing bar
P_1 = P x (s/b)



VEHICULAR LOADS

Vehicular load tables are designed in accordance with the 16th Edition of the American Association of State Highway and Transportation Officials (AASHTO) for H-10 through H-25 loads with deflection limited to the lesser of .125 inches (3.175 mm) or L/400 to a maximum simple span of 8'- 0" (2,438mm). Automobile and forklift loads are similarly evaluated with loads calculated and distributed in accordance with the criteria shown below. If the load conditions of your application are not adequately addressed in the criteria presented, please contact Vulcraft for assistance in determining the proper grating for your application.

Vehicular Load Table Criteria	H-25[5]	H-20/ HL-93[6]	H-15	H-10[2]	Passenger Vehicles	5 Ton Forklifts[3]	3 Ton Forklifts[3]	1 Ton Forklifts[3]
Truck/ Vehicle Weight (lbs)					6,322	14,400	9,800	4,200
Load Capacity (lbs)					3,578	10,000	6,000	2,000
Axle Load (lbs)	40,000	32,000	24,000	16,000				
Impact Factor	30%	30%	30%	30%	30%	30%	30%	30%
Total Load (lbs)	52,000	41,600	31,200	20,800	4,651	13,000	7,800	2,600
% of Load on Drive Axel					60%	85%	85%	85%
Wheel Load (lbs)	26,000	20,800	15,600	10,400	2,326	6,500	3,900	1,300
A-Length of distribution perpendicular to axle or parallel to main bars (in)	25	20	15	10	9	11	7	4
C-Width of distribution parallel to axle or perpendicular to main bars (in)	25	20	15	10	9	11	7	4

Notes:

1. For continuous spans, use continuity factor = .80.
2. This distribution results in larger grating sizes for lighter trucks on shorter spans.
3. The fork lift wheel loads and load distribution patterns depicted above, generally, and only partially, represent the broad range of rubber-tired lift trucks available. For those applications falling outside of these examples, please contact Vulcraft.
4. Wheeled vehicles with urethane tires should NEVER be used in conjunction with open grid bar grating.
5. HS20 is the same as H20 and HS15 is the same as H15. The "S" stands for semi-trailer.
6. The "HL-93" notation shown with "H-20" represents AASHTO's truck loading standard post-1993. Since, 1993, H-10, H-20, etc. have been retired in lieu of the "HL-93" loading which represents all trucks.

VEHICULAR LOADS

19HW4

Note: All loads based on Smooth surface

Bearing Bar Size	S_x in³/ft.	I_x in⁴/ft.	Unit Wt. lb/ft²	Maximum Clear Span Between Supports (in)							
				H-25	H-20 / HL-93	H-15	H-10	Auto Traffic	5-Ton Forklift	3-Ton Forklift	1-Ton Forklift
1 x ¼	0.421	0.211	9.92	15	13	11	8	13	8	7	7
1-¼ x ¼	0.658	0.411	12.06	17	15	12	10	17	10	8	10
1-½ x ¼	0.947	0.711	14.21	19	17	15	13	23	12	10	14
1-½ x ⅜	1.421	1.066	20.83	22	20	18	16	32*	15	14	20
2 x ¼	1.684	1.684	18.51	24	22	20	18	38*	17	16	23
2-½ x ¼	2.632	3.289	22.80	31	29	27	26	47*	23	22	35
3 x ¼	3.789	5.684	27.10	39	37	36	35	56*	31	31	48*
3 x ⅜	5.684	8.526	40.70	47*	47*	47*	48*	64*	43	44	55*
4 x ¼	6.737	13.474	35.69	55*	54*	55*	55*	75*	50	52	64*
4 x ⅜	10.105	20.211	53.58	62*	62*	62*	63*	85*	60*	61*	73*
5 x ⅜	15.789	39.474	66.47	77*	77*	78*	79*	107*	74*	76*	92*
6 x ⅜	22.737	68.211	79.35	92*	92*	93*	95*	128*	89*	92*	110*

** Indicates that value was controlled by L/400 ≤ ⅛" deflection limit.*

15HW4

Note: All loads based on Smooth surface

Bearing Bar Size	S_x in³/ft.	I_x in⁴/ft.	Unit Wt. lb/ft²	Maximum Clear Span Between Supports (in)							
				H-25	H-20 / HL-93	H-15	H-10	Auto Traffic	5-Ton Forklift	3-Ton Forklift	1-Ton Forklift
1 x ¼	0.533	0.267	12.21	16	14	11	9	15	9	7	8
1-¼ x ¼	0.833	0.521	14.93	18	16	14	11	20	11	9	12
1-½ x ¼	1.200	0.900	17.65	21	18	16	14	27	13	12	16
1-½ x ⅜	1.800	1.350	25.98	25	23	20	19	38	17	16	23
2 x ¼	2.133	2.133	23.09	27	25	23	21	45	19	18	26
2-½ x ¼	3.333	4.167	28.53	35	33	32	30	67	27	26	40
3 x ¼	4.800	7.200	33.97	46	44	42	42	84*	36	36	57
3 x ⅜	7.200	10.800	51.01	62	60	59	60	96*	51	52	81*
4 x ¼	8.533	17.067	44.85	71	70	69	70	112*	60	61	95*
4 x ⅜	12.800	25.600	67.33	93*	93*	93*	95*	128*	87	90	108*
5 x ⅜	20.000	50.000	83.65	115*	116*	117*	118*	160*	112*	114*	135*
6 x ⅜	28.800	86.400	99.97	138*	139*	140*	142*	192*	134*	137*	163*

** Indicates that value was controlled by L/400 ≤ ⅛" deflection limit.*

30HW4

Note: All loads based on Smooth surface

Bearing Bar Size	S_x in³/ft.	I_x in⁴/ft.	Unit Wt. lb/ft²	Maximum Clear Span Between Supports (in)							
				H-25	H-20 / HL-93	H-15	H-10	Auto Traffic	5-Ton Forklift	3-Ton Forklift	1-Ton Forklift
1 x ¼	0.267	0.133	6.77	14	12	10	7	10	7	6	6
1-¼ x ¼	0.417	0.260	8.13	16	13	11	9	14	9	7	8
1-½ x ¼	0.600	0.450	9.49	17	15	12	10	18	10	8	11
1-½ x ⅜	0.900	0.675	13.74	19	17	15	13	24	12	11	16
2 x ¼	1.067	1.067	12.21	20	18	16	14	28	13	12	18
2-½ x ¼	1.667	2.083	14.93	25	23	21	20	41	18	17	27
3 x ¼	2.400	3.600	17.65	30	28	27	26	50*	23	23	38
3 x ⅜	3.600	5.400	26.53	39	37	36	37	57*	32	33	50*
4 x ¼	4.267	8.533	23.09	44	42	42	43	67*	37	39	59*
4 x ⅜	6.400	12.800	34.69	55*	55*	57*	56*	76*	52	55*	67*
5 x ⅜	10.000	25.000	42.85	68*	68*	69*	70*	95*	66*	69*	84*
6 x ⅜	14.400	43.200	51.01	81*	81*	82*	84*	114*	79*	82*	101*

** Indicates that value was controlled by L/400 ≤ ⅛" deflection limit.*

VEHICULAR LOADS

Note: All loads based on Smooth surface

38HW4

Bearing Bar Size	S_x in³/ft.	I_x in⁴/ft.	Unit Wt. lb/ft²	Maximum Clear Span Between Supports (in)							
				H-25	H-20 / HL-93	H-15	H-10	Auto Traffic	5-Ton Forklift	3-Ton Forklift	1-Ton Forklift
1 x ¼	0.211	0.105	5.62	14	12	9	7	9	7	5	6
1-¼ x ¼	0.329	0.206	6.70	15	13	10	8	12	8	6	8
1-½ x ¼	0.474	0.355	7.77	16	14	11	9	16	9	8	10
1-½ x ⅜	0.711	0.533	11.17	18	16	13	12	21	11	10	14
2 x ¼	0.842	0.842	9.92	19	17	15	13	24	12	11	16
2-½ x ¼	1.316	1.645	12.06	23	20	19	17	36	16	15	24
3 x ¼	1.895	2.842	14.21	27	25	23	23	48*	20	21	34
3 x ⅜	2.842	4.263	21.37	34	33	31	32	54*	28	29	48*
4 x ¼	3.368	6.737	18.51	38	37	36	37	63*	32	34	57*
4 x ⅜	5.053	10.105	27.82	51	50	50	53	72*	45	49	65*
5 x ⅜	7.895	19.737	34.26	63*	64*	64*	67*	90*	63*	65*	81*
6 x ⅜	11.368	34.105	40.70	75*	76*	77*	80*	108*	75*	78*	97*

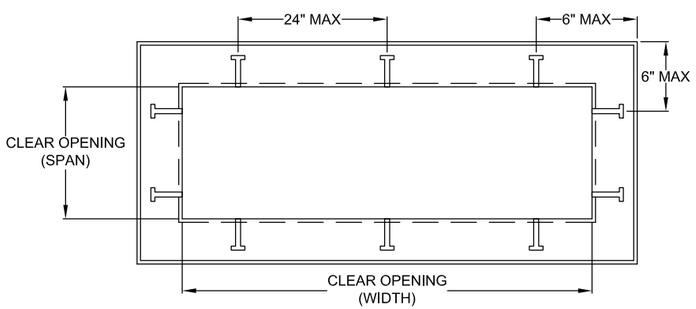
** Indicates that value was controlled by L/400 ≤ ⅛" deflection limit.*

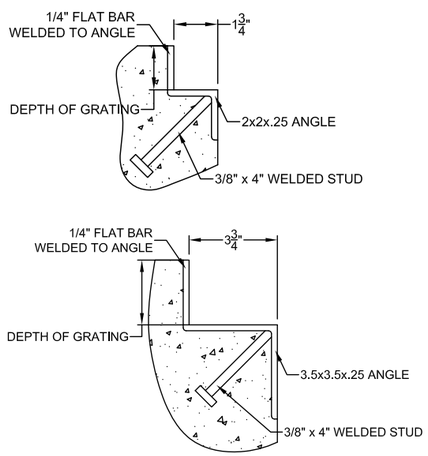
Grating Frames

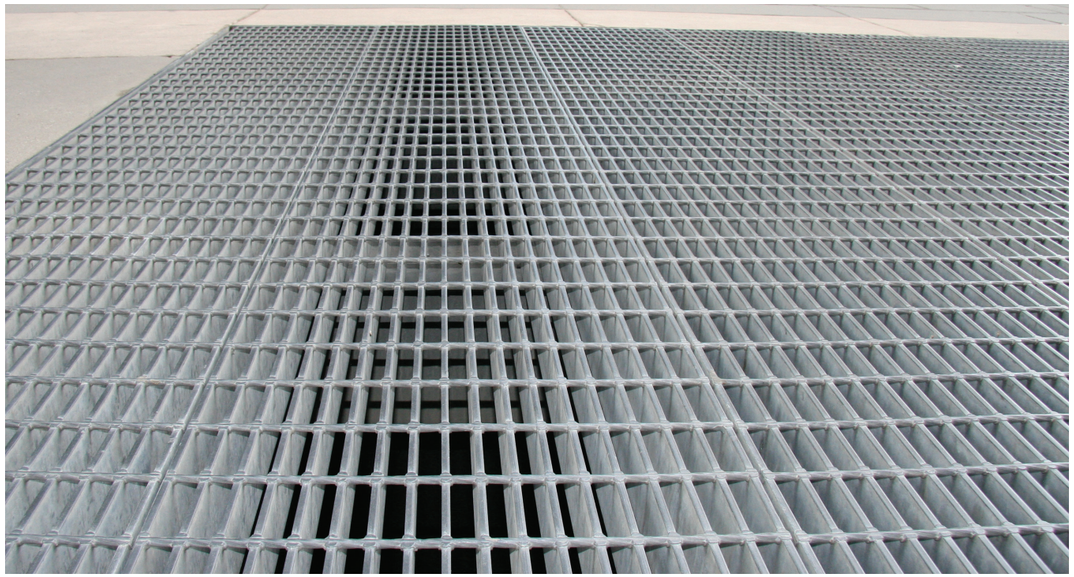
Vulcraft's structural fabrication services can be leveraged to further aid you in getting a superior solution for covering your concrete opening by also obtaining an Embed Frame with your grating. A steel embed frame can improve the quality and lifespan of your project by:

- Shielding the concrete at the opening edges from cracking and chipping,
- Providing an edge for the opening when forming the concrete pour,
- Providing uniform elevation for the opening to minimize potential for uneven surfaces,
- And providing a smooth an uniform bearing surface for the grating, allowing for easier attachment and better performance over it's lifetime.

Frames are available in normal rectangular configurations only and will be supplied as a fully-assembled, four-sided unit in sizes up to those that can safely be transported via normal flatbed carriers. Sizes or configurations other than this should be discussed with Vulcraft. Embed frames can be supplied mill finished, painted, or hot-dipped galvanized. To order, please include a detail similar to the following with the Clear Opening Width and Span clearly defined as well as the desired quantities and finish.

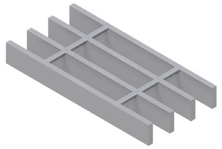






LOAD TABLES - HD

Grating Type: 19HW4
Design Code: NAAMM MBG 534-19
Material: ASTM A1011CS Grade 36
Surface: Smooth



U = Safe Uniform Load (lbs/ft²)
D_u = Deflection Due to Safe Uniform Load (in)
C = Safe Concentrated Load (lbs/ft of grating width)
D_c = Deflection Due to Safe Concentrated Load (in)
Allowable Extreme Fiber Stress = 20 ksi

Bearing Bar Size (inches)	Approx. Weight (lbs/ft²)	Ped. Span (inches)	Load / Deflection	Span (ft -in) 1' - 0"	1' - 6"	2' - 0"	2' - 6"	3' - 0"	3' - 6"	4' - 0"	4' - 6"	5' - 0"	5' - 6"	6' - 0"	6' - 6"	7' - 0"	7' - 6"	8' - 0"	Section Properties S_x (in³)/ft	I_x (in⁴)/ft
1" x ¼"	9.53	61	U	5,614	2,495	1,404	898	624	458	351	277	225	186						0.421	
			D_u	0.02	0.05	0.08	0.13	0.19	0.25	0.33	0.42	0.52	0.63							
			C	2,807	1,871	1,404	1,123	936	802	702	624	561	510						0.211	
			D_c	0.02	0.04	0.07	0.10	0.15	0.20	0.26	0.34	0.41	0.50							
1 ¼" x ¼"	11.72	72	U	8,772	3,899	2,193	1,404	975	716	548	433	351	290	244					0.658	
			D_u	0.02	0.04	0.07	0.10	0.15	0.20	0.26	0.34	0.41	0.50	0.60						
			C	4,386	2,924	2,193	1,754	1,462	1,253	1,096	975	877	797	731					0.411	
			D_c	0.01	0.03	0.05	0.08	0.12	0.16	0.21	0.27	0.33	0.40	0.48						
1 ½" x ¼"	13.92	83	U	12,632	5,614	3,158	2,021	1,404	1,031	789	624	505	418	351	299	258			0.947	
			D_u	0.01	0.03	0.06	0.09	0.12	0.17	0.22	0.28	0.34	0.42	0.50	0.58	0.68				
			C	6,316	4,211	3,158	2,526	2,105	1,805	1,579	1,404	1,263	1,148	1,053	972	902			0.711	
			D_c	0.01	0.02	0.04	0.07	0.10	0.14	0.18	0.22	0.28	0.33	0.40	0.47	0.54				
1 ½" x ⅜"	20.78	92	U	18,947	8,421	4,737	3,032	2,105	1,547	1,184	936	758	626	526	448	387	337	296	1.421	
			D_u	0.01	0.03	0.06	0.09	0.12	0.17	0.22	0.28	0.34	0.42	0.50	0.58	0.68	0.78	0.88		
			C	9,474	6,316	4,737	3,789	3,158	2,707	2,368	2,105	1,895	1,722	1,579	1,457	1,353	1,263	1,184	1.066	
			D_c	0.01	0.02	0.04	0.07	0.10	0.14	0.18	0.22	0.28	0.33	0.40	0.47	0.54	0.62	0.71		
2" x ¼"	18.31	103	U	22,456	9,981	5,614	3,593	2,495	1,833	1,404	1,109	898	742	624	532	458	399	351	1.684	
			D_u	0.01	0.02	0.04	0.06	0.09	0.13	0.17	0.21	0.26	0.31	0.37	0.44	0.51	0.58	0.66		
			C	11,228	7,485	5,614	4,491	3,743	3,208	2,807	2,495	2,246	2,041	1,871	1,727	1,604	1,497	1,404	1.684	
			D_c	0.01	0.02	0.03	0.05	0.07	0.10	0.13	0.17	0.21	0.25	0.30	0.35	0.41	0.47	0.53		
2 ½" x ¼"	22.70	122	U	35,088	15,595	8,772	5,614	3,899	2,864	2,193	1,733	1,404	1,160	975	830	716	624	548	2.632	
			D_u	0.01	0.02	0.03	0.05	0.07	0.10	0.13	0.17	0.21	0.25	0.30	0.35	0.41	0.47	0.53		
			C	17,544	11,696	8,772	7,018	5,848	5,013	4,386	3,899	3,509	3,190	2,924	2,699	2,506	2,339	2,193	3.289	
			D_c	0.01	0.01	0.03	0.04	0.06	0.08	0.11	0.13	0.17	0.20	0.24	0.28	0.32	0.37	0.42		
3" x ¼"	27.10	140	U	50,526	22,456	12,632	8,084	5,614	4,125	3,158	2,495	2,021	1,670	1,404	1,196	1,031	898	789	3.789	
			D_u	0.01	0.02	0.03	0.04	0.06	0.08	0.11	0.14	0.17	0.21	0.25	0.29	0.34	0.39	0.44		
			C	25,263	16,842	12,632	10,105	8,421	7,218	6,316	5,614	5,053	4,593	4,211	3,887	3,609	3,368	3,158	5.684	
			D_c	0.01	0.01	0.02	0.03	0.05	0.07	0.09	0.11	0.14	0.17	0.20	0.23	0.27	0.31	0.35		
3" x ⅜"	40.99	154	U	75,789	33,684	18,947	12,126	8,421	6,187	4,737	3,743	3,032	2,505	2,105	1,794	1,547	1,347	1,184	5.684	
			D_u	0.01	0.02	0.03	0.04	0.06	0.08	0.11	0.14	0.17	0.21	0.25	0.29	0.34	0.39	0.44		
			C	37,895	25,263	18,947	15,158	12,632	10,827	9,474	8,421	7,579	6,890	6,316	5,830	5,414	5,053	4,737	8.526	
			D_c	0.01	0.01	0.02	0.03	0.05	0.07	0.09	0.11	0.14	0.17	0.20	0.23	0.27	0.31	0.35		

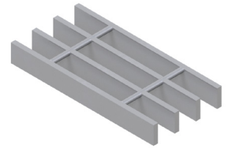
Spans and loads in red exceed a deflection of ¼" for uniform loads of 100 lbs./sq. ft. Experience has shown that ¼" deflection is the maximum deflection to give pedestrian comfort, but can be exceeded for other types of loads at the discretion of the specifying professional.

19HW4 (in)

# of Bars	2	3	4	5	6	7	8	9	10	11
¼" Bars	1-7/16	2-5/8	3-13/16	5	6-3/16	7-3/8	8-9/16	9-3/4	10-15/16	12-1/8
⅜" Bars	1-9/16	2-3/4	3-15/16	5-1/8	6-5/16	7-1/2	8-11/16	9-7/8	11-1/16	12-1/4
# of Bars	12	13	14	15	16	17	18	19	20	21
¼" Bars	13-5/16	14-1/2	15-11/16	16-7/8	18-1/16	19-1/4	20-7/16	21-5/8	22-13/16	24
⅜" Bars	13-7/16	14-5/8	15-13/16	17	18-3/16	19-3/8	20-9/16	21-3/4	22-15/16	24-1/8
# of Bars	22	23	24	25	26	27	28	29	30	31
¼" Bars	25-3/16	26-3/8	27-9/16	28-3/4	29-15/16	31-1/8	32-5/16	33-1/2	34-11/16	35-7/8
⅜" Bars	25-5/16	26-1/2	27-11/16	28-7/8	30-1/16	31-1/4	32-7/16	33-5/8	34-13/16	36

LOAD TABLES - HD

Grating Type: 19HW4
Design Code: NAAMM MBG 534-19
Material: ASTM A1011CS Grade 36
Surface: Smooth



U = Safe Uniform Load (lbs/ft²)
D_u = Deflection Due to Safe Uniform Load (in)
C = Safe Concentrated Load (lbs/ft of grating width)
D_c = Deflection Due to Safe Concentrated Load (in)
Allowable Extreme Fiber Stress = 20 ksi

Bearing Bar Size (inches)	Approx. Weight (lbs/ft²)	Ped. Span (inches)	Load / Deflection	Span (ft -in) 1' - 0"	1' - 6"	2' - 0"	2' - 6"	3' - 0"	3' - 6"	4' - 0"	4' - 6"	5' - 0"	5' - 6"	6' - 0"	6' - 6"	7' - 0"	7' - 6"	8' - 0"	Section Properties S_x (in³)/ft	I_x (in⁴)/ft
3 ½" x ¼"	31.49	157	U	68,772	30,565	17,193	11,004	7,641	5,614	4,298	3,396	2,751	2,273	1,910	1,628	1,404	1,223	1,075	5.158	
			D_u	0.01	0.01	0.02	0.04	0.05	0.07	0.09	0.12	0.15	0.18	0.21	0.25	0.29	0.33	0.38		
			C	34,386	22,924	17,193	13,754	11,462	9,825	8,596	7,641	6,877	6,252	5,731	5,290	4,912	4,585	4,298	9.026	
			D_c	0.00	0.01	0.02	0.03	0.04	0.06	0.08	0.10	0.12	0.14	0.17	0.20	0.23	0.27	0.30		
3 ½" x ⅜"	47.57	173	U	103,158	45,848	25,789	16,505	11,462	8,421	6,447	5,094	4,126	3,410	2,865	2,442	2,105	1,834	1,612	7.737	
			D_u	0.01	0.01	0.02	0.04	0.05	0.07	0.09	0.12	0.15	0.18	0.21	0.25	0.29	0.33	0.38		
			C	51,579	34,386	25,789	20,632	17,193	14,737	12,895	11,462	10,316	9,378	8,596	7,935	7,368	6,877	6,447	13.539	
			D_c	0.00	0.01	0.02	0.03	0.04	0.06	0.08	0.10	0.12	0.14	0.17	0.20	0.23	0.27	0.30		
4" x¼"	35.88	173	U	89,825	39,922	22,456	14,372	9,981	7,333	5,614	4,436	3,593	2,969	2,495	2,126	1,833	1,597	1,404	6.737	
			D_u	0.01	0.01	0.02	0.03	0.05	0.06	0.08	0.10	0.13	0.16	0.19	0.22	0.25	0.29	0.33		
			C	44,912	29,942	22,456	17,965	14,971	12,832	11,228	9,981	8,982	8,166	7,485	6,910	6,416	5,988	5,614	13.474	
			D_c	0.00	0.01	0.02	0.03	0.04	0.05	0.07	0.08	0.10	0.13	0.15	0.17	0.20	0.23	0.26		
4" x ⅜"	54.16	192	U	134,737	59,883	33,684	21,558	14,971	10,999	8,421	6,654	5,389	4,454	3,743	3,189	2,750	2,395	2,105	10.105	
			D_u	0.01	0.01	0.02	0.03	0.05	0.06	0.08	0.10	0.13	0.16	0.19	0.22	0.25	0.29	0.33		
			C	67,368	44,912	33,684	26,947	22,456	19,248	16,842	14,971	13,474	12,249	11,228	10,364	9,624	8,982	8,421	20.211	
			D_c	0.00	0.01	0.02	0.03	0.04	0.05	0.07	0.08	0.10	0.13	0.15	0.17	0.20	0.23	0.26		
5" x ⅜"	67.34	227	U	210,526	93,567	52,632	33,684	23,392	17,186	13,158	10,396	8,421	6,960	5,848	4,983	4,296	3,743	3,289	15.789	
			D_u	0.00	0.01	0.02	0.03	0.04	0.05	0.07	0.08	0.10	0.13	0.15	0.17	0.20	0.23	0.26		
			C	105,263	70,175	52,632	42,105	35,088	30,075	26,316	23,392	21,053	19,139	17,544	16,194	15,038	14,035	13,158	39.474	
			D_c	0.00	0.01	0.01	0.02	0.03	0.04	0.05	0.07	0.08	0.10	0.12	0.14	0.16	0.19	0.21		
6" x ⅜"	80.51	260	U	303,158	134,737	75,789	48,505	33,684	24,748	18,947	14,971	12,126	10,022	8,421	7,175	6,187	5,389	4,737	22.737	
			D_u	0.00	0.01	0.01	0.02	0.03	0.04	0.06	0.07	0.09	0.10	0.12	0.15	0.17	0.19	0.22		
			C	151,579	101,053	75,789	60,632	50,526	43,308	37,895	33,684	30,316	27,560	25,263	23,320	21,654	20,211	18,947	68.211	
			D_c	0.00	0.01	0.01	0.02	0.02	0.03	0.04	0.06	0.07	0.08	0.10	0.12	0.14	0.16	0.18		

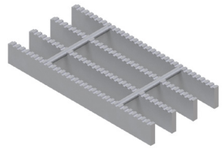
Spans and loads in red exceed a deflection of ¼" for uniform loads of 100 lbs./sq. ft. Experience has shown that ¼" deflection is the maximum deflection to give pedestrian comfort, but can be exceeded for other types of loads at the discretion of the specifying professional.

19HW4 (in)

# of Bars	2	3	4	5	6	7	8	9	10	11
¼" Bars	1-7/16	2-5/8	3-13/16	5	6-3/16	7-3/8	8-9/16	9-3/4	10-15/16	12-1/8
⅜" Bars	1-9/16	2-3/4	3-15/16	5-1/8	6-5/16	7-1/2	8-11/16	9-7/8	11-1/16	12-1/4
# of Bars	12	13	14	15	16	17	18	19	20	21
¼" Bars	13-5/16	14-1/2	15-11/16	16-7/8	18-1/16	19-1/4	20-7/16	21-5/8	22-13/16	24
⅜" Bars	13-7/16	14-5/8	15-13/16	17	18-3/16	19-3/8	20-9/16	21-3/4	22-15/16	24-1/8
# of Bars	22	23	24	25	26	27	28	29	30	31
¼" Bars	25-3/16	26-3/8	27-9/16	28-3/4	29-15/16	31-1/8	32-5/16	33-1/2	34-11/16	35-7/8
⅜" Bars	25-5/16	26-1/2	27-11/16	28-7/8	30-1/16	31-1/4	32-7/16	33-5/8	34-13/16	36

LOAD TABLES - HD

Grating Type: 19HW4
Design Code: NAAMM MBG 534-19
Material: ASTM A1011CS Grade 36
Surface: Serrated



U = Safe Uniform Load (lbs/ft²)
D_u = Deflection Due to Safe Uniform Load (in)
C = Safe Concentrated Load (lbs/ft of grating width)
D_c = Deflection Due to Safe Concentrated Load (in)
Allowable Extreme Fiber Stress = 20 ksi

Bearing Bar Size (inches)	Approx. Weight (lbs/ft²)	Ped. Span (inches)	Load / Deflection	Span (ft -in) 1' - 0"	1' - 6"	2' - 0"	2' - 6"	3' - 0"	3' - 6"	4' - 0"	4' - 6"	5' - 0"	5' - 6"	6' - 0"	6' - 6"	7' - 0"	7' - 6"	8' - 0"	Section Properties S_x (in³)/ft	I_x (in⁴)/ft
1" x ¼"	9.53	49	U	3,158	1,404	789	505	351	258	197	156								0.237	
			D_u	0.03	0.06	0.11	0.17	0.25	0.34	0.44	0.56									4.447
			C	1,579	1,053	789	632	526	451	395	351								0.089	
			D_c	0.02	0.05	0.09	0.14	0.20	0.27	0.35	0.45									7.227
1 ¼" x ¼"	11.72	61	U	5,614	2,495	1,404	898	624	458	351	277	225	186						0.421	
			D_u	0.02	0.05	0.08	0.13	0.19	0.25	0.33	0.42	0.52	0.63							6.671
			C	2,807	1,871	1,404	1,123	936	802	702	624	561	510						0.211	
			D_c	0.02	0.04	0.07	0.10	0.15	0.20	0.26	0.34	0.41	0.50							10.840
1 ½" x ¼"	13.92	72	U	8,772	3,899	2,193	1,404	975	716	548	433	351	290	244					0.658	
			D_u	0.02	0.04	0.07	0.10	0.15	0.20	0.26	0.34	0.41	0.50	0.60						5.921
			C	4,386	2,924	2,193	1,754	1,462	1,253	1,096	975	877	797	731					0.411	
			D_c	0.01	0.03	0.05	0.08	0.12	0.16	0.21	0.27	0.33	0.40	0.48						11.102
1 ½" x ⅜"	20.78	80	U	13,158	5,848	3,289	2,105	1,462	1,074	822	650	526	435	365	311	269			0.987	
			D_u	0.02	0.04	0.07	0.10	0.15	0.20	0.26	0.34	0.41	0.50	0.60	0.70	0.81				8.882
			C	6,579	4,386	3,289	2,632	2,193	1,880	1,645	1,462	1,316	1,196	1,096	1,012	940			0.617	
			D_c	0.01	0.03	0.05	0.08	0.12	0.16	0.21	0.27	0.33	0.40	0.48	0.56	0.65				16.653
2" x ¼"	18.31	93	U	17,193	7,641	4,298	2,751	1,910	1,404	1,075	849	688	568	478	407	351	306	269	1.289	
			D_u	0.01	0.03	0.05	0.07	0.11	0.14	0.19	0.24	0.30	0.36	0.43	0.50	0.58	0.67	0.76		14.250
			C	8,596	5,731	4,298	3,439	2,865	2,456	2,149	1,910	1,719	1,563	1,433	1,323	1,228	1,146	1,075	1.128	
			D_c	0.01	0.02	0.04	0.06	0.09	0.12	0.15	0.19	0.24	0.29	0.34	0.40	0.46	0.53	0.61		33.844
2 ½" x ¼"	22.70	113	U	28,421	12,632	7,105	4,547	3,158	2,320	1,776	1,404	1,137	940	789	673	580	505	444	2.132	
			D_u	0.01	0.02	0.04	0.06	0.08	0.11	0.15	0.19	0.23	0.28	0.33	0.39	0.45	0.52	0.59		20.882
			C	14,211	9,474	7,105	5,684	4,737	4,060	3,553	3,158	2,842	2,584	2,368	2,186	2,030	1,895	1,776	2.398	
			D_c	0.01	0.02	0.03	0.05	0.07	0.09	0.12	0.15	0.18	0.22	0.26	0.31	0.36	0.41	0.47		60.035
3" x ¼"	27.10	131	U	42,456	18,869	10,614	6,793	4,717	3,466	2,654	2,097	1,698	1,404	1,179	1,005	866	755	663	3.184	
			D_u	0.01	0.02	0.03	0.05	0.07	0.09	0.12	0.15	0.19	0.23	0.27	0.32	0.37	0.42	0.48		
			C	21,228	14,152	10,614	8,491	7,076	6,065	5,307	4,717	4,246	3,860	3,538	3,266	3,033	2,830	2,654	4.378	
			D_c	0.01	0.01	0.02	0.04	0.05	0.07	0.10	0.12	0.15	0.18	0.22	0.25	0.29	0.34	0.39		
3" x ⅜"	40.99	145	U	63,684	28,304	15,921	10,189	7,076	5,199	3,980	3,145	2,547	2,105	1,769	1,507	1,300	1,132	995	4.776	
			D_u	0.01	0.02	0.03	0.05	0.07	0.09	0.12	0.15	0.19	0.23	0.27	0.32	0.37	0.42	0.48		
			C	31,842	21,228	15,921	12,737	10,614	9,098	7,961	7,076	6,368	5,789	5,307	4,899	4,549	4,246	3,980	6.567	
			D_c	0.01	0.01	0.02	0.04	0.05	0.07	0.10	0.12	0.15	0.18	0.22	0.25	0.29	0.34	0.39		

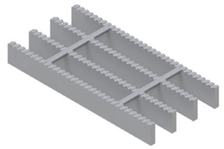
Spans and loads in red exceed a deflection of ¼" for uniform loads of 100 lbs./sq. ft. Experience has shown that ¼" deflection is the maximum deflection to give pedestrian comfort, but can be exceeded for other types of loads at the discretion of the specifying professional.

19HW4 (in)

# of Bars	2	3	4	5	6	7	8	9	10	11
¼" Bars	1-7/16	2-5/8	3-13/16	5	6-3/16	7-3/8	8-9/16	9-3/4	10-15/16	12-1/8
⅜" Bars	1-9/16	2-3/4	3-15/16	5-1/8	6-5/16	7-1/2	8-11/16	9-7/8	11-1/16	12-1/4
# of Bars	12	13	14	15	16	17	18	19	20	21
¼" Bars	13-5/16	14-1/2	15-11/16	16-7/8	18-1/16	19-1/4	20-7/16	21-5/8	22-13/16	24
⅜" Bars	13-7/16	14-5/8	15-13/16	17	18-3/16	19-3/8	20-9/16	21-3/4	22-15/16	24-1/8
# of Bars	22	23	24	25	26	27	28	29	30	31
¼" Bars	25-3/16	26-3/8	27-9/16	28-3/4	29-15/16	31-1/8	32-5/16	33-1/2	34-11/16	35-7/8
⅜" Bars	25-5/16	26-1/2	27-11/16	28-7/8	30-1/16	31-1/4	32-7/16	33-5/8	34-13/16	36

LOAD TABLES - HD

Grating Type: 19HW4
Design Code: NAAMM MBG 534-19
Material: ASTM A1011CS Grade 36
Surface: Serrated



U = Safe Uniform Load (lbs/ft²)
D_u = Deflection Due to Safe Uniform Load (in)
C = Safe Concentrated Load (lbs/ft of grating width)
D_c = Deflection Due to Safe Concentrated Load (in)
Allowable Extreme Fiber Stress = 20 ksi

Bearing Bar Size (inches)	Approx. Weight (lbs/ft²)	Ped. Span (inches)	Load / Deflection	Span (ft -in) 1' - 0"	1' - 6"	2' - 0"	2' - 6"	3' - 0"	3' - 6"	4' - 0"	4' - 6"	5' - 0"	5' - 6"	6' - 0"	6' - 6"	7' - 0"	7' - 6"	8' - 0"	Section Properties S_x (in³)/ft	I_x (in⁴)/ft
3 ½" x ¼"	31.49	148	U	59,298	26,355	14,825	9,488	6,589	4,841	3,706	2,928	2,372	1,960	1,647	1,404	1,210	1,054	927	4.447	
			D_u	0.01	0.01	0.03	0.04	0.06	0.08	0.10	0.13	0.16	0.19	0.23	0.27	0.31	0.36	0.41		7.227
			C	29,649	19,766	14,825	11,860	9,883	8,471	7,412	6,589	5,930	5,391	4,942	4,561	4,236	3,953	3,706		
			D_c	0.01	0.01	0.02	0.03	0.05	0.06	0.08	0.10	0.13	0.15	0.18	0.22	0.25	0.29	0.33		
3 ½" x ⅜"	47.57	164	U	88,947	39,532	22,237	14,232	9,883	7,261	5,559	4,392	3,558	2,940	2,471	2,105	1,815	1,581	1,390	6.671	
			D_u	0.01	0.01	0.03	0.04	0.06	0.08	0.10	0.13	0.16	0.19	0.23	0.27	0.31	0.36	0.41		10.840
			C	44,474	29,649	22,237	17,789	14,825	12,707	11,118	9,883	8,895	8,086	7,412	6,842	6,353	5,930	5,559		
			D_c	0.01	0.01	0.02	0.03	0.05	0.06	0.08	0.10	0.13	0.15	0.18	0.22	0.25	0.29	0.33		
4" x¼"	35.88	165	U	78,947	35,088	19,737	12,632	8,772	6,445	4,934	3,899	3,158	2,610	2,193	1,869	1,611	1,404	1,234	5.921	
			D_u	0.01	0.01	0.02	0.03	0.05	0.07	0.09	0.11	0.14	0.17	0.20	0.23	0.27	0.31	0.35		11.102
			C	39,474	26,316	19,737	15,789	13,158	11,278	9,868	8,772	7,895	7,177	6,579	6,073	5,639	5,263	4,934		
			D_c	0.00	0.01	0.02	0.03	0.04	0.05	0.07	0.09	0.11	0.13	0.16	0.19	0.22	0.25	0.28		
4" x ⅜"	54.16	183	U	118,421	52,632	29,605	18,947	13,158	9,667	7,401	5,848	4,737	3,915	3,289	2,803	2,417	2,105	1,850	8.882	
			D_u	0.01	0.01	0.02	0.03	0.05	0.07	0.09	0.11	0.14	0.17	0.20	0.23	0.27	0.31	0.35		16.653
			C	59,211	39,474	29,605	23,684	19,737	16,917	14,803	13,158	11,842	10,766	9,868	9,109	8,459	7,895	7,401		
			D_c	0.00	0.01	0.02	0.03	0.04	0.05	0.07	0.09	0.11	0.13	0.16	0.19	0.22	0.25	0.28		
5" x ⅜"	67.34	218	U	190,000	84,444	47,500	30,400	21,111	15,510	11,875	9,383	7,600	6,281	5,278	4,497	3,878	3,378	2,969	14.250	
			D_u	0.00	0.01	0.02	0.03	0.04	0.05	0.07	0.09	0.11	0.13	0.16	0.18	0.21	0.25	0.28		33.844
			C	95,000	63,333	47,500	38,000	31,667	27,143	23,750	21,111	19,000	17,273	15,833	14,615	13,571	12,667	11,875		
			D_c	0.00	0.01	0.01	0.02	0.03	0.04	0.06	0.07	0.09	0.11	0.13	0.15	0.17	0.20	0.22		
6" x ⅜"	80.51	252	U	278,421	123,743	69,605	44,547	30,936	22,728	17,401	13,749	11,137	9,204	7,734	6,590	5,682	4,950	4,350	20.882	
			D_u	0.00	0.01	0.01	0.02	0.03	0.04	0.06	0.07	0.09	0.11	0.13	0.15	0.18	0.20	0.23		60.035
			C	139,211	92,807	69,605	55,684	46,404	39,774	34,803	30,936	27,842	25,311	23,202	21,417	19,887	18,561	17,401		
			D_c	0.00	0.01	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.09	0.10	0.12	0.14	0.16	0.18		

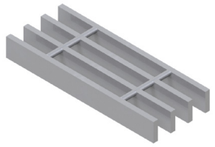
Spans and loads in red exceed a deflection of ¼" for uniform loads of 100 lbs./sq. ft. Experience has shown that ¼" deflection is the maximum deflection to give pedestrian comfort, but can be exceeded for other types of loads at the discretion of the specifying professional.

19HW4 (in)

# of Bars	2	3	4	5	6	7	8	9	10	11
¼" Bars	1-7/16	2-5/8	3-13/16	5	6-3/16	7-3/8	8-9/16	9-3/4	10-15/16	12-1/8
⅜" Bars	1-9/16	2-3/4	3-15/16	5-1/8	6-5/16	7-1/2	8-11/16	9-7/8	11-1/16	12-1/4
# of Bars	12	13	14	15	16	17	18	19	20	21
¼" Bars	13-5/16	14-1/2	15-11/16	16-7/8	18-1/16	19-1/4	20-7/16	21-5/8	22-13/16	24
⅜" Bars	13-7/16	14-5/8	15-13/16	17	18-3/16	19-3/8	20-9/16	21-3/4	22-15/16	24-1/8
# of Bars	22	23	24	25	26	27	28	29	30	31
¼" Bars	25-3/16	26-3/8	27-9/16	28-3/4	29-15/16	31-1/8	32-5/16	33-1/2	34-11/16	35-7/8
⅜" Bars	25-5/16	26-1/2	27-11/16	28-7/8	30-1/16	31-1/4	32-7/16	33-5/8	34-13/16	36

LOAD TABLES - HD CLOSE-MESH

Grating Type: 15HW4
Design Code: NAAMM MBG 534-19
Material: ASTM A1011CS Grade 36
Surface: Smooth



U = Safe Uniform Load (lbs/ft²)
D_u = Deflection Due to Safe Uniform Load (in)
C = Safe Concentrated Load (lbs/ft of grating width)
D_c = Deflection Due to Safe Concentrated Load (in)
Allowable Extreme Fiber Stress = 20 ksi

Bearing Bar Size (inches)	Approx. Weight (lbs/ft²)	Ped. Span (inches)	Load / Deflection	Span (ft -in) 1' - 0"	1' - 6"	2' - 0"	2' - 6"	3' - 0"	3' - 6"	4' - 0"	4' - 6"	5' - 0"	5' - 6"	6' - 0"	6' - 6"	7' - 0"	7' - 6"	8' - 0"	Section Properties S_x (in³)/ft	I_x (in⁴)/ft
1" x ¼"	11.80	65	U	7,111	3,160	1,778	1,138	790	580	444	351	284	235						0.533	
			D_u	0.02	0.05	0.08	0.13	0.19	0.25	0.33	0.42	0.52	0.63							
			C	3,556	2,370	1,778	1,422	1,185	1,016	889	790	711	646						0.267	
			D_c	0.02	0.04	0.07	0.10	0.15	0.20	0.26	0.34	0.41	0.50							
1 ¼" x ¼"	14.56	77	U	11,111	4,938	2,778	1,778	1,235	907	694	549	444	367	309	263				0.833	
			D_u	0.02	0.04	0.07	0.10	0.15	0.20	0.26	0.34	0.41	0.50	0.60	0.70					
			C	5,556	3,704	2,778	2,222	1,852	1,587	1,389	1,235	1,111	1,010	926	855				0.521	
			D_c	0.01	0.03	0.05	0.08	0.12	0.16	0.21	0.27	0.33	0.40	0.48	0.56					
1 ½" x ¼"	17.32	88	U	16,000	7,111	4,000	2,560	1,778	1,306	1,000	790	640	529	444	379	327	284		1.200	
			D_u	0.01	0.03	0.06	0.09	0.12	0.17	0.22	0.28	0.34	0.42	0.50	0.58	0.68	0.78			
			C	8,000	5,333	4,000	3,200	2,667	2,286	2,000	1,778	1,600	1,455	1,333	1,231	1,143	1,067		0.900	
			D_c	0.01	0.02	0.04	0.07	0.10	0.14	0.18	0.22	0.28	0.33	0.40	0.47	0.54	0.62			
1 ½" x ⅜"	25.88	97	U	24,000	10,667	6,000	3,840	2,667	1,959	1,500	1,185	960	793	667	568	490	427	375	1.800	
			D_u	0.01	0.03	0.06	0.09	0.12	0.17	0.22	0.28	0.34	0.42	0.50	0.58	0.68	0.78	0.88		
			C	12,000	8,000	6,000	4,800	4,000	3,429	3,000	2,667	2,400	2,182	2,000	1,846	1,714	1,600	1,500	1.350	
			D_c	0.01	0.02	0.04	0.07	0.10	0.14	0.18	0.22	0.28	0.33	0.40	0.47	0.54	0.62	0.71		
2" x ¼"	22.85	109	U	28,444	12,642	7,111	4,551	3,160	2,322	1,778	1,405	1,138	940	790	673	580	506	444	2.133	
			D_u	0.01	0.02	0.04	0.06	0.09	0.13	0.17	0.21	0.26	0.31	0.37	0.44	0.51	0.58	0.66		
			C	14,222	9,481	7,111	5,689	4,741	4,063	3,556	3,160	2,844	2,586	2,370	2,188	2,032	1,896	1,778	2.133	
			D_c	0.01	0.02	0.03	0.05	0.07	0.10	0.13	0.17	0.21	0.25	0.30	0.35	0.41	0.47	0.53		
2 ½" x ¼"	28.37	129	U	44,444	19,753	11,111	7,111	4,938	3,628	2,778	2,195	1,778	1,469	1,235	1,052	907	790	694	3.333	
			D_u	0.01	0.02	0.03	0.05	0.07	0.10	0.13	0.17	0.21	0.25	0.30	0.35	0.41	0.47	0.53		
			C	22,222	14,815	11,111	8,889	7,407	6,349	5,556	4,938	4,444	4,040	3,704	3,419	3,175	2,963	2,778	4.167	
			D_c	0.01	0.01	0.03	0.04	0.06	0.08	0.11	0.13	0.17	0.20	0.24	0.28	0.32	0.37	0.42		
3" x ¼"	33.90	148	U	64,000	28,444	16,000	10,240	7,111	5,224	4,000	3,160	2,560	2,116	1,778	1,515	1,306	1,138	1,000	4.800	
			D_u	0.01	0.02	0.03	0.04	0.06	0.08	0.11	0.14	0.17	0.21	0.25	0.29	0.34	0.39	0.44		
			C	32,000	21,333	16,000	12,800	10,667	9,143	8,000	7,111	6,400	5,818	5,333	4,923	4,571	4,267	4,000	7.200	
			D_c	0.01	0.01	0.02	0.03	0.05	0.07	0.09	0.11	0.14	0.17	0.20	0.23	0.27	0.31	0.35		
3" x ⅜"	51.19	164	U	96,000	42,667	24,000	15,360	10,667	7,837	6,000	4,741	3,840	3,174	2,667	2,272	1,959	1,707	1,500	7.200	
			D_u	0.01	0.02	0.03	0.04	0.06	0.08	0.11	0.14	0.17	0.21	0.25	0.29	0.34	0.39	0.44		
			C	48,000	32,000	24,000	19,200	16,000	13,714	12,000	10,667	9,600	8,727	8,000	7,385	6,857	6,400	6,000	10.800	
			D_c	0.01	0.01	0.02	0.03	0.05	0.07	0.09	0.11	0.14	0.17	0.20	0.23	0.27	0.31	0.35		

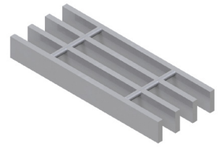
Spans and loads in red exceed a deflection of ¼" for uniform loads of 100 lbs./sq. ft. Experience has shown that ¼" deflection is the maximum deflection to give pedestrian comfort, but can be exceeded for other types of loads at the discretion of the specifying professional.

15HW4 (in)

# of Bars	2	3	4	5	6	7	8	9	10	11
¼" Bars	1-3/16	2-1/8	3-1/16	4	4-15/16	5-7/8	6-13/16	7-3/4	8-11/16	9-5/8
⅜" Bars	1-5/16	2-1/4	3-3/16	4-1/8	5-1/16	6	6-15/16	7-7/8	8-13/16	9-3/4
# of Bars	12	13	14	15	16	17	18	19	20	21
¼" Bars	10-9/16	11-1/2	12-7/16	13-3/8	14-5/16	15-1/4	16-3/16	17-1/8	18-1/16	19
⅜" Bars	10-11/16	11-5/8	12-9/16	13-1/2	14-7/16	15-3/8	16-5/16	17-1/4	18-3/16	19-1/8
# of Bars	22	23	24	25	26	27	28	29	30	31
¼" Bars	19-15/16	20-7/8	21-13/16	22-3/4	23-11/16	24-5/8	25-9/16	26-1/2	27-7/16	28-3/8
⅜" Bars	20-1/16	21	21-15/16	22-7/8	23-13/16	24-3/4	25-11/16	26-5/8	27-9/16	28-1/2

LOAD TABLES - HD CLOSE-MESH

Grating Type: 15HW4
Design Code: NAAMM MBG 534-19
Material: ASTM A1011CS Grade 36
Surface: Smooth



U = Safe Uniform Load (lbs/ft²)
D_u = Deflection Due to Safe Uniform Load (in)
C = Safe Concentrated Load (lbs/ft of grating width)
D_c = Deflection Due to Safe Concentrated Load (in)
Allowable Extreme Fiber Stress = 20 ksi

Bearing Bar Size (inches)	Approx. Weight (lbs/ft²)	Ped. Span (inches)	Load / Deflection	Span (ft -in) 1' - 0"	1' - 6"	2' - 0"	2' - 6"	3' - 0"	3' - 6"	4' - 0"	4' - 6"	5' - 0"	5' - 6"	6' - 0"	6' - 6"	7' - 0"	7' - 6"	8' - 0"	Section Properties S_x (in³)/ft	I_x (in⁴)/ft
3 ½" x ¼"	39.42	166	U	87,111	38,716	21,778	13,938	9,679	7,111	5,444	4,302	3,484	2,880	2,420	2,062	1,778	1,549	1,361	6.533	
			D_u	0.01	0.01	0.02	0.04	0.05	0.07	0.09	0.12	0.15	0.18	0.21	0.25	0.29	0.33	0.38		
			C	43,556	29,037	21,778	17,422	14,519	12,444	10,889	9,679	8,711	7,919	7,259	6,701	6,222	5,807	5,444	11.433	
			D_c	0.00	0.01	0.02	0.03	0.04	0.06	0.08	0.10	0.12	0.14	0.17	0.20	0.23	0.27	0.30		
3 ½" x ⅜"	59.47	184	U	130,667	58,074	32,667	20,907	14,519	10,667	8,167	6,453	5,227	4,320	3,630	3,093	2,667	2,323	2,042	9.800	
			D_u	0.01	0.01	0.02	0.04	0.05	0.07	0.09	0.12	0.15	0.18	0.21	0.25	0.29	0.33	0.38		
			C	65,333	43,556	32,667	26,133	21,778	18,667	16,333	14,519	13,067	11,879	10,889	10,051	9,333	8,711	8,167	17.150	
			D_c	0.00	0.01	0.02	0.03	0.04	0.06	0.08	0.10	0.12	0.14	0.17	0.20	0.23	0.27	0.30		
4" x¼"	44.95	184	U	113,778	50,568	28,444	18,204	12,642	9,288	7,111	5,619	4,551	3,761	3,160	2,693	2,322	2,023	1,778	8.533	
			D_u	0.01	0.01	0.02	0.03	0.05	0.06	0.08	0.10	0.13	0.16	0.19	0.22	0.25	0.29	0.33		
			C	56,889	37,926	28,444	22,756	18,963	16,254	14,222	12,642	11,378	10,343	9,481	8,752	8,127	7,585	7,111	17.067	
			D_c	0.00	0.01	0.02	0.03	0.04	0.05	0.07	0.08	0.10	0.13	0.15	0.17	0.20	0.23	0.26		
4" x ⅜"	67.76	203	U	170,667	75,852	42,667	27,307	18,963	13,932	10,667	8,428	6,827	5,642	4,741	4,039	3,483	3,034	2,667	12.800	
			D_u	0.01	0.01	0.02	0.03	0.05	0.06	0.08	0.10	0.13	0.16	0.19	0.22	0.25	0.29	0.33		
			C	85,333	56,889	42,667	34,133	28,444	24,381	21,333	18,963	17,067	15,515	14,222	13,128	12,190	11,378	10,667	25.600	
			D_c	0.00	0.01	0.02	0.03	0.04	0.05	0.07	0.08	0.10	0.13	0.15	0.17	0.20	0.23	0.26		
5" x ⅜"	84.34	240	U	266,667	118,519	66,667	42,667	29,630	21,769	16,667	13,169	10,667	8,815	7,407	6,312	5,442	4,741	4,167	20.000	
			D_u	0.00	0.01	0.02	0.03	0.04	0.05	0.07	0.08	0.10	0.13	0.15	0.17	0.20	0.23	0.26		
			C	133,333	88,889	66,667	53,333	44,444	38,095	33,333	29,630	26,667	24,242	22,222	20,513	19,048	17,778	16,667	50.000	
			D_c	0.00	0.01	0.01	0.02	0.03	0.04	0.05	0.07	0.08	0.10	0.12	0.14	0.16	0.19	0.21		
6" x ⅜"	100.91	276	U	384,000	170,667	96,000	61,440	42,667	31,347	24,000	18,963	15,360	12,694	10,667	9,089	7,837	6,827	6,000	28.800	
			D_u	0.00	0.01	0.01	0.02	0.03	0.04	0.06	0.07	0.09	0.10	0.12	0.15	0.17	0.19	0.22		
			C	192,000	128,000	96,000	76,800	64,000	54,857	48,000	42,667	38,400	34,909	32,000	29,538	27,429	25,600	24,000	86.400	
			D_c	0.00	0.01	0.01	0.02	0.02	0.03	0.04	0.06	0.07	0.08	0.10	0.12	0.14	0.16	0.18		

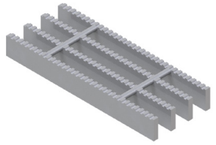
Spans and loads in red exceed a deflection of ¼" for uniform loads of 100 lbs./sq. ft. Experience has shown that ¼" deflection is the maximum deflection to give pedestrian comfort, but can be exceeded for other types of loads at the discretion of the specifying professional.

15HW4 (in)

# of Bars	2	3	4	5	6	7	8	9	10	11
¼" Bars	1-3/16	2-1/8	3-1/16	4	4-15/16	5-7/8	6-13/16	7-3/4	8-11/16	9-5/8
⅜" Bars	1-5/16	2-1/4	3-3/16	4-1/8	5-1/16	6	6-15/16	7-7/8	8-13/16	9-3/4
# of Bars	12	13	14	15	16	17	18	19	20	21
¼" Bars	10-9/16	11-1/2	12-7/16	13-3/8	14-5/16	15-1/4	16-3/16	17-1/8	18-1/16	19
⅜" Bars	10-11/16	11-5/8	12-9/16	13-1/2	14-7/16	15-3/8	16-5/16	17-1/4	18-3/16	19-1/8
# of Bars	22	23	24	25	26	27	28	29	30	31
¼" Bars	19-15/16	20-7/8	21-13/16	22-3/4	23-11/16	24-5/8	25-9/16	26-1/2	27-7/16	28-3/8
⅜" Bars	20-1/16	21	21-15/16	22-7/8	23-13/16	24-3/4	25-11/16	26-5/8	27-9/16	28-1/2

LOAD TABLES - HD CLOSE-MESH

Grating Type: 15HW4
Design Code: NAAMM MBG 534-19
Material: ASTM A1011CS Grade 36
Surface: Serrated



U = Safe Uniform Load (lbs/ft²)
D_u = Deflection Due to Safe Uniform Load (in)
C = Safe Concentrated Load (lbs/ft of grating width)
D_c = Deflection Due to Safe Concentrated Load (in)
Allowable Extreme Fiber Stress = 20 ksi

Bearing Bar Size (inches)	Approx. Weight (lbs/ft²)	Ped. Span (inches)	Load / Deflection	Span (ft -in) 1' - 0"	1' - 6"	2' - 0"	2' - 6"	3' - 0"	3' - 6"	4' - 0"	4' - 6"	5' - 0"	5' - 6"	6' - 0"	6' - 6"	7' - 0"	7' - 6"	8' - 0"	Section Properties S_x (in³)/ft	I_x (in⁴)/ft
1" x ¼"	11.80	52	U	4,000	1,778	1,000	640	444	327	250	198								0.300	
			D_u	0.03	0.06	0.11	0.17	0.25	0.34	0.44	0.56									
			C	2,000	1,333	1,000	800	667	571	500	444									0.113
			D_c	0.02	0.05	0.09	0.14	0.20	0.27	0.35	0.45									
1 ¼" x ¼"	14.56	65	U	7,111	3,160	1,778	1,138	790	580	444	351	284	235						0.533	
			D_u	0.02	0.05	0.08	0.13	0.19	0.25	0.33	0.42	0.52	0.63							
			C	3,556	2,370	1,778	1,422	1,185	1,016	889	790	711	646							0.267
			D_c	0.02	0.04	0.07	0.10	0.15	0.20	0.26	0.34	0.41	0.50							
1 ½" x ¼"	17.32	77	U	11,111	4,938	2,778	1,778	1,235	907	694	549	444	367	309	263				0.833	
			D_u	0.02	0.04	0.07	0.10	0.15	0.20	0.26	0.34	0.41	0.50	0.60	0.70					
			C	5,556	3,704	2,778	2,222	1,852	1,587	1,389	1,235	1,111	1,010	926	855					0.521
			D_c	0.01	0.03	0.05	0.08	0.12	0.16	0.21	0.27	0.33	0.40	0.48	0.56					
1 ½" x ⅜"	25.88	85	U	16,667	7,407	4,167	2,667	1,852	1,361	1,042	823	667	551	463	394	340	296		1.250	
			D_u	0.02	0.04	0.07	0.10	0.15	0.20	0.26	0.34	0.41	0.50	0.60	0.70	0.81	0.93			
			C	8,333	5,556	4,167	3,333	2,778	2,381	2,083	1,852	1,667	1,515	1,389	1,282	1,190	1,111			0.781
			D_c	0.01	0.03	0.05	0.08	0.12	0.16	0.21	0.27	0.33	0.40	0.48	0.56	0.65	0.74			
2" x ¼"	22.85	99	U	21,778	9,679	5,444	3,484	2,420	1,778	1,361	1,075	871	720	605	515	444	387	340	1.633	
			D_u	0.01	0.03	0.05	0.07	0.11	0.14	0.19	0.24	0.30	0.36	0.43	0.50	0.58	0.67	0.76		
			C	10,889	7,259	5,444	4,356	3,630	3,111	2,722	2,420	2,178	1,980	1,815	1,675	1,556	1,452	1,361		1.429
			D_c	0.01	0.02	0.04	0.06	0.09	0.12	0.15	0.19	0.24	0.29	0.34	0.40	0.46	0.53	0.61		
2 ½" x ¼"	28.37	119	U	36,000	16,000	9,000	5,760	4,000	2,939	2,250	1,778	1,440	1,190	1,000	852	735	640	563	2.700	
			D_u	0.01	0.02	0.04	0.06	0.08	0.11	0.15	0.19	0.23	0.28	0.33	0.39	0.45	0.52	0.59		
			C	18,000	12,000	9,000	7,200	6,000	5,143	4,500	4,000	3,600	3,273	3,000	2,769	2,571	2,400	2,250		3.038
			D_c	0.01	0.02	0.03	0.05	0.07	0.09	0.12	0.15	0.18	0.22	0.26	0.31	0.36	0.41	0.47		
3" x ¼"	33.90	139	U	53,778	23,901	13,444	8,604	5,975	4,390	3,361	2,656	2,151	1,778	1,494	1,273	1,098	956	840	4.033	
			D_u	0.01	0.02	0.03	0.05	0.07	0.09	0.12	0.15	0.19	0.23	0.27	0.32	0.37	0.42	0.48		
			C	26,889	17,926	13,444	10,756	8,963	7,683	6,722	5,975	5,378	4,889	4,481	4,137	3,841	3,585	3,361		5.546
			D_c	0.01	0.01	0.02	0.04	0.05	0.07	0.10	0.12	0.15	0.18	0.22	0.25	0.29	0.34	0.39		
3" x ⅜"	51.19	154	U	80,667	35,852	20,167	12,907	8,963	6,585	5,042	3,984	3,227	2,667	2,241	1,909	1,646	1,434	1,260	6.050	
			D_u	0.01	0.02	0.03	0.05	0.07	0.09	0.12	0.15	0.19	0.23	0.27	0.32	0.37	0.42	0.48		
			C	40,333	26,889	20,167	16,133	13,444	11,524	10,083	8,963	8,067	7,333	6,722	6,205	5,762	5,378	5,042		8.319
			D_c	0.01	0.01	0.02	0.04	0.05	0.07	0.10	0.12	0.15	0.18	0.22	0.25	0.29	0.34	0.39		

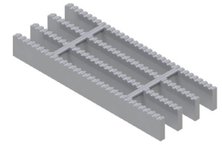
Spans and loads in red exceed a deflection of ¼" for uniform loads of 100 lbs./sq. ft. Experience has shown that ¼" deflection is the maximum deflection to give pedestrian comfort, but can be exceeded for other types of loads at the discretion of the specifying professional.

15HW4 (in)

# of Bars	2	3	4	5	6	7	8	9	10	11
¼" Bars	1-3/16	2-1/8	3-1/16	4	4-15/16	5-7/8	6-13/16	7-3/4	8-11/16	9-5/8
⅜" Bars	1-5/16	2-1/4	3-3/16	4-1/8	5-1/16	6	6-15/16	7-7/8	8-13/16	9-3/4
# of Bars	12	13	14	15	16	17	18	19	20	21
¼" Bars	10-9/16	11-1/2	12-7/16	13-3/8	14-5/16	15-1/4	16-3/16	17-1/8	18-1/16	19
⅜" Bars	10-11/16	11-5/8	12-9/16	13-1/2	14-7/16	15-3/8	16-5/16	17-1/4	18-3/16	19-1/8
# of Bars	22	23	24	25	26	27	28	29	30	31
¼" Bars	19-15/16	20-7/8	21-13/16	22-3/4	23-11/16	24-5/8	25-9/16	26-1/2	27-7/16	28-3/8
⅜" Bars	20-1/16	21	21-15/16	22-7/8	23-13/16	24-3/4	25-11/16	26-5/8	27-9/16	28-1/2

LOAD TABLES - HD CLOSE-MESH

Grating Type: 15HW4
Design Code: NAAMM MBG 534-19
Material: ASTM A1011CS Grade 36
Surface: Serrated



U = Safe Uniform Load (lbs/ft²)
D_u = Deflection Due to Safe Uniform Load (in)
C = Safe Concentrated Load (lbs/ft of grating width)
D_c = Deflection Due to Safe Concentrated Load (in)
Allowable Extreme Fiber Stress = 20 ksi

Bearing Bar Size (inches)	Approx. Weight (lbs/ft²)	Ped. Span (inches)	Load / Deflection	Span (ft -in) 1' - 0"	1' - 6"	2' - 0"	2' - 6"	3' - 0"	3' - 6"	4' - 0"	4' - 6"	5' - 0"	5' - 6"	6' - 0"	6' - 6"	7' - 0"	7' - 6"	8' - 0"	Section Properties S_x (in³)/ft	I_x (in⁴)/ft
3 ½" x ¼"	39.42	157	U	75,111	33,383	18,778	12,018	8,346	6,132	4,694	3,709	3,004	2,483	2,086	1,778	1,533	1,335	1,174	5.633	
			D_u	0.01	0.01	0.03	0.04	0.06	0.08	0.10	0.13	0.16	0.19	0.23	0.27	0.31	0.36	0.41		
			C	37,556	25,037	18,778	15,022	12,519	10,730	9,389	8,346	7,511	6,828	6,259	5,778	5,365	5,007	4,694	9.154	
			D_c	0.01	0.01	0.02	0.03	0.05	0.06	0.08	0.10	0.13	0.15	0.18	0.22	0.25	0.29	0.33		
3 ½" x ⅜"	59.47	174	U	112,667	50,074	28,167	18,027	12,519	9,197	7,042	5,564	4,507	3,725	3,130	2,667	2,299	2,003	1,760	8.450	
			D_u	0.01	0.01	0.03	0.04	0.06	0.08	0.10	0.13	0.16	0.19	0.23	0.27	0.31	0.36	0.41		
			C	56,333	37,556	28,167	22,533	18,778	16,095	14,083	12,519	11,267	10,242	9,389	8,667	8,048	7,511	7,042	13.731	
			D_c	0.01	0.01	0.02	0.03	0.05	0.06	0.08	0.10	0.13	0.15	0.18	0.22	0.25	0.29	0.33		
4" x¼"	44.95	175	U	100,000	44,444	25,000	16,000	11,111	8,163	6,250	4,938	4,000	3,306	2,778	2,367	2,041	1,778	1,563	7.500	
			D_u	0.01	0.01	0.02	0.03	0.05	0.07	0.09	0.11	0.14	0.17	0.20	0.23	0.27	0.31	0.35		
			C	50,000	33,333	25,000	20,000	16,667	14,286	12,500	11,111	10,000	9,091	8,333	7,692	7,143	6,667	6,250	14.063	
			D_c	0.00	0.01	0.02	0.03	0.04	0.05	0.07	0.09	0.11	0.13	0.16	0.19	0.22	0.25	0.28		
4" x ⅜"	67.76	194	U	150,000	66,667	37,500	24,000	16,667	12,245	9,375	7,407	6,000	4,959	4,167	3,550	3,061	2,667	2,344	11.250	
			D_u	0.01	0.01	0.02	0.03	0.05	0.07	0.09	0.11	0.14	0.17	0.20	0.23	0.27	0.31	0.35		
			C	75,000	50,000	37,500	30,000	25,000	21,429	18,750	16,667	15,000	13,636	12,500	11,538	10,714	10,000	9,375	21.094	
			D_c	0.00	0.01	0.02	0.03	0.04	0.05	0.07	0.09	0.11	0.13	0.16	0.18	0.21	0.25	0.28		
5" x ⅜"	84.34	231	U	240,667	106,963	60,167	38,507	26,741	19,646	15,042	11,885	9,627	7,956	6,685	5,696	4,912	4,279	3,760	18.050	
			D_u	0.00	0.01	0.02	0.03	0.04	0.05	0.07	0.09	0.11	0.13	0.16	0.18	0.21	0.25	0.28		
			C	120,333	80,222	60,167	48,133	40,111	34,381	30,083	26,741	24,067	21,879	20,056	18,513	17,190	16,044	15,042	42.869	
			D_c	0.00	0.01	0.01	0.02	0.03	0.04	0.06	0.07	0.09	0.11	0.13	0.15	0.17	0.20	0.22		
6" x ⅜"	100.91	267	U	352,667	156,741	88,167	56,427	39,185	28,789	22,042	17,416	14,107	11,658	9,796	8,347	7,197	6,270	5,510	26.450	
			D_u	0.00	0.01	0.01	0.02	0.03	0.04	0.06	0.07	0.09	0.11	0.13	0.15	0.18	0.20	0.23		
			C	176,333	117,556	88,167	70,533	58,778	50,381	44,083	39,185	35,267	32,061	29,389	27,128	25,190	23,511	22,042	76.044	
			D_c	0.00	0.01	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.09	0.10	0.12	0.14	0.16	0.18		

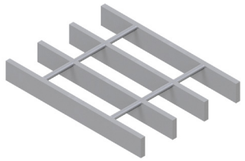
Spans and loads in red exceed a deflection of ¼" for uniform loads of 100 lbs./sq. ft. Experience has shown that ¼" deflection is the maximum deflection to give pedestrian comfort, but can be exceeded for other types of loads at the discretion of the specifying professional.

15HW4 (in)

# of Bars	2	3	4	5	6	7	8	9	10	11
¼" Bars	1-3/16	2-1/8	3-1/16	4	4-15/16	5-7/8	6-13/16	7-3/4	8-11/16	9-5/8
⅜" Bars	1-5/16	2-1/4	3-3/16	4-1/8	5-1/16	6	6-15/16	7-7/8	8-13/16	9-3/4
# of Bars	12	13	14	15	16	17	18	19	20	21
¼" Bars	10-9/16	11-1/2	12-7/16	13-3/8	14-5/16	15-1/4	16-3/16	17-1/8	18-1/16	19
⅜" Bars	10-11/16	11-5/8	12-9/16	13-1/2	14-7/16	15-3/8	16-5/16	17-1/4	18-3/16	19-1/8
# of Bars	22	23	24	25	26	27	28	29	30	31
¼" Bars	19-15/16	20-7/8	21-13/16	22-3/4	23-11/16	24-5/8	25-9/16	26-1/2	27-7/16	28-3/8
⅜" Bars	20-1/16	21	21-15/16	22-7/8	23-13/16	24-3/4	25-11/16	26-5/8	27-9/16	28-1/2

LOAD TABLES - WIDE-GAP

Grating Type: 30HW4
Design Code: NAAMM MBG 534-19
Material: ASTM A1011CS Grade 36
Surface: Smooth



U = Safe Uniform Load (lbs/ft²)
D_u = Deflection Due to Safe Uniform Load (in)
C = Safe Concentrated Load (lbs/ft of grating width)
D_c = Deflection Due to Safe Concentrated Load (in)
Allowable Extreme Fiber Stress = 20 ksi

Bearing Bar Size (inches)	Approx. Weight (lbs/ft²)	Ped. Span (inches)	Load / Deflection	Span (ft -in) 1' - 0"	1' - 6"	2' - 0"	2' - 6"	3' - 0"	3' - 6"	4' - 0"	4' - 6"	5' - 0"	5' - 6"	6' - 0"	6' - 6"	7' - 0"	7' - 6"	8' - 0"	Section Properties S_x (in³)/ft	I_x (in⁴)/ft
1" x ¼"	6.68	55	U	3,556	1,580	889	569	395	290	222	176	142							0.267	
			D_u	0.02	0.05	0.08	0.13	0.19	0.25	0.33	0.42	0.52								
			C	1,778	1,185	889	711	593	508	444	395	356							0.133	
			D_c	0.02	0.04	0.07	0.10	0.15	0.20	0.26	0.34	0.41								
1 ¼" x ¼"	8.10	65	U	5,556	2,469	1,389	889	617	454	347	274	222	184						0.417	
			D_u	0.02	0.04	0.07	0.10	0.15	0.20	0.26	0.34	0.41	0.50							
			C	2,778	1,852	1,389	1,111	926	794	694	617	556	505						0.260	
			D_c	0.01	0.03	0.05	0.08	0.12	0.16	0.21	0.27	0.33	0.40							
1 ½" x ¼"	9.52	74	U	8,000	3,556	2,000	1,280	889	653	500	395	320	264	222	189				0.600	
			D_u	0.01	0.03	0.06	0.09	0.12	0.17	0.22	0.28	0.34	0.42	0.50	0.58					
			C	4,000	2,667	2,000	1,600	1,333	1,143	1,000	889	800	727	667	615				0.450	
			D_c	0.01	0.02	0.04	0.07	0.10	0.14	0.18	0.22	0.28	0.33	0.40	0.47					
1 ½" x ⅜"	13.77	82	U	12,000	5,333	3,000	1,920	1,333	980	750	593	480	397	333	284	245			0.900	
			D_u	0.01	0.03	0.06	0.09	0.12	0.17	0.22	0.28	0.34	0.42	0.50	0.58	0.68				
			C	6,000	4,000	3,000	2,400	2,000	1,714	1,500	1,333	1,200	1,091	1,000	923	857			0.675	
			D_c	0.01	0.02	0.04	0.07	0.10	0.14	0.18	0.22	0.28	0.33	0.40	0.47	0.54				
2" x ¼"	12.35	92	U	14,222	6,321	3,556	2,276	1,580	1,161	889	702	569	470	395	337	290	253	222	1.067	
			D_u	0.01	0.02	0.04	0.06	0.09	0.13	0.17	0.21	0.26	0.31	0.37	0.44	0.51	0.58	0.66		
			C	7,111	4,741	3,556	2,844	2,370	2,032	1,778	1,580	1,422	1,293	1,185	1,094	1,016	948	889	1.067	
			D_c	0.01	0.02	0.03	0.05	0.07	0.10	0.13	0.17	0.21	0.25	0.30	0.35	0.41	0.47	0.53		
2 ½" x ¼"	15.18	109	U	22,222	9,877	5,556	3,556	2,469	1,814	1,389	1,097	889	735	617	526	454	395	347	1.667	
			D_u	0.01	0.02	0.03	0.05	0.07	0.10	0.13	0.17	0.21	0.25	0.30	0.35	0.41	0.47	0.53		
			C	11,111	7,407	5,556	4,444	3,704	3,175	2,778	2,469	2,222	2,020	1,852	1,709	1,587	1,481	1,389	2.083	
			D_c	0.01	0.01	0.03	0.04	0.06	0.08	0.11	0.13	0.17	0.20	0.24	0.28	0.32	0.37	0.42		
3" x ¼"	18.02	125	U	32,000	14,222	8,000	5,120	3,556	2,612	2,000	1,580	1,280	1,058	889	757	653	569	500	2.400	
			D_u	0.01	0.02	0.03	0.04	0.06	0.08	0.11	0.14	0.17	0.21	0.25	0.29	0.34	0.39	0.44		
			C	16,000	10,667	8,000	6,400	5,333	4,571	4,000	3,556	3,200	2,909	2,667	2,462	2,286	2,133	2,000	3.600	
			D_c	0.01	0.01	0.02	0.03	0.05	0.07	0.09	0.11	0.14	0.17	0.20	0.23	0.27	0.31	0.35		
3" x ⅜"	26.96	138	U	48,000	21,333	12,000	7,680	5,333	3,918	3,000	2,370	1,920	1,587	1,333	1,136	980	853	750	3.600	
			D_u	0.01	0.02	0.03	0.04	0.06	0.08	0.11	0.14	0.17	0.21	0.25	0.29	0.34	0.39	0.44		
			C	24,000	16,000	12,000	9,600	8,000	6,857	6,000	5,333	4,800	4,364	4,000	3,692	3,429	3,200	3,000	5.400	
			D_c	0.01	0.01	0.02	0.03	0.05	0.07	0.09	0.11	0.14	0.17	0.20	0.23	0.27	0.31	0.35		

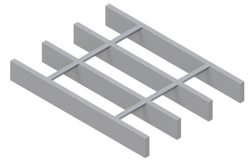
Spans and loads in red exceed a deflection of ¼" for uniform loads of 100 lbs./sq. ft. Experience has shown that ¼" deflection is the maximum deflection to give pedestrian comfort, but can be exceeded for other types of loads at the discretion of the specifying professional.

30HW4 (in)

# of Bars	2	3	4	5	6	7	8	9	10	11
¼" Bars	2-⅛	4	5-⅞	7-¾	9-⅝	11-½	13-⅜	15-¼	17-⅛	19
⅜" Bars	2-¼	4-⅛	6	7-⅞	9-¾	11-⅝	13-½	15-⅜	17-¼	19-⅛
# of Bars	12	13	14	15	16	17	18	19	20	21
¼" Bars	20-⅞	22-¾	24-⅝	26-½	28-⅜	30-¼	32-⅛	34	35-⅞	37-¾
⅜" Bars	21	22-⅞	24-¾	26-⅝	28-½	30-⅜	32-¼	34-⅛	36	37-⅞

LOAD TABLES - WIDE-GAP

Grating Type: 30HW4
Design Code: NAAMM MBG 534-19
Material: ASTM A1011CS Grade 36
Surface: Smooth



U = Safe Uniform Load (lbs/ft²)
D_u = Deflection Due to Safe Uniform Load (in)
C = Safe Concentrated Load (lbs/ft of grating width)
D_c = Deflection Due to Safe Concentrated Load (in)
Allowable Extreme Fiber Stress = 20 ksi

Bearing Bar Size (inches)	Approx. Weight (lbs/ft²)	Ped. Span (inches)	Load / Deflection	Span (ft -in) 1' - 0"	1' - 6"	2' - 0"	2' - 6"	3' - 0"	3' - 6"	4' - 0"	4' - 6"	5' - 0"	5' - 6"	6' - 0"	6' - 6"	7' - 0"	7' - 6"	8' - 0"	Section Properties S_x (in³)/ft	I_x (in⁴)/ft
3 ½" x ¼"	20.85	140	U	43,556	19,358	10,889	6,969	4,840	3,556	2,722	2,151	1,742	1,440	1,210	1,031	889	774	681	3.267	
			D_u	0.01	0.01	0.02	0.04	0.05	0.07	0.09	0.12	0.15	0.18	0.21	0.25	0.29	0.33	0.38		
			C	21,778	14,519	10,889	8,711	7,259	6,222	5,444	4,840	4,356	3,960	3,630	3,350	3,111	2,904	2,722	5.717	
			D_c	0.00	0.01	0.02	0.03	0.04	0.06	0.08	0.10	0.12	0.14	0.17	0.20	0.23	0.27	0.30		
3 ½" x ⅜"	31.21	155	U	65,333	29,037	16,333	10,453	7,259	5,333	4,083	3,226	2,613	2,160	1,815	1,546	1,333	1,161	1,021	4.900	
			D_u	0.01	0.01	0.02	0.04	0.05	0.07	0.09	0.12	0.15	0.18	0.21	0.25	0.29	0.33	0.38		
			C	32,667	21,778	16,333	13,067	10,889	9,333	8,167	7,259	6,533	5,939	5,444	5,026	4,667	4,356	4,083	8.575	
			D_c	0.00	0.01	0.02	0.03	0.04	0.06	0.08	0.10	0.12	0.14	0.17	0.20	0.23	0.27	0.30		
4" x¼"	23.68	155	U	56,889	25,284	14,222	9,102	6,321	4,644	3,556	2,809	2,276	1,881	1,580	1,346	1,161	1,011	889	4.267	
			D_u	0.01	0.01	0.02	0.03	0.05	0.06	0.08	0.10	0.13	0.16	0.19	0.22	0.25	0.29	0.33		
			C	28,444	18,963	14,222	11,378	9,481	8,127	7,111	6,321	5,689	5,172	4,741	4,376	4,063	3,793	3,556	8.533	
			D_c	0.00	0.01	0.02	0.03	0.04	0.05	0.07	0.08	0.10	0.13	0.15	0.17	0.20	0.23	0.26		
4" x ⅜"	35.46	171	U	85,333	37,926	21,333	13,653	9,481	6,966	5,333	4,214	3,413	2,821	2,370	2,020	1,741	1,517	1,333	6.400	
			D_u	0.01	0.01	0.02	0.03	0.05	0.06	0.08	0.10	0.13	0.16	0.19	0.22	0.25	0.29	0.33		
			C	42,667	28,444	21,333	17,067	14,222	12,190	10,667	9,481	8,533	7,758	7,111	6,564	6,095	5,689	5,333	12.800	
			D_c	0.00	0.01	0.02	0.03	0.04	0.05	0.07	0.08	0.10	0.13	0.15	0.17	0.20	0.23	0.26		
5" x ⅜"	43.96	202	U	133,333	59,259	33,333	21,333	14,815	10,884	8,333	6,584	5,333	4,408	3,704	3,156	2,721	2,370	2,083	10.000	
			D_u	0.00	0.01	0.02	0.03	0.04	0.05	0.07	0.08	0.10	0.13	0.15	0.17	0.20	0.23	0.26		
			C	66,667	44,444	33,333	26,667	22,222	19,048	16,667	14,815	13,333	12,121	11,111	10,256	9,524	8,889	8,333	25.000	
			D_c	0.00	0.01	0.01	0.02	0.03	0.04	0.05	0.07	0.08	0.10	0.12	0.14	0.16	0.19	0.21		
6" x ⅜"	52.46	232	U	192,000	85,333	48,000	30,720	21,333	15,673	12,000	9,481	7,680	6,347	5,333	4,544	3,918	3,413	3,000	14.400	
			D_u	0.00	0.01	0.01	0.02	0.03	0.04	0.06	0.07	0.09	0.10	0.12	0.15	0.17	0.19	0.22		
			C	96,000	64,000	48,000	38,400	32,000	27,429	24,000	21,333	19,200	17,455	16,000	14,769	13,714	12,800	12,000	43.200	
			D_c	0.00	0.01	0.01	0.02	0.02	0.03	0.04	0.06	0.07	0.08	0.10	0.12	0.14	0.16	0.18		

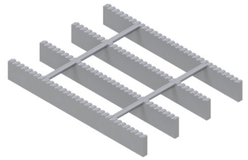
Spans and loads in red exceed a deflection of ¼" for uniform loads of 100 lbs./sq. ft. Experience has shown that ¼" deflection is the maximum deflection to give pedestrian comfort, but can be exceeded for other types of loads at the discretion of the specifying professional.

30HW4 (in)

# of Bars	2	3	4	5	6	7	8	9	10	11
¼" Bars	2-⅛	4	5-⅞	7-¾	9-⅝	11-½	13-⅜	15-¼	17-⅛	19
⅜" Bars	2-¼	4-⅛	6	7-⅞	9-¾	11-⅝	13-½	15-⅜	17-¼	19-⅛
# of Bars	12	13	14	15	16	17	18	19	20	21
¼" Bars	20-⅞	22-¾	24-⅝	26-½	28-⅜	30-¼	32-⅛	34	35-⅞	37-¾
⅜" Bars	21	22-⅞	24-¾	26-⅝	28-½	30-⅜	32-¼	34-⅛	36	37-⅞

LOAD TABLES - WIDE-GAP

Grating Type: 30HW4
Design Code: NAAMM MBG 534-19
Material: ASTM A1011CS Grade 36
Surface: Serrated



U = Safe Uniform Load (lbs/ft²)
D_u = Deflection Due to Safe Uniform Load (in)
C = Safe Concentrated Load (lbs/ft of grating width)
D_c = Deflection Due to Safe Concentrated Load (in)
Allowable Extreme Fiber Stress = 20 ksi

Bearing Bar Size (inches)	Approx. Weight (lbs/ft²)	Ped. Span (inches)	Load / Deflection	Span (ft -in) 1' - 0"	1' - 6"	2' - 0"	2' - 6"	3' - 0"	3' - 6"	4' - 0"	4' - 6"	5' - 0"	5' - 6"	6' - 0"	6' - 6"	7' - 0"	7' - 6"	8' - 0"	Section Properties S_x (in³)/ft	I_x (in⁴)/ft
1" x ¼"	6.68	44	U	2,000	889	500	320	222	163	125										0.150
			D_u	0.03	0.06	0.11	0.17	0.25	0.34	0.44										
			C	1,000	667	500	400	333	286	250										0.056
			D_c	0.02	0.05	0.09	0.14	0.20	0.27	0.35										
1 ¼" x ¼"	8.10	55	U	3,556	1,580	889	569	395	290	222	176	142								0.267
			D_u	0.02	0.05	0.08	0.13	0.19	0.25	0.33	0.42	0.52								
			C	1,778	1,185	889	711	593	508	444	395	356								0.133
			D_c	0.02	0.04	0.07	0.10	0.15	0.20	0.26	0.34	0.41								
1 ½" x ¼"	9.52	65	U	5,556	2,469	1,389	889	617	454	347	274	222	184							0.417
			D_u	0.02	0.04	0.07	0.10	0.15	0.20	0.26	0.34	0.41	0.50							
			C	2,778	1,852	1,389	1,111	926	794	694	617	556	505							0.260
			D_c	0.01	0.03	0.05	0.08	0.12	0.16	0.21	0.27	0.33	0.40							
1 ½" x ⅜"	13.77	71	U	8,333	3,704	2,083	1,333	926	680	521	412	333	275	231						0.625
			D_u	0.02	0.04	0.07	0.10	0.15	0.20	0.26	0.34	0.41	0.50	0.60						
			C	4,167	2,778	2,083	1,667	1,389	1,190	1,042	926	833	758	694						0.391
			D_c	0.01	0.03	0.05	0.08	0.12	0.16	0.21	0.27	0.33	0.40	0.48						
2" x ¼"	12.35	83	U	10,889	4,840	2,722	1,742	1,210	889	681	538	436	360	302	258	222				0.817
			D_u	0.01	0.03	0.05	0.07	0.11	0.14	0.19	0.24	0.30	0.36	0.43	0.50	0.58				
			C	5,444	3,630	2,722	2,178	1,815	1,556	1,361	1,210	1,089	990	907	838	778				0.715
			D_c	0.01	0.02	0.04	0.06	0.09	0.12	0.15	0.19	0.24	0.29	0.34	0.40	0.46				
2 ½" x ¼"	15.18	100	U	18,000	8,000	4,500	2,880	2,000	1,469	1,125	889	720	595	500	426	367	320	281		1.350
			D_u	0.01	0.02	0.04	0.06	0.08	0.11	0.15	0.19	0.23	0.28	0.33	0.39	0.45	0.52	0.59		
			C	9,000	6,000	4,500	3,600	3,000	2,571	2,250	2,000	1,800	1,636	1,500	1,385	1,286	1,200	1,125		1.519
			D_c	0.01	0.02	0.03	0.05	0.07	0.09	0.12	0.15	0.18	0.22	0.26	0.31	0.36	0.41	0.47		
3" x ¼"	18.02	117	U	26,889	11,951	6,722	4,302	2,988	2,195	1,681	1,328	1,076	889	747	636	549	478	420		2.017
			D_u	0.01	0.02	0.03	0.05	0.07	0.09	0.12	0.15	0.19	0.23	0.27	0.32	0.37	0.42	0.48		
			C	13,444	8,963	6,722	5,378	4,481	3,841	3,361	2,988	2,689	2,444	2,241	2,068	1,921	1,793	1,681		2.773
			D_c	0.01	0.01	0.02	0.04	0.05	0.07	0.10	0.12	0.15	0.18	0.22	0.25	0.29	0.34	0.39		
3" x ⅜"	26.96	129	U	40,333	17,926	10,083	6,453	4,481	3,293	2,521	1,992	1,613	1,333	1,120	955	823	717	630		3.025
			D_u	0.01	0.02	0.03	0.05	0.07	0.09	0.12	0.15	0.19	0.23	0.27	0.32	0.37	0.42	0.48		
			C	20,167	13,444	10,083	8,067	6,722	5,762	5,042	4,481	4,033	3,667	3,361	3,103	2,881	2,689	2,521		4.159
			D_c	0.01	0.01	0.02	0.04	0.05	0.07	0.10	0.12	0.15	0.18	0.22	0.25	0.29	0.34	0.39		

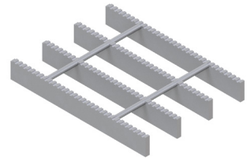
Spans and loads in red exceed a deflection of ¼" for uniform loads of 100 lbs./sq. ft. Experience has shown that ¼" deflection is the maximum deflection to give pedestrian comfort, but can be exceeded for other types of loads at the discretion of the specifying professional.

30HW4 (in)

# of Bars	2	3	4	5	6	7	8	9	10	11
¼" Bars	2-⅛	4	5-⅞	7-¾	9-⅝	11-½	13-⅜	15-¼	17-⅛	19
⅜" Bars	2-¼	4-⅛	6	7-⅞	9-¾	11-⅝	13-½	15-⅜	17-¼	19-⅛
# of Bars	12	13	14	15	16	17	18	19	20	21
¼" Bars	20-⅞	22-¾	24-⅝	26-½	28-⅜	30-¼	32-⅛	34	35-⅞	37-¾
⅜" Bars	21	22-⅞	24-¾	26-⅝	28-½	30-⅜	32-¼	34-⅛	36	37-⅞

LOAD TABLES - WIDE-GAP

Grating Type: 30HW4
Design Code: NAAMM MBG 534-19
Material: ASTM A1011CS Grade 36
Surface: Serrated



U = Safe Uniform Load (lbs/ft²)
D_u = Deflection Due to Safe Uniform Load (in)
C = Safe Concentrated Load (lbs/ft of grating width)
D_c = Deflection Due to Safe Concentrated Load (in)
Allowable Extreme Fiber Stress = 20 ksi

Bearing Bar Size (inches)	Approx. Weight (lbs/ft²)	Ped. Span (inches)	Load / Deflection	Span (ft -in) 1' - 0"	1' - 6"	2' - 0"	2' - 6"	3' - 0"	3' - 6"	4' - 0"	4' - 6"	5' - 0"	5' - 6"	6' - 0"	6' - 6"	7' - 0"	7' - 6"	8' - 0"	Section Properties S_x (in³)/ft	I_x (in⁴)/ft
3 ½" x ¼"	20.85	132	U	37,556	16,691	9,389	6,009	4,173	3,066	2,347	1,855	1,502	1,242	1,043	889	766	668	587	2.817	
			D_u	0.01	0.01	0.03	0.04	0.06	0.08	0.10	0.13	0.16	0.19	0.23	0.27	0.31	0.36	0.41		
			C	18,778	12,519	9,389	7,511	6,259	5,365	4,694	4,173	3,756	3,414	3,130	2,889	2,683	2,504	2,347	4.577	
			D_c	0.01	0.01	0.02	0.03	0.05	0.06	0.08	0.10	0.13	0.15	0.18	0.22	0.25	0.29	0.33		
3 ½" x ⅜"	31.21	146	U	56,333	25,037	14,083	9,013	6,259	4,599	3,521	2,782	2,253	1,862	1,565	1,333	1,150	1,001	880	4.225	
			D_u	0.01	0.01	0.03	0.04	0.06	0.08	0.10	0.13	0.16	0.19	0.23	0.27	0.31	0.36	0.41		
			C	28,167	18,778	14,083	11,267	9,389	8,048	7,042	6,259	5,633	5,121	4,694	4,333	4,024	3,756	3,521	6.866	
			D_c	0.01	0.01	0.02	0.03	0.05	0.06	0.08	0.10	0.13	0.15	0.18	0.22	0.25	0.29	0.33		
4" x¼"	23.68	147	U	50,000	22,222	12,500	8,000	5,556	4,082	3,125	2,469	2,000	1,653	1,389	1,183	1,020	889	781	3.750	
			D_u	0.01	0.01	0.02	0.03	0.05	0.07	0.09	0.11	0.14	0.17	0.20	0.23	0.27	0.31	0.35		
			C	25,000	16,667	12,500	10,000	8,333	7,143	6,250	5,556	5,000	4,545	4,167	3,846	3,571	3,333	3,125	7.031	
			D_c	0.00	0.01	0.02	0.03	0.04	0.05	0.07	0.09	0.11	0.13	0.16	0.19	0.22	0.25	0.28		
4" x ⅜"	35.46	163	U	75,000	33,333	18,750	12,000	8,333	6,122	4,688	3,704	3,000	2,479	2,083	1,775	1,531	1,333	1,172	5.625	
			D_u	0.01	0.01	0.02	0.03	0.05	0.07	0.09	0.11	0.14	0.17	0.20	0.23	0.27	0.31	0.35		
			C	37,500	25,000	18,750	15,000	12,500	10,714	9,375	8,333	7,500	6,818	6,250	5,769	5,357	5,000	4,688	10.547	
			D_c	0.00	0.01	0.02	0.03	0.04	0.05	0.07	0.09	0.11	0.13	0.16	0.19	0.22	0.25	0.28		
5" x ⅜"	43.96	195	U	120,333	53,481	30,083	19,253	13,370	9,823	7,521	5,942	4,813	3,978	3,343	2,848	2,456	2,139	1,880	9.025	
			D_u	0.00	0.01	0.02	0.03	0.04	0.05	0.07	0.09	0.11	0.13	0.16	0.18	0.21	0.25	0.28		
			C	60,167	40,111	30,083	24,067	20,056	17,190	15,042	13,370	12,033	10,939	10,028	9,256	8,595	8,022	7,521	21.434	
			D_c	0.00	0.01	0.01	0.02	0.03	0.04	0.06	0.07	0.09	0.11	0.13	0.15	0.17	0.20	0.22		
6" x ⅜"	52.46	225	U	176,333	78,370	44,083	28,213	19,593	14,395	11,021	8,708	7,053	5,829	4,898	4,174	3,599	3,135	2,755	13.225	
			D_u	0.00	0.01	0.01	0.02	0.03	0.04	0.06	0.07	0.09	0.11	0.13	0.15	0.18	0.20	0.23		
			C	88,167	58,778	44,083	35,267	29,389	25,190	22,042	19,593	17,633	16,030	14,694	13,564	12,595	11,756	11,021	38.022	
			D_c	0.00	0.01	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.09	0.10	0.12	0.14	0.16	0.18		

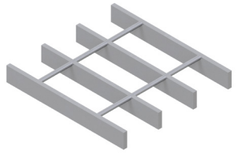
Spans and loads in red exceed a deflection of ¼" for uniform loads of 100 lbs./sq. ft. Experience has shown that ¼" deflection is the maximum deflection to give pedestrian comfort, but can be exceeded for other types of loads at the discretion of the specifying professional.

30HW4 (in)

# of Bars	2	3	4	5	6	7	8	9	10	11
¼" Bars	2-⅛	4	5-⅞	7-¾	9-⅝	11-½	13-⅜	15-¼	17-⅛	19
⅜" Bars	2-¼	4-⅛	6	7-⅞	9-¾	11-⅝	13-½	15-⅜	17-¼	19-⅛
# of Bars	12	13	14	15	16	17	18	19	20	21
¼" Bars	20-⅞	22-¾	24-⅝	26-½	28-⅜	30-¼	32-⅛	34	35-⅞	37-¾
⅜" Bars	21	22-⅞	24-¾	26-⅝	28-½	30-⅜	32-¼	34-⅛	36	37-⅞

LOAD TABLES - EXTRA-WIDE-GAP

Grating Type: 38HW4
Design Code: NAAMM MBG 534-19
Material: ASTM A1011CS Grade 36
Surface: Smooth



U = Safe Uniform Load (lbs/ft²)
D_u = Deflection Due to Safe Uniform Load (in)
C = Safe Concentrated Load (lbs/ft of grating width)
D_c = Deflection Due to Safe Concentrated Load (in)
Allowable Extreme Fiber Stress = 20 ksi

Bearing Bar Size (inches)	Approx. Weight (lbs/ft²)	Ped. Span (inches)	Load / Deflection	Span (ft -in) 1' - 0"	1' - 6"	2' - 0"	2' - 6"	3' - 0"	3' - 6"	4' - 0"	4' - 6"	5' - 0"	5' - 6"	6' - 0"	6' - 6"	7' - 0"	7' - 6"	8' - 0"	Section Properties S_x (in³)/ft	I_x (in⁴)/ft
1" x ¼"	5.55	51	U	2,807	1,248	702	449	312	229	175	139								0.211	
			D_u	0.02	0.05	0.08	0.13	0.19	0.25	0.33	0.42									
			C	1,404	936	702	561	468	401	351	312								0.105	
			D_c	0.02	0.04	0.07	0.10	0.15	0.20	0.26	0.34									
1 ¼" x ¼"	6.68	61	U	4,386	1,949	1,096	702	487	358	274	217	175	145						0.329	
			D_u	0.02	0.04	0.07	0.10	0.15	0.20	0.26	0.34	0.41	0.50							
			C	2,193	1,462	1,096	877	731	627	548	487	439	399						0.206	
			D_c	0.01	0.03	0.05	0.08	0.12	0.16	0.21	0.27	0.33	0.40							
1 ½" x ¼"	7.82	70	U	6,316	2,807	1,579	1,011	702	516	395	312	253	209	175					0.474	
			D_u	0.01	0.03	0.06	0.09	0.12	0.17	0.22	0.28	0.34	0.42	0.50						
			C	3,158	2,105	1,579	1,263	1,053	902	789	702	632	574	526					0.355	
			D_c	0.01	0.02	0.04	0.07	0.10	0.14	0.18	0.22	0.28	0.33	0.40						
1 ½" x ⅜"	11.22	77	U	9,474	4,211	2,368	1,516	1,053	773	592	468	379	313	263	224				0.711	
			D_u	0.01	0.03	0.06	0.09	0.12	0.17	0.22	0.28	0.34	0.42	0.50	0.58					
			C	4,737	3,158	2,368	1,895	1,579	1,353	1,184	1,053	947	861	789	729				0.533	
			D_c	0.01	0.02	0.04	0.07	0.10	0.14	0.18	0.22	0.28	0.33	0.40	0.47					
2" x ¼"	10.08	87	U	11,228	4,990	2,807	1,796	1,248	917	702	554	449	371	312	266	229	200		0.842	
			D_u	0.01	0.02	0.04	0.06	0.09	0.13	0.17	0.21	0.26	0.31	0.37	0.44	0.51	0.58			
			C	5,614	3,743	2,807	2,246	1,871	1,604	1,404	1,248	1,123	1,021	936	864	802	749		0.842	
			D_c	0.01	0.02	0.03	0.05	0.07	0.10	0.13	0.17	0.21	0.25	0.30	0.35	0.41	0.47			
2 ½" x ¼"	12.35	102	U	17,544	7,797	4,386	2,807	1,949	1,432	1,096	866	702	580	487	415	358	312	274	1.316	
			D_u	0.01	0.02	0.03	0.05	0.07	0.10	0.13	0.17	0.21	0.25	0.30	0.35	0.41	0.47	0.53		
			C	8,772	5,848	4,386	3,509	2,924	2,506	2,193	1,949	1,754	1,595	1,462	1,350	1,253	1,170	1,096	1.645	
			D_c	0.01	0.01	0.03	0.04	0.06	0.08	0.11	0.13	0.17	0.20	0.24	0.28	0.32	0.37	0.42		
3" x ¼"	14.62	117	U	25,263	11,228	6,316	4,042	2,807	2,062	1,579	1,248	1,011	835	702	598	516	449	395	1.895	
			D_u	0.01	0.02	0.03	0.04	0.06	0.08	0.11	0.14	0.17	0.21	0.25	0.29	0.34	0.39	0.44		
			C	12,632	8,421	6,316	5,053	4,211	3,609	3,158	2,807	2,526	2,297	2,105	1,943	1,805	1,684	1,579	2.842	
			D_c	0.01	0.01	0.02	0.03	0.05	0.07	0.09	0.11	0.14	0.17	0.20	0.23	0.27	0.31	0.35		
3" x ⅜"	21.86	130	U	37,895	16,842	9,474	6,063	4,211	3,093	2,368	1,871	1,516	1,253	1,053	897	773	674	592	2.842	
			D_u	0.01	0.02	0.03	0.04	0.06	0.08	0.11	0.14	0.17	0.21	0.25	0.29	0.34	0.39	0.44		
			C	18,947	12,632	9,474	7,579	6,316	5,414	4,737	4,211	3,789	3,445	3,158	2,915	2,707	2,526	2,368	4.263	
			D_c	0.01	0.01	0.02	0.03	0.05	0.07	0.09	0.11	0.14	0.17	0.20	0.23	0.27	0.31	0.35		

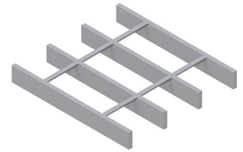
Spans and loads in red exceed a deflection of ¼" for uniform loads of 100 lbs./sq. ft. Experience has shown that ¼" deflection is the maximum deflection to give pedestrian comfort, but can be exceeded for other types of loads at the discretion of the specifying professional.

38HW4 (in)

# of Bars	2	3	4	5	6	7	8	9	10	11
¼" Bars	2-⅝	5	7-⅜	9-¾	12-⅛	14-½	16-⅞	19-¼	21-⅝	24
⅜" Bars	2-¾	5-⅛	7-½	9-⅞	12-¼	14-⅝	17	19-⅜	21-¾	24-⅛
# of Bars	12	13	14	15	16	17	18	19	20	21
¼" Bars	26-⅜	28-¾	31-⅛	33-½	35-⅞	38-¼	40-⅝	43	45-⅜	47-¾
⅜" Bars	26-½	28-⅞	31-¼	33-⅝	36	38-⅜	40-¾	43-⅛	45-½	47-⅞

LOAD TABLES - EXTRA-WIDE-GAP

Grating Type: 38HW4
Design Code: NAAMM MBG 534-19
Material: ASTM A1011CS Grade 36
Surface: Smooth



U = Safe Uniform Load (lbs/ft²)
D_u = Deflection Due to Safe Uniform Load (in)
C = Safe Concentrated Load (lbs/ft of grating width)
D_c = Deflection Due to Safe Concentrated Load (in)
Allowable Extreme Fiber Stress = 20 ksi

Bearing Bar Size (inches)	Approx. Weight (lbs/ft²)	Ped. Span (inches)	Load / Deflection	Span (ft -in) 1' - 0"	1' - 6"	2' - 0"	2' - 6"	3' - 0"	3' - 6"	4' - 0"	4' - 6"	5' - 0"	5' - 6"	6' - 0"	6' - 6"	7' - 0"	7' - 6"	8' - 0"	Section Properties S_x (in³)/ft	I_x (in⁴)/ft
3 ½" x ¼"	16.88	132	U	34,386	15,283	8,596	5,502	3,821	2,807	2,149	1,698	1,375	1,137	955	814	702	611	537	2.579	
			D_u	0.01	0.01	0.02	0.04	0.05	0.07	0.09	0.12	0.15	0.18	0.21	0.25	0.29	0.33	0.38		
			C	17,193	11,462	8,596	6,877	5,731	4,912	4,298	3,821	3,439	3,126	2,865	2,645	2,456	2,292	2,149	4.513	
			D_c	0.00	0.01	0.02	0.03	0.04	0.06	0.08	0.10	0.12	0.14	0.17	0.20	0.23	0.27	0.30		
3 ½" x ⅜"	25.26	146	U	51,579	22,924	12,895	8,253	5,731	4,211	3,224	2,547	2,063	1,705	1,433	1,221	1,053	917	806	3.868	
			D_u	0.01	0.01	0.02	0.04	0.05	0.07	0.09	0.12	0.15	0.18	0.21	0.25	0.29	0.33	0.38		
			C	25,789	17,193	12,895	10,316	8,596	7,368	6,447	5,731	5,158	4,689	4,298	3,968	3,684	3,439	3,224	6.770	
			D_c	0.00	0.01	0.02	0.03	0.04	0.06	0.08	0.10	0.12	0.14	0.17	0.20	0.23	0.27	0.30		
4" x¼"	19.15	146	U	44,912	19,961	11,228	7,186	4,990	3,666	2,807	2,218	1,796	1,485	1,248	1,063	917	798	702	3.368	
			D_u	0.01	0.01	0.02	0.03	0.05	0.06	0.08	0.10	0.13	0.16	0.19	0.22	0.25	0.29	0.33		
			C	22,456	14,971	11,228	8,982	7,485	6,416	5,614	4,990	4,491	4,083	3,743	3,455	3,208	2,994	2,807	6.737	
			D_c	0.00	0.01	0.02	0.03	0.04	0.05	0.07	0.08	0.10	0.13	0.15	0.17	0.20	0.23	0.26		
4" x ⅜"	28.66	161	U	67,368	29,942	16,842	10,779	7,485	5,499	4,211	3,327	2,695	2,227	1,871	1,595	1,375	1,198	1,053	5.053	
			D_u	0.01	0.01	0.02	0.03	0.05	0.06	0.08	0.10	0.13	0.16	0.19	0.22	0.25	0.29	0.33		
			C	33,684	22,456	16,842	13,474	11,228	9,624	8,421	7,485	6,737	6,124	5,614	5,182	4,812	4,491	4,211	10.105	
			D_c	0.00	0.01	0.02	0.03	0.04	0.05	0.07	0.08	0.10	0.13	0.15	0.17	0.20	0.23	0.26		
5" x ⅜"	35.46	191	U	105,263	46,784	26,316	16,842	11,696	8,593	6,579	5,198	4,211	3,480	2,924	2,491	2,148	1,871	1,645	7.895	
			D_u	0.00	0.01	0.02	0.03	0.04	0.05	0.07	0.08	0.10	0.13	0.15	0.17	0.20	0.23	0.26		
			C	52,632	35,088	26,316	21,053	17,544	15,038	13,158	11,696	10,526	9,569	8,772	8,097	7,519	7,018	6,579	19.737	
			D_c	0.00	0.01	0.01	0.02	0.03	0.04	0.05	0.07	0.08	0.10	0.12	0.14	0.16	0.19	0.21		
6" x ⅜"	42.26	218	U	151,579	67,368	37,895	24,253	16,842	12,374	9,474	7,485	6,063	5,011	4,211	3,588	3,093	2,695	2,368	11.368	
			D_u	0.00	0.01	0.01	0.02	0.03	0.04	0.06	0.07	0.09	0.10	0.12	0.15	0.17	0.19	0.22		
			C	75,789	50,526	37,895	30,316	25,263	21,654	18,947	16,842	15,158	13,780	12,632	11,660	10,827	10,105	9,474	34.105	
			D_c	0.00	0.01	0.01	0.02	0.02	0.03	0.04	0.06	0.07	0.08	0.10	0.12	0.14	0.16	0.18		

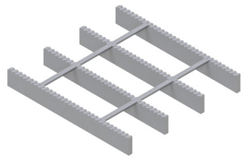
Spans and loads in red exceed a deflection of ¼" for uniform loads of 100 lbs./sq. ft. Experience has shown that ¼" deflection is the maximum deflection to give pedestrian comfort, but can be exceeded for other types of loads at the discretion of the specifying professional.

38HW4 (in)

# of Bars	2	3	4	5	6	7	8	9	10	11
¼" Bars	2-⅝	5	7-⅜	9-¾	12-⅛	14-½	16-⅞	19-¼	21-⅝	24
⅜" Bars	2-¾	5-⅛	7-½	9-⅞	12-¼	14-⅝	17	19-⅜	21-¾	24-⅛
# of Bars	12	13	14	15	16	17	18	19	20	21
¼" Bars	26-⅜	28-¾	31-⅛	33-½	35-⅞	38-¼	40-⅝	43	45-⅜	47-¾
⅜" Bars	26-½	28-⅞	31-¼	33-⅝	36	38-⅜	40-¾	43-⅛	45-½	47-⅞

LOAD TABLES - EXTRA-WIDE-GAP

Grating Type: 38HW4
Design Code: NAAMM MBG 534-19
Material: ASTM A1011CS Grade 36
Surface: Serrated



U = Safe Uniform Load (lbs/ft²)
D_u = Deflection Due to Safe Uniform Load (in)
C = Safe Concentrated Load (lbs/ft of grating width)
D_c = Deflection Due to Safe Concentrated Load (in)
Allowable Extreme Fiber Stress = 20 ksi

Bearing Bar Size (inches)	Approx. Weight (lbs/ft²)	Ped. Span (inches)	Load / Deflection	Span (ft -in) 1' - 0"	1' - 6"	2' - 0"	2' - 6"	3' - 0"	3' - 6"	4' - 0"	4' - 6"	5' - 0"	5' - 6"	6' - 0"	6' - 6"	7' - 0"	7' - 6"	8' - 0"	Section Properties S_x (in³)/ft	I_x (in⁴)/ft
1" x ¼"	5.55	42	U	1,579	702	395	253	175	129										0.118	
			D_u	0.03	0.06	0.11	0.17	0.25	0.34											
			C	789	526	395	316	263	226											0.044
			D_c	0.02	0.05	0.09	0.14	0.20	0.27											
1 ¼" x ¼"	6.68	51	U	2,807	1,248	702	449	312	229	175	139								0.211	
			D_u	0.02	0.05	0.08	0.13	0.19	0.25	0.33	0.42									
			C	1,404	936	702	561	468	401	351	312									0.105
			D_c	0.02	0.04	0.07	0.10	0.15	0.20	0.26	0.34									
1 ½" x ¼"	7.82	61	U	4,386	1,949	1,096	702	487	358	274	217	175	145						0.329	
			D_u	0.02	0.04	0.07	0.10	0.15	0.20	0.26	0.34	0.41	0.50							
			C	2,193	1,462	1,096	877	731	627	548	487	439	399							0.206
			D_c	0.01	0.03	0.05	0.08	0.12	0.16	0.21	0.27	0.33	0.40							
1 ½" x ⅜"	11.22	67	U	6,579	2,924	1,645	1,053	731	537	411	325	263	217	183					0.493	
			D_u	0.02	0.04	0.07	0.10	0.15	0.20	0.26	0.34	0.41	0.50	0.60						
			C	3,289	2,193	1,645	1,316	1,096	940	822	731	658	598	548						0.308
			D_c	0.01	0.03	0.05	0.08	0.12	0.16	0.21	0.27	0.33	0.40	0.48						
2" x ¼"	10.08	78	U	8,596	3,821	2,149	1,375	955	702	537	425	344	284	239	203				0.645	
			D_u	0.01	0.03	0.05	0.07	0.11	0.14	0.19	0.24	0.30	0.36	0.43	0.50					
			C	4,298	2,865	2,149	1,719	1,433	1,228	1,075	955	860	781	716	661					0.564
			D_c	0.01	0.02	0.04	0.06	0.09	0.12	0.15	0.19	0.24	0.29	0.34	0.40					
2 ½" x ¼"	12.35	95	U	14,211	6,316	3,553	2,274	1,579	1,160	888	702	568	470	395	336	290	253	222	1.066	
			D_u	0.01	0.02	0.04	0.06	0.08	0.11	0.15	0.19	0.23	0.28	0.33	0.39	0.45	0.52	0.59		
			C	7,105	4,737	3,553	2,842	2,368	2,030	1,776	1,579	1,421	1,292	1,184	1,093	1,015	947	888		1.199
			D_c	0.01	0.02	0.03	0.05	0.07	0.09	0.12	0.15	0.18	0.22	0.26	0.31	0.36	0.41	0.47		
3" x ¼"	14.62	110	U	21,228	9,435	5,307	3,396	2,359	1,733	1,327	1,048	849	702	590	502	433	377	332	1.592	
			D_u	0.01	0.02	0.03	0.05	0.07	0.09	0.12	0.15	0.19	0.23	0.27	0.32	0.37	0.42	0.48		
			C	10,614	7,076	5,307	4,246	3,538	3,033	2,654	2,359	2,123	1,930	1,769	1,633	1,516	1,415	1,327		2.189
			D_c	0.01	0.01	0.02	0.04	0.05	0.07	0.10	0.12	0.15	0.18	0.22	0.25	0.29	0.34	0.39		
3" x ⅜"	21.86	122	U	31,842	14,152	7,961	5,095	3,538	2,599	1,990	1,572	1,274	1,053	885	754	650	566	498	2.388	
			D_u	0.01	0.02	0.03	0.05	0.07	0.09	0.12	0.15	0.19	0.23	0.27	0.32	0.37	0.42	0.48		
			C	15,921	10,614	7,961	6,368	5,307	4,549	3,980	3,538	3,184	2,895	2,654	2,449	2,274	2,123	1,990		3.284
			D_c	0.01	0.01	0.02	0.04	0.05	0.07	0.10	0.12	0.15	0.18	0.22	0.25	0.29	0.34	0.39		

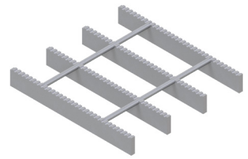
Spans and loads in red exceed a deflection of ¼" for uniform loads of 100 lbs./sq. ft. Experience has shown that ¼" deflection is the maximum deflection to give pedestrian comfort, but can be exceeded for other types of loads at the discretion of the specifying professional.

38HW4 (in)

# of Bars	2	3	4	5	6	7	8	9	10	11
¼" Bars	2-⅝	5	7-⅜	9-¾	12-⅛	14-½	16-⅞	19-¼	21-⅝	24
⅜" Bars	2-¾	5-⅛	7-½	9-⅞	12-¼	14-⅝	17	19-⅜	21-¾	24-⅛
# of Bars	12	13	14	15	16	17	18	19	20	21
¼" Bars	26-⅜	28-¾	31-⅛	33-½	35-⅞	38-¼	40-⅝	43	45-⅜	47-¾
⅜" Bars	26-½	28-⅞	31-¼	33-⅝	36	38-⅜	40-¾	43-⅛	45-½	47-⅞

LOAD TABLES - EXTRA-WIDE-GAP

Grating Type: 38HW4
Design Code: NAAMM MBG 534-19
Material: ASTM A1011CS Grade 36
Surface: Serrated



U = Safe Uniform Load (lbs/ft²)
D_u = Deflection Due to Safe Uniform Load (in)
C = Safe Concentrated Load (lbs/ft of grating width)
D_c = Deflection Due to Safe Concentrated Load (in)
Allowable Extreme Fiber Stress = 20 ksi

Bearing Bar Size (inches)	Approx. Weight (lbs/ft²)	Ped. Span (inches)	Load / Deflection	Span (ft -in) 1' - 0"	1' - 6"	2' - 0"	2' - 6"	3' - 0"	3' - 6"	4' - 0"	4' - 6"	5' - 0"	5' - 6"	6' - 0"	6' - 6"	7' - 0"	7' - 6"	8' - 0"	Section Properties S_x (in³)/ft	I_x (in⁴)/ft
3 ½" x ¼"	16.88	125	U	29,649	13,177	7,412	4,744	3,294	2,420	1,853	1,464	1,186	980	824	702	605	527	463	2.224	
			D_u	0.01	0.01	0.03	0.04	0.06	0.08	0.10	0.13	0.16	0.19	0.23	0.27	0.31	0.36	0.41		
			C	14,825	9,883	7,412	5,930	4,942	4,236	3,706	3,294	2,965	2,695	2,471	2,281	2,118	1,977	1,853		3.613
			D_c	0.01	0.01	0.02	0.03	0.05	0.06	0.08	0.10	0.13	0.15	0.18	0.22	0.25	0.29	0.33		
3 ½" x ⅜"	25.26	138	U	44,474	19,766	11,118	7,116	4,942	3,631	2,780	2,196	1,779	1,470	1,235	1,053	908	791	695	3.336	
			D_u	0.01	0.01	0.03	0.04	0.06	0.08	0.10	0.13	0.16	0.19	0.23	0.27	0.31	0.36	0.41		
			C	22,237	14,825	11,118	8,895	7,412	6,353	5,559	4,942	4,447	4,043	3,706	3,421	3,177	2,965	2,780		5.420
			D_c	0.01	0.01	0.02	0.03	0.05	0.06	0.08	0.10	0.13	0.15	0.18	0.22	0.25	0.29	0.33		
4" x¼"	19.15	139	U	39,474	17,544	9,868	6,316	4,386	3,222	2,467	1,949	1,579	1,305	1,096	934	806	702	617	2.961	
			D_u	0.01	0.01	0.02	0.03	0.05	0.07	0.09	0.11	0.14	0.17	0.20	0.23	0.27	0.31	0.35		
			C	19,737	13,158	9,868	7,895	6,579	5,639	4,934	4,386	3,947	3,589	3,289	3,036	2,820	2,632	2,467		5.551
			D_c	0.00	0.01	0.02	0.03	0.04	0.05	0.07	0.09	0.11	0.13	0.16	0.19	0.22	0.25	0.28		
4" x ⅜"	28.66	154	U	59,211	26,316	14,803	9,474	6,579	4,834	3,701	2,924	2,368	1,957	1,645	1,401	1,208	1,053	925	4.441	
			D_u	0.01	0.01	0.02	0.03	0.05	0.07	0.09	0.11	0.14	0.17	0.20	0.23	0.27	0.31	0.35		
			C	29,605	19,737	14,803	11,842	9,868	8,459	7,401	6,579	5,921	5,383	4,934	4,555	4,229	3,947	3,701		8.326
			D_c	0.00	0.01	0.02	0.03	0.04	0.05	0.07	0.09	0.11	0.13	0.16	0.19	0.22	0.25	0.28		
5" x ⅜"	35.46	183	U	95,000	42,222	23,750	15,200	10,556	7,755	5,938	4,691	3,800	3,140	2,639	2,249	1,939	1,689	1,484	7.125	
			D_u	0.00	0.01	0.02	0.03	0.04	0.05	0.07	0.09	0.11	0.13	0.16	0.18	0.21	0.25	0.28		
			C	47,500	31,667	23,750	19,000	15,833	13,571	11,875	10,556	9,500	8,636	7,917	7,308	6,786	6,333	5,938		16.922
			D_c	0.00	0.01	0.01	0.02	0.03	0.04	0.06	0.07	0.09	0.11	0.13	0.15	0.17	0.20	0.22		
6" x ⅜"	42.26	212	U	139,211	61,871	34,803	22,274	15,468	11,364	8,701	6,875	5,568	4,602	3,867	3,295	2,841	2,475	2,175	10.441	
			D_u	0.00	0.01	0.01	0.02	0.03	0.04	0.06	0.07	0.09	0.11	0.13	0.15	0.18	0.20	0.23		
			C	69,605	46,404	34,803	27,842	23,202	19,887	17,401	15,468	13,921	12,656	11,601	10,709	9,944	9,281	8,701		30.017
			D_c	0.00	0.01	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.09	0.10	0.12	0.14	0.16	0.18		

Spans and loads in red exceed a deflection of ¼" for uniform loads of 100 lbs./sq. ft. Experience has shown that ¼" deflection is the maximum deflection to give pedestrian comfort, but can be exceeded for other types of loads at the discretion of the specifying professional.

38HW4 (in)

# of Bars	2	3	4	5	6	7	8	9	10	11
¼" Bars	2-⅝	5	7-⅜	9-¾	12-⅛	14-½	16-⅞	19-¼	21-⅝	24
⅜" Bars	2-¾	5-⅛	7-½	9-⅞	12-¼	14-⅝	17	19-⅜	21-¾	24-⅛
# of Bars	12	13	14	15	16	17	18	19	20	21
¼" Bars	26-⅜	28-¾	31-⅛	33-½	35-⅞	38-¼	40-⅝	43	45-⅜	47-¾
⅜" Bars	26-½	28-⅞	31-¼	33-⅝	36	38-⅜	40-¾	43-⅛	45-½	47-⅞

NOTES

LOAD TABLES | HEAVY DUTY, METRIC

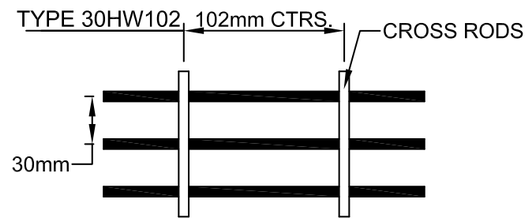
OVERVIEW

Heavy-Duty Welded Grating has the strength for heavy-duty load areas such as airfields, industrial plants, truck and bus terminals, parking lots and railroad yards. Common uses are flooring, driveways, subway and tunnel ventilation grilles, curb inlet grates, ramps, docks, etc.

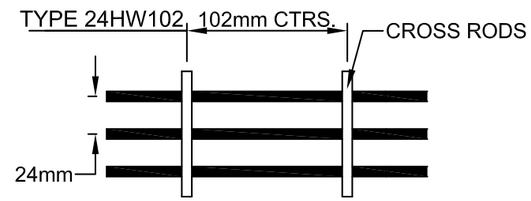
It is a sturdy grating to carry loads and maintain the same level over many years of use. Whenever rolling wheel loads are to be used over the grating, we recommend that the grating be load banded to add lateral strength. Serrations are available on bars up to 10mm thick to provide additional traction for rolling loads.

Standard heavy-duty bar grating is resistance-welded for durability, strength and safety using an automated electric/hydraulic welding process. High temperatures, combined with high pressure fuse the bearing bars and cross bars together to form a permanent joint.

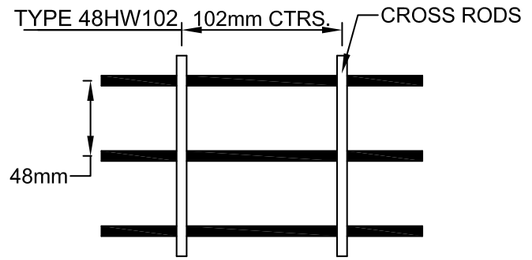
Heavy-Duty



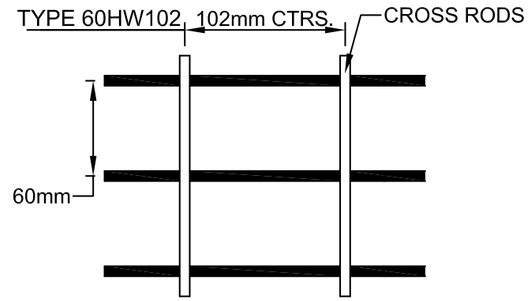
HD Close-Mesh



Wide-Gap



Extra-Wide-Gap



DESIGN CRITERIA

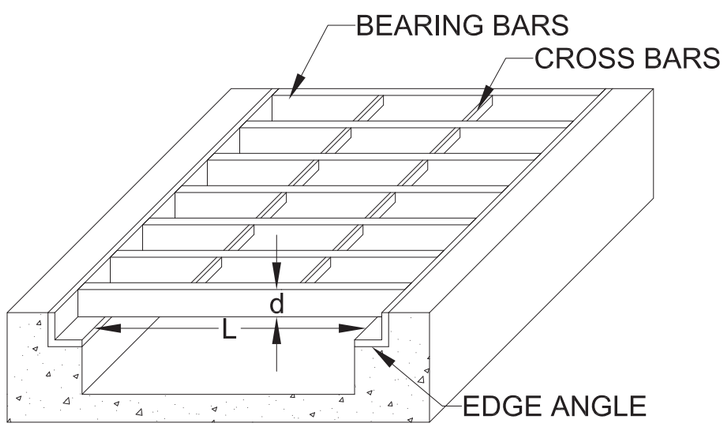
The load and deflection tables on the following pages have been prepared to provide the designer with a convenient reference for the load carrying capabilities of typical heavy duty grating.

Static Loads
Uniform loads and concentrated loads per foot of grating width are given on 152.4mm increments for spans from 300mm to 2,438mm. The values in these load tables are based on allowable stresses for static loads.

Determine M:	$M = \frac{FS}{12}$
Substituting for M, solve for L:	(i) a > L $M = \frac{PL^2}{8ab}$ (ii) a > L $M = \frac{P(.25L - .125a)}{b}$
Check D*:	$D = \frac{P_1[(2L^3) - (a^2L) + (a^3/4)]}{96EI}$

*Deflection should be limited to 1/400 span.

M = Bending Moment
S = Section Modulus - mm^3/m of grating width
I = Moment of Inertia - mm^3/m of grating width
E = Modulus of Elasticity
F = Allowable Bending Stress
L = Simple Clear Span - mm
D = Deflection - mm
a = Partial Load Contact Parallel to Span - mm
s = Center-to-Center Spacing Between Bars - mm
b = Partial Load Contact Dimension at 90° to span - mm
b = a + (2s)
P = Total Wheel of Partial Load Including Impact - kN.
P_1 = P per bearing bar
P_1 = P x (s/b)



VEHICULAR LOADS

Vehicular load tables are designed in accordance with the 16th Edition of the American Association of State Highway and Transportation Officials (AASHTO) for H-10 through H-25 loads with deflection limited to the lesser of .125 inches (3.175 mm) or L/400 to a maximum simple span of 8'- 0" (2,438mm). Automobile and forklift loads are similarly evaluated with loads calculated and distributed in accordance with the criteria shown below. If the load conditions of your application are not adequately addressed in the criteria presented, please contact Vulcraft for assistance in determining the proper grating for your application.

Vehicular Load Table Criteria	H-25[5]	H-20/ HL-93[6]	H-15	H-10[2]	Passenger Vehicles	5 Ton Forklifts[3]	3 Ton Forklifts[3]	1 Ton Forklifts[3]
Truck/ Vehicle Weight (kN)					28	64	44	19
Load Capacity (kN)					16	44	27	9
Axle Load (kN)	178	142	107	71				
Impact Factor	30%	30%	30%	30%	30%	30%	30%	30%
Total Load (kN)	231	185	139	93	21	58	35	12
% of Load on Drive Axel					60%	85%	85%	85%
Wheel Load (kN)	116	93	69	46	10	29	17	6
A-Length of distribution perpendicular to axle or parallel to main bars (mm)	635	508	381	254	229	279	178	102
C-Width of distribution parallel to axle or perpendicular to main bars (mm)	635	508	381	254	229	279	178	102

Notes:
1. For continuous spans, use continuity factor = .80.
2. This distribution results in larger grating sizes for lighter trucks on shorter spans.
3. The fork lift wheel loads and load distribution patterns depicted above, generally, and only partially, represent the broad range of rubber-tired lift trucks available. For those applications falling outside of these examples, please contact Vulcraft.
4. Wheeled vehicles with urethane tires should NEVER be used in conjunction with open grid bar grating.
5. HS20 is the same as H20 and HS15 is the same as H15. The "S" stands for semi-trailer.
6. The "HL-93" notation shown with "H-20" represents AASHTO's truck loading standard post-1993. Since, 1993, H-10, H-20, etc. have been retired in lieu of the "HL-93" loading which represents all trucks.

VEHICULAR LOADS

Note: All loads based on Smooth surface

30HW102

Bearing Bar Size	S_x mm³/m	I_x mm⁴/m	Unit Wt. kPa	Maximum Clear Span Between Supports (mm)							
				H-25	H-20 / HL-93	H-15	H-10	Auto Traffic	5-Ton Forklift	3-Ton Forklift	1-Ton Forklift
25 x 6	22,940	291.33E+3	47.87	393	331	270	212	324	210	165	183
32 x 6	35,960	571.69E+3	58.59	435	374	314	259	442	250	208	258
38 x 6	51,610	983.22E+3	69.14	486	426	369	318	586	299	261	349
38 x 10	76,610	1.46E+6	100.76	571	513	458	413	822	378	347	498
51 x 6	91,760	2.33E+6	90.41	618	561	508	466	954	422	395	580
64 x 6	143,370	4.55E+6	111.68	786	733	686	657	1,326*	581	567	878
76 x 6	206,450	7.87E+6	132.95	993	944	905	890	1,589*	776	777	1,242
76 x 10	306,450	11.68E+6	197.65	1,330	1,289	1,262	1,271	1,818*	1,094	1,121	1,557*
102 x 6	367,020	18.64E+6	175.48	1,518	1,480	1,460	1,483	2,116*	1,270	1,312	1,812*
102 x 10	544,800	27.68E+6	260.79	1,752*	1,752*	1,762*	1,793*	2,421*	1,689*	1,730*	2,075*
127 x 10	851,250	54.05E+6	323.93	2,174*	2,179*	2,196*	2,239*	3,024*	2,109*	2,161*	2,593*
152 x 10	1,225,800	93.41E+6	387.07	2,599*	2,608*	2,631*	2,685*	3,629*	2,528*	2,592*	3,111*

** Indicates that value was controlled by L/400 ≤ 3mm deflection limit.*

Note: All loads based on Smooth surface

24HW102

Bearing Bar Size	S_x mm³/m	I_x mm⁴/m	Unit Wt. kPa	Maximum Clear Span Between Supports (mm)							
				H-25	H-20 / HL-93	H-15	H-10	Auto Traffic	5-Ton Forklift	3-Ton Forklift	1-Ton Forklift
25 x 6	28,670	364.16E+3	58.51	411	349	288	230	369	226	181	206
32 x 6	44,940	714.61E+3	71.91	463	403	343	288	512	275	233	293
38 x 6	64,520	1.23E+6	85.09	528	468	411	359	687	334	296	400
38 x 10	95,770	1.82E+6	124.44	633	575	521	475	974	431	399	575
51 x 6	114,700	2.91E+6	111.68	691	634	582	540	1,133	485	457	672
64 x 6	179,210	5.69E+6	138.26	901	848	802	772	1,706	679	664	1,021
76 x 6	258,060	9.83E+6	164.85	1,158	1,109	1,071	1,056	2,133*	917	917	1,448
76 x 10	383,060	14.59E+6	245.01	1,578	1,537	1,511	1,521	2,441*	1,305	1,330	2,067*
102 x 6	458,780	23.31E+6	218.02	1,812	1,775	1,755	1,779	2,842*	1,521	1,560	2,408*
102 x 10	681,000	34.59E+6	323.93	2,353*	2,357*	2,371*	2,409*	3,252*	2,212	2,296	2,756*
127 x 10	1,064,070	67.57E+6	402.86	2,929*	2,938*	2,960*	3,010*	4,089*	2,837*	2,894*	3,444*
152 x 10	1,532,260	116.76E+6	481.78	3,508*	3,521*	3,549*	3,610*	4,876*	3,402*	3,472*	4,133*

** Indicates that value was controlled by L/400 ≤ 3mm deflection limit.*

Note: All loads based on Smooth surface

48HW102

Bearing Bar Size	S_x mm³/m	I_x mm⁴/m	Unit Wt. kPa	Maximum Clear Span Between Supports (mm)							
				H-25	H-20 / HL-93	H-15	H-10	Auto Traffic	5-Ton Forklift	3-Ton Forklift	1-Ton Forklift
25 x 6	14,340	182.08E+3	31.92	367	306	245	187	264	189	145	153
32 x 6	22,470	357.30E+3	38.62	396	335	275	220	348	217	176	211
38 x 6	32,260	614.51E+3	45.22	430	370	313	262	451	251	214	282
38 x 10	47,880	912.17E+3	65.24	486	428	374	329	619	307	277	397
51 x 6	57,350	1.46E+6	58.51	517	461	408	366	712	338	312	461
64 x 6	89,610	2.84E+6	71.80	630	577	530	501	1,048	449	437	692
76 x 6	129,030	4.92E+6	85.09	767	719	680	665	1,420*	585	591	974
76 x 10	191,530	7.30E+6	126.62	992	951	924	935	1,625*	808	842	1,430*
102 x 6	229,390	11.65E+6	111.68	1,117	1,080	1,060	1,084	1,892*	932	981	1,665*
102 x 10	340,500	17.30E+6	166.08	1,517	1,493	1,495	1,563	2,163*	1,328	1,427	1,905*
127 x 10	532,030	33.78E+6	205.55	1,906*	1,915*	1,938*	1,994*	2,702*	1,874*	1,946*	2,381*
152 x 10	766,130	58.38E+6	245.01	2,276*	2,290*	2,322*	2,392*	3,242*	2,247*	2,334*	2,857*

** Indicates that value was controlled by L/400 ≤ 3mm deflection limit.*

VEHICULAR LOADS

60HW102

Bearing Bar Size	S_x mm³/m	I_x mm⁴/m	Unit Wt. kPa	Maximum Clear Span Between Supports (mm)							
				H-25	H-20 / HL-93	H-15	H-10	Auto Traffic	5-Ton Forklift	3-Ton Forklift	1-Ton Forklift
25 x 6	11,470	145.66E+3	26.61	358	296	236	177	241	181	137	142
32 x 6	17,980	285.84E+3	31.96	381	320	261	206	312	205	164	193
38 x 6	25,810	491.61E+3	37.24	409	349	292	241	399	233	197	255
38 x 10	38,310	729.74E+3	53.41	455	397	343	297	542	280	250	357
51 x 6	45,880	1.17E+6	47.87	481	424	371	329	621	306	280	414
64 x 6	71,680	2.28E+6	58.51	572	519	472	442	906	400	388	618
76 x 6	103,230	3.93E+6	69.14	684	635	596	581	1,255	514	520	868
76 x 10	153,230	5.84E+6	102.94	868	826	799	808	1,538*	701	735	1,276
102 x 6	183,510	9.32E+6	90.41	970	932	912	935	1,790*	805	855	1,503
102 x 10	272,400	13.84E+6	134.51	1,296	1,271	1,272	1,338	2,048*	1,138	1,238	1,829*
127 x 10	425,630	27.03E+6	166.08	1,785*	1,795*	1,823*	1,885*	2,558*	1,699	1,849*	2,287*
152 x 10	612,900	46.70E+6	197.65	2,130*	2,147*	2,183*	2,260*	3,069*	2,120*	2,218*	2,743*

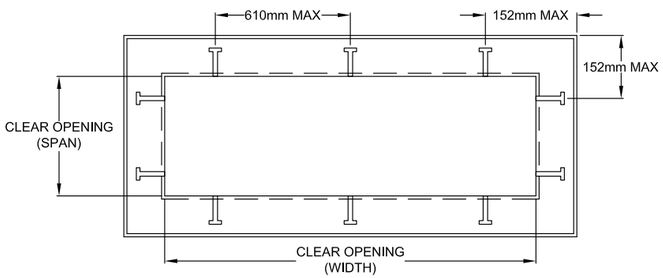
** Indicates that value was controlled by L/400 ≤ 3mm deflection limit.*

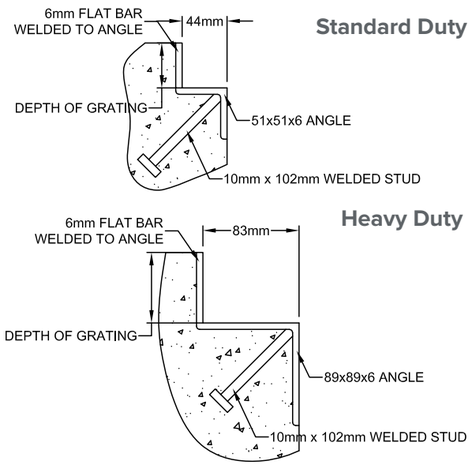
Grating Frames

Vulcraft's structural fabrication services can be leveraged to further aid you in getting a superior solution for covering your concrete opening by also obtaining an Embed Frame with your grating. A steel embed frame can improve the quality and lifespan of your project by:

- Shielding the concrete at the opening edges from cracking and chipping,
- Providing an edge for the opening when forming the concrete pour,
- Providing uniform elevation for the opening to minimize potential for uneven surfaces,
- And providing a smooth an uniform bearing surface for the grating, allowing for easier attachment and better performance over it's lifetime.

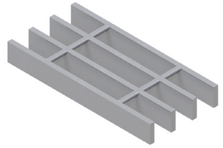
Frames are available in normal rectangular configurations only and will be supplied as a fully-assembled, four-sided unit in sizes up to those that can safely be transported via normal flatbed carriers. Sizes or configurations other than this should be discussed with Vulcraft. Embed frames can be supplied mill finished, painted, or hot-dipped galvanized. To order, please include a detail similar to the following with the Clear Opening Width and Span clearly defined as well as the desired quantities and finish.





LOAD TABLES - HD

Grating Type: 30HW102
Design Code: NAAMM MBG 534-19
Material: ASTM A1011CS Grade 250
Surface: Smooth



U = Safe Uniform Load (kPa)
D_u = Deflection Due to Safe Uniform Load (mm)
C = Safe Concentrated Load (kN/meter of grating width)
D_c = Deflection Due to Safe Concentrated Load (mm)
Allowable Extreme Fiber Stress = 137.9 MPa

Bearing Bar Size (mm)	Approx. Wieght (kg/m²)	Ped. Span (mm)	Load / Deflection	SPAN (mm) 305	457	610	762	915	1067	1219	1372	1524	1677	1829	1981	2134	2286	2438	Section Properties S_x (mm³)/m / I_x (mm⁴)/m
25 x 6	46.7	1,560.00	U	272.0	121.0	68.1	43.6	30.3	22.2	17.0	13.4	10.9	9.0						22,940
			D_u	0.5	1.2	2.1	3.3	4.7	6.4	8.4	10.6	13.1	15.9						
			C	41.5	27.7	20.7	16.6	13.8	11.9	10.4	9.2	8.3	7.5						291.33E+3
			D_c	0.4	0.9	1.7	2.6	3.8	5.2	6.7	8.5	10.5	12.7						
32 x 6	57.6	1,846.00	U	426.4	189.6	106.7	68.3	47.4	34.8	26.7	21.1	17.1	14.1	11.9	10.1				35,960
			D_u	0.4	0.9	1.7	2.6	3.8	5.1	6.7	8.5	10.5	12.7	15.1	17.7				
			C	65.0	43.4	32.5	26.0	21.7	18.6	16.3	14.5	13.0	11.8	10.8	10.0				571.69E+3
			D_c	0.3	0.8	1.3	2.1	3.0	4.1	5.4	6.8	8.4	10.2	12.1	14.2				
38 x 6	68.4	2,114.00	U	612.1	272.2	153.1	98.0	68.1	50.0	38.3	30.3	24.5	20.3	17.0	14.5	12.5			51,610
			D_u	0.4	0.8	1.4	2.2	3.2	4.3	5.6	7.1	8.8	10.6	12.6	14.8	17.2			
			C	93.3	62.2	46.7	37.4	31.1	26.7	23.3	20.8	18.7	17.0	15.6	14.4	13.3			983.22E+3
			D_c	0.3	0.6	1.1	1.8	2.5	3.4	4.5	5.7	7.0	8.5	10.1	11.8	13.7			
38 x 10	101.1	2,334.00	U	908.6	404.0	227.3	145.5	101.0	74.2	56.8	44.9	36.4	30.1	25.3	21.5	18.6	16.2	14.2	76,610
			D_u	0.4	0.8	1.4	2.2	3.2	4.3	5.6	7.1	8.8	10.6	12.6	14.8	17.2	19.7	22.4	
			C	138.6	92.4	69.3	55.4	46.2	39.6	34.7	30.8	27.7	25.2	23.1	21.3	19.8	18.5	17.3	1.46E+6
			D_c	0.3	0.6	1.1	1.8	2.5	3.4	4.5	5.7	7.0	8.5	10.1	11.8	13.7	15.8	17.9	
51 x 6	90.1	2,623.00	U	1,088.2	483.8	272.2	174.2	121.0	88.9	68.1	53.8	43.6	36.0	30.3	25.8	22.2	19.4	17.0	91,760
			D_u	0.3	0.6	1.1	1.6	2.4	3.2	4.2	5.3	6.6	7.9	9.5	11.1	12.9	14.8	16.8	
			C	165.9	110.7	83.0	66.4	55.3	47.4	41.5	36.9	33.2	30.2	27.7	25.5	23.7	22.1	20.8	2.33E+6
			D_c	0.2	0.5	0.8	1.3	1.9	2.6	3.4	4.3	5.3	6.4	7.6	8.9	10.3	11.8	13.4	
64 x 6	111.8	3,101.00	U	1,700.2	756.0	425.3	272.3	189.1	138.9	106.4	84.0	68.1	56.3	47.3	40.3	34.7	30.3	26.6	143,370
			D_u	0.2	0.5	0.8	1.3	1.9	2.6	3.4	4.3	5.3	6.4	7.6	8.9	10.3	11.8	13.4	
			C	259.3	172.9	129.7	103.8	86.5	74.1	64.9	57.6	51.9	47.2	43.2	39.9	37.1	34.6	32.4	4.55E+6
			D_c	0.2	0.4	0.7	1.1	1.5	2.1	2.7	3.4	4.2	5.1	6.1	7.1	8.2	9.5	10.8	
76 x 6	133.5	3,556.00	U	2,448.3	1,088.6	612.5	392.0	272.3	200.1	153.2	121.0	98.0	81.0	68.1	58.0	50.0	43.6	38.3	206,450
			D_u	0.2	0.4	0.7	1.1	1.6	2.1	2.8	3.5	4.4	5.3	6.3	7.4	8.6	9.9	11.2	
			C	373.4	249.0	186.7	149.4	124.5	106.7	93.4	83.0	74.7	67.9	62.3	57.5	53.4	49.8	46.7	7.87E+6
			D_c	0.1	0.3	0.6	0.9	1.3	1.7	2.2	2.8	3.5	4.2	5.0	5.9	6.9	7.9	9.0	
76 x 10	199.7	3,925.00	U	3,634.3	1,615.9	909.2	581.9	404.2	297.0	227.4	179.7	145.5	120.3	101.1	86.1	74.3	64.7	56.9	306,450
			D_u	0.2	0.4	0.7	1.1	1.6	2.1	2.8	3.5	4.4	5.3	6.3	7.4	8.6	9.9	11.2	
			C	554.2	369.6	277.2	221.8	184.8	158.4	138.6	123.2	110.9	100.8	92.4	85.3	79.2	73.9	69.3	11.68E+6
			D_c	0.1	0.3	0.6	0.9	1.3	1.7	2.2	2.8	3.5	4.2	5.0	5.9	6.9	7.9	9.0	

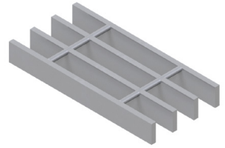
Spans and loads in red exceed a deflection of 6mm for uniform loads of 5kPa. Experience has shown that 6mm deflection is the maximum deflection to give pedestrian comfort, but can be exceeded for other types of loads at the discretion of the specifying professional.

30HW102 (mm)

# of Bars	2	3	4	5	6	7	8	9	10	11
6mm Bars	36	66	96	126	156	186	216	246	276	306
10mm Bars	40	70	100	130	160	190	220	250	280	310
# of Bars	12	13	14	15	16	17	18	19	20	21
6mm Bars	336	366	396	426	456	486	516	546	576	606
10mm Bars	340	370	400	430	460	490	520	550	580	610
# of Bars	22	23	24	25	26	27	28	29	30	31
6mm Bars	636	666	696	726	756	786	816	846	876	906
10mm Bars	640	670	700	730	760	790	820	850	880	910

LOAD TABLES - HD

Grating Type: 30HW102
Design Code: NAAMM MBG 534-19
Material: ASTM A1011CS Grade 250
Surface: Smooth



U = Safe Uniform Load (kPa)
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Allowable Extreme Fiber Stress = 137.9 MPa

Bearing Bar Size (mm)	Approx. Wieght (kg/m²)	Ped. Span (mm)	Load / Deflection	SPAN (mm) 305	457	610	762	915	1067	1219	1372	1524	1677	1829	1981	2134	2286	2438	Section Properties S_x (mm³)/m / I_x (mm⁴)/m
89 x 6	155.2	3,991.00	U	3,332.5	1,481.7	833.7	533.6	370.6	272.3	208.5	164.7	133.4	110.3	92.7	79.0	68.1	59.3	52.2	281,000
			D_u	0.2	0.3	0.6	0.9	1.4	1.8	2.4	3.0	3.8	4.5	5.4	6.3	7.4	8.4	9.6	
			C	508.2	338.9	254.2	203.4	169.5	145.3	127.1	113.0	101.7	92.4	84.7	78.2	72.6	67.8	63.6	12.49E+6
			D_c	0.1	0.3	0.5	0.8	1.1	1.5	1.9	2.4	3.0	3.6	4.3	5.1	5.9	6.8	7.7	
89 x 10	231.9	4,406.00	U	4,946.6	2,199.5	1,237.5	792.1	550.1	404.2	309.5	244.5	198.1	163.7	137.6	117.2	101.1	88.0	77.4	417110
			D_u	0.2	0.3	0.6	0.9	1.4	1.8	2.4	3.0	3.8	4.5	5.4	6.3	7.4	8.4	9.6	
			C	754.4	503.0	377.3	301.9	251.6	215.6	188.7	167.7	151.0	137.2	125.8	116.1	107.8	100.6	94.4	18.54E+6
			D_c	0.1	0.3	0.5	0.8	1.1	1.5	1.9	2.4	3.0	3.6	4.3	5.1	5.9	6.8	7.7	
102 x 6	176.9	4,412.00	U	4,352.6	1,935.3	1,088.9	697.0	484.0	355.6	272.3	215.2	174.3	144.0	121.0	103.1	88.9	77.5	68.1	367,020
			D_u	0.1	0.3	0.5	0.8	1.2	1.6	2.1	2.7	3.3	4.0	4.7	5.6	6.4	7.4	8.4	
			C	663.8	442.6	332.0	265.6	221.4	189.7	166.0	147.6	132.8	120.8	110.7	102.2	94.9	88.6	83.0	18.64E+6
			D_c	0.1	0.2	0.4	0.7	0.9	1.3	1.7	2.1	2.6	3.2	3.8	4.4	5.1	5.9	6.7	
102 x 10	264.1	4,870.00	U	6,460.9	2,872.8	1,616.3	1,034.6	718.5	527.9	404.2	319.4	258.7	213.8	179.7	153.1	132.0	115.0	101.1	544,800
			D_u	0.1	0.3	0.5	0.8	1.2	1.6	2.1	2.7	3.3	4.0	4.7	5.6	6.4	7.4	8.4	
			C	985.3	657.0	492.8	394.3	328.6	281.6	246.4	219.1	197.2	179.2	164.3	151.7	140.8	131.4	123.3	27.68E+6
			D_c	0.1	0.2	0.4	0.7	0.9	1.3	1.7	2.1	2.6	3.2	3.8	4.4	5.1	5.9	6.7	
127 x 10	328.5	5,757.00	U	10,095.2	4,488.7	2,525.4	1,616.5	1,122.7	824.9	631.6	499.0	404.2	334.1	280.7	239.2	206.3	179.7	158.0	851,250
			D_u	0.1	0.2	0.4	0.7	0.9	1.3	1.7	2.1	2.6	3.2	3.8	4.4	5.1	5.9	6.7	
			C	1,539.5	1,026.6	770.0	616.0	513.4	440.1	385.1	342.3	308.1	280.1	256.7	237.0	220.1	205.4	192.6	54.05E+6
			D_c	0.1	0.2	0.3	0.5	0.8	1.0	1.3	1.7	2.1	2.5	3.0	3.6	4.1	4.7	5.4	
152 x 10	392.9	6,600.00	U	14,537.0	6,463.7	3,636.6	2,327.8	1,616.6	1,187.8	909.5	718.6	582.1	481.1	404.2	344.5	297.0	258.7	227.5	1,225,800
			D_u	0.1	0.2	0.4	0.5	0.8	1.1	1.4	1.8	2.2	2.6	3.2	3.7	4.3	4.9	5.6	
			C	2,216.9	1,478.3	1,108.8	887.1	739.3	633.7	554.5	492.9	443.6	403.3	369.7	341.3	316.9	295.8	277.3	93.41E+6
			D_c	0.1	0.2	0.3	0.4	0.6	0.9	1.1	1.4	1.8	2.1	2.5	3.0	3.4	3.9	4.5	

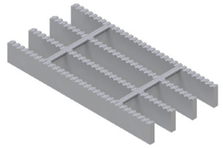
Spans and loads in red exceed a deflection of 6mm for uniform loads of 5kPa. Experience has shown that 6mm deflection is the maximum deflection to give pedestrian comfort, but can be exceeded for other types of loads at the discretion of the specifying professional.

30HW102 (mm)

# of Bars	2	3	4	5	6	7	8	9	10	11
6mm Bars	36	66	96	126	156	186	216	246	276	306
10mm Bars	40	70	100	130	160	190	220	250	280	310
# of Bars	12	13	14	15	16	17	18	19	20	21
6mm Bars	336	366	396	426	456	486	516	546	576	606
10mm Bars	340	370	400	430	460	490	520	550	580	610
# of Bars	22	23	24	25	26	27	28	29	30	31
6mm Bars	636	666	696	726	756	786	816	846	876	906
10mm Bars	640	670	700	730	760	790	820	850	880	910

LOAD TABLES - HD

Grating Type: 30HW102
Design Code: NAAMM MBG 534-19
Material: ASTM A1011CS Grade 250
Surface: Serrated



U = Safe Uniform Load (kPa)
D_u = Deflection Due to Safe Uniform Load (mm)
C = Safe Concentrated Load (kN/meter of grating width)
D_c = Deflection Due to Safe Concentrated Load (mm)
Allowable Extreme Fiber Stress = 137.9 MPa

Bearing Bar Size (mm)	Approx. Wieght (kg/m²)	Ped. Span (mm)	Load / Deflection	SPAN (mm) 305	457	610	762	915	1067	1219	1372	1524	1677	1829	1981	2134	2286	2438	Section Properties S_x (mm³)/m / I_x (mm⁴)/m
25 x 6	46.7	1,255.00	U	152.2	67.7	38.1	24.4	16.9	12.4	9.5	7.5								12,840
			D_u	0.7	1.6	2.8	4.4	6.3	8.6	11.2	14.2								
			C	23.2	15.5	11.6	9.3	7.7	6.6	5.8	5.2								121.94E+3
			D_c	0.6	1.3	2.2	3.5	5.1	6.9	9.0	11.4								
32 x 6	57.6	1,560.00	U	272.0	121.0	68.1	43.6	30.3	22.2	17.0	13.4	10.9	9.0						22,940
			D_u	0.5	1.2	2.1	3.3	4.7	6.4	8.4	10.6	13.1	15.9						
			C	41.5	27.7	20.7	16.6	13.8	11.9	10.4	9.2	8.3	7.5						291.33E+3
			D_c	0.4	0.9	1.7	2.6	3.8	5.2	6.7	8.5	10.5	12.7						
38 x 6	68.4	1,842.00	U	423.7	188.4	106.0	67.8	47.1	34.6	26.5	20.9	17.0	14.0	11.8	10.0				35,730
			D_u	0.4	0.9	1.7	2.6	3.8	5.2	6.7	8.5	10.5	12.7	15.2	17.8				
			C	64.6	43.1	32.3	25.9	21.5	18.5	16.2	14.4	12.9	11.8	10.8	9.9				566.31E+3
			D_c	0.3	0.8	1.3	2.1	3.0	4.1	5.4	6.8	8.4	10.2	12.1	14.2				
38 x 10	101.1	2,033.00	U	629.0	279.7	157.3	100.7	69.9	51.4	39.3	31.1	25.2	20.8	17.5	14.9	12.9			53,040
			D_u	0.4	0.9	1.7	2.6	3.8	5.2	6.7	8.5	10.5	12.7	15.2	17.8	20.6			
			C	95.9	64.0	48.0	38.4	32.0	27.4	24.0	21.3	19.2	17.4	16.0	14.8	13.7			840.62E+3
			D_c	0.3	0.8	1.3	2.1	3.0	4.1	5.4	6.8	8.4	10.2	12.1	14.2	16.5			
51 x 6	90.1	2,371.00	U	831.2	369.6	207.9	133.1	92.4	67.9	52.0	41.1	33.3	27.5	23.1	19.7	17.0	14.8	13.0	70,090
			D_u	0.3	0.7	1.2	1.9	2.7	3.7	4.8	6.1	7.5	9.1	10.8	12.7	14.7	16.9	19.2	
			C	126.8	84.5	63.4	50.7	42.3	36.2	31.7	28.2	25.4	23.1	21.1	19.5	18.1	16.9	15.9	1.56E+6
			D_c	0.2	0.5	1.0	1.5	2.2	2.9	3.8	4.9	6.0	7.3	8.7	10.2	11.8	13.5	15.4	
64 x 6	111.8	2,864.00	U	1,374.8	611.3	343.9	220.1	152.9	112.3	86.0	68.0	55.0	45.5	38.2	32.6	28.1	24.5	21.5	115,930
			D_u	0.2	0.5	0.9	1.5	2.1	2.9	3.7	4.7	5.8	7.1	8.4	9.9	11.5	13.1	15.0	
			C	209.7	139.8	104.9	83.9	69.9	59.9	52.4	46.6	42.0	38.1	35.0	32.3	30.0	28.0	26.2	3.31E+6
			D_c	0.2	0.4	0.7	1.2	1.7	2.3	3.0	3.8	4.7	5.7	6.7	7.9	9.2	10.5	12.0	
76 x 6	133.5	3,329.00	U	2,054.3	913.4	513.9	329.0	228.5	167.9	128.5	101.6	82.3	68.0	57.1	48.7	42.0	36.6	32.2	173,230
			D_u	0.2	0.4	0.8	1.2	1.7	2.3	3.1	3.9	4.8	5.8	6.9	8.1	9.4	10.8	12.2	
			C	313.3	208.9	156.7	125.4	104.5	89.6	78.4	69.7	62.7	57.0	52.2	48.2	44.8	41.8	39.2	6.05E+6
			D_c	0.2	0.3	0.6	1.0	1.4	1.9	2.4	3.1	3.8	4.6	5.5	6.5	7.5	8.6	9.8	
76 x 10	199.7	3,675.00	U	3,049.4	1,355.9	762.9	488.3	339.1	249.2	190.8	150.7	122.1	100.9	84.8	72.3	62.3	54.3	47.7	257,140
			D_u	0.2	0.4	0.8	1.2	1.7	2.3	3.1	3.9	4.8	5.8	6.9	8.1	9.4	10.8	12.2	
			C	465.0	310.1	232.6	186.1	155.1	132.9	116.3	103.4	93.1	84.6	77.5	71.6	66.5	62.0	58.2	8.97E+6
			D_c	0.2	0.3	0.6	1.0	1.4	1.9	2.4	3.1	3.8	4.6	5.5	6.5	7.5	8.6	9.8	

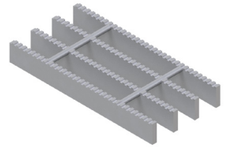
Spans and loads in red exceed a deflection of 6mm for uniform loads of 5kPa. Experience has shown that 6mm deflection is the maximum deflection to give pedestrian comfort, but can be exceeded for other types of loads at the discretion of the specifying professional.

30HW102 (mm)

# of Bars	2	3	4	5	6	7	8	9	10	11
6mm Bars	36	66	96	126	156	186	216	246	276	306
10mm Bars	40	70	100	130	160	190	220	250	280	310
# of Bars	12	13	14	15	16	17	18	19	20	21
6mm Bars	336	366	396	426	456	486	516	546	576	606
10mm Bars	340	370	400	430	460	490	520	550	580	610
# of Bars	22	23	24	25	26	27	28	29	30	31
6mm Bars	636	666	696	726	756	786	816	846	876	906
10mm Bars	640	670	700	730	760	790	820	850	880	910

LOAD TABLES - HD

Grating Type: 30HW102
Design Code: NAAMM MBG 534-19
Material: ASTM A1011CS Grade 250
Surface: Serrated



U = Safe Uniform Load (kPa)
D_u = Deflection Due to Safe Uniform Load (mm)
C = Safe Concentrated Load (kN/meter of grating width)
D_c = Deflection Due to Safe Concentrated Load (mm)
Allowable Extreme Fiber Stress = 137.9 MPa

Bearing Bar Size (mm)	Approx. Wieght (kg/m²)	Ped. Span (mm)	Load / Deflection	SPAN (mm) 305	457	610	762	915	1067	1219	1372	1524	1677	1829	1981	2134	2286	2438	Section Properties S_x (mm³)/m / I_x (mm⁴)/m
89 x 6	155.2	3,774.00	U	2,869.9	1,276.1	718.0	459.5	319.2	234.5	179.5	141.9	114.9	95.0	79.8	68.0	58.6	51.1	44.9	242,000
			D_u	0.2	0.4	0.6	1.0	1.5	2.0	2.6	3.3	4.0	4.9	5.8	6.8	7.9	9.1	10.3	
			C	437.7	291.8	218.9	175.1	146.0	125.1	109.5	97.3	87.6	79.6	73.0	67.4	62.6	58.4	54.8	9.98E+6
			D_c	0.1	0.3	0.5	0.8	1.2	1.6	2.1	2.6	3.2	3.9	4.7	5.5	6.3	7.3	8.3	
89 x 10	231.9	4,166.00	U	4,260.0	1,894.2	1,065.7	682.1	473.8	348.1	266.5	210.6	170.6	141.0	118.5	100.9	87.0	75.8	66.7	359220
			D_u	0.2	0.4	0.6	1.0	1.5	2.0	2.6	3.3	4.0	4.9	5.8	6.8	7.9	9.1	10.3	
			C	649.7	433.2	324.9	260.0	216.6	185.7	162.5	144.4	130.0	118.2	108.3	100.0	92.9	86.7	81.3	14.82E+6
			D_c	0.1	0.3	0.5	0.8	1.2	1.6	2.1	2.6	3.2	3.9	4.7	5.5	6.3	7.3	8.3	
102 x 6	176.9	4,202.00	U	3,821.5	1,699.2	956.0	611.9	425.0	312.3	239.1	188.9	153.0	126.5	106.3	90.6	78.1	68.0	59.8	322,240
			D_u	0.1	0.3	0.6	0.9	1.3	1.7	2.2	2.8	3.5	4.2	5.0	5.9	6.9	7.9	9.0	
			C	582.8	388.6	291.5	233.2	194.3	166.6	145.8	129.6	116.6	106.0	97.2	89.7	83.3	77.7	72.9	15.34E+6
			D_c	0.1	0.3	0.4	0.7	1.0	1.4	1.8	2.3	2.8	3.4	4.0	4.7	5.5	6.3	7.2	
102 x 10	264.1	4,638.00	U	5,672.6	2,522.2	1,419.1	908.3	630.8	463.5	354.9	280.4	227.1	187.7	157.7	134.4	115.9	101.0	88.8	478,330
			D_u	0.1	0.3	0.6	0.9	1.3	1.7	2.2	2.8	3.5	4.2	5.0	5.9	6.9	7.9	9.0	
			C	865.1	576.8	432.7	346.2	288.5	247.3	216.4	192.3	173.1	157.4	144.3	133.2	123.7	115.4	108.2	22.77E+6
			D_c	0.1	0.3	0.4	0.7	1.0	1.4	1.8	2.3	2.8	3.4	4.0	4.7	5.5	6.3	7.2	
127 x 10	328.5	5,538.00	U	9,103.3	4,047.7	2,277.3	1,457.7	1,012.4	743.8	569.5	450.0	364.5	301.3	253.1	215.7	186.0	162.0	142.5	767,620
			D_u	0.1	0.2	0.4	0.7	1.0	1.4	1.8	2.2	2.8	3.3	4.0	4.7	5.4	6.2	7.1	
			C	1,388.3	925.7	694.4	555.5	463.0	396.8	347.2	308.7	277.8	252.5	231.5	213.7	198.4	185.2	173.7	46.29E+6
			D_c	0.1	0.2	0.4	0.6	0.8	1.1	1.4	1.8	2.2	2.7	3.2	3.7	4.3	5.0	5.7	
152 x 10	392.9	6,391.00	U	13,341.7	5,932.2	3,337.6	2,136.4	1,483.7	1,090.1	834.7	659.5	534.2	441.5	371.0	316.1	272.6	237.5	208.8	1,125,010
			D_u	0.1	0.2	0.4	0.6	0.8	1.1	1.5	1.9	2.3	2.8	3.3	3.9	4.5	5.1	5.8	
			C	2,034.6	1,356.7	1,017.6	814.2	678.5	581.6	508.9	452.4	407.1	370.1	339.3	313.2	290.8	271.4	254.5	82.13E+6
			D_c	0.1	0.2	0.3	0.5	0.7	0.9	1.2	1.5	1.8	2.2	2.6	3.1	3.6	4.1	4.7	

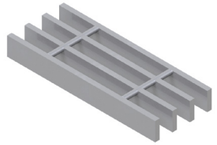
Spans and loads in red exceed a deflection of 6mm for uniform loads of 5kPa. Experience has shown that 6mm deflection is the maximum deflection to give pedestrian comfort, but can be exceeded for other types of loads at the discretion of the specifying professional.

30HW102 (mm)

# of Bars	2	3	4	5	6	7	8	9	10	11
6mm Bars	36	66	96	126	156	186	216	246	276	306
10mm Bars	40	70	100	130	160	190	220	250	280	310
# of Bars	12	13	14	15	16	17	18	19	20	21
6mm Bars	336	366	396	426	456	486	516	546	576	606
10mm Bars	340	370	400	430	460	490	520	550	580	610
# of Bars	22	23	24	25	26	27	28	29	30	31
6mm Bars	636	666	696	726	756	786	816	846	876	906
10mm Bars	640	670	700	730	760	790	820	850	880	910

LOAD TABLES - HD CLOSE-MESH

Grating Type: 24W102
Design Code: NAAMM MBG 534-19
Material: ASTM A1011CS Grade 250
Surface: Smooth



U = Safe Uniform Load (kPa)
D_u = Deflection Due to Safe Uniform Load (mm)
C = Safe Concentrated Load (kN/meter of grating width)
D_c = Deflection Due to Safe Concentrated Load (mm)
Allowable Extreme Fiber Stress = 137.9 MPa

Bearing Bar Size (mm)	Approx. Wieght (kg/m²)	Ped. Span (mm)	Load / Deflection	SPAN (mm) 305	457	610	762	915	1067	1219	1372	1524	1677	1829	1981	2134	2286	2438	Section Properties S_x (mm³)/m / I_x (mm⁴)/m
25 x 6	56.9	1,649.00	U	340.0	151.2	85.1	54.5	37.8	27.8	21.3	16.8	13.6	11.3						28,670
			D_u	0.5	1.2	2.1	3.3	4.7	6.4	8.4	10.6	13.1	15.9						
			C	51.9	34.6	25.9	20.8	17.3	14.8	13.0	11.5	10.4	9.4						364.16E+3
			D_c	0.4	0.9	1.7	2.6	3.8	5.2	6.7	8.5	10.5	12.7						
32 x 6	70.4	1,952.00	U	533.0	237.0	133.3	85.3	59.3	43.6	33.3	26.3	21.3	17.6	14.8	12.6				44,940
			D_u	0.4	0.9	1.7	2.6	3.8	5.1	6.7	8.5	10.5	12.7	15.1	17.7				
			C	81.3	54.2	40.7	32.5	27.1	23.2	20.3	18.1	16.3	14.8	13.6	12.5				714.61E+3
			D_c	0.3	0.8	1.3	2.1	3.0	4.1	5.4	6.8	8.4	10.2	12.1	14.2				
38 x 6	83.7	2,235.00	U	765.1	340.2	191.4	122.5	85.1	62.5	47.9	37.8	30.6	25.3	21.3	18.1	15.6	13.6		64,520
			D_u	0.4	0.8	1.4	2.2	3.2	4.3	5.6	7.1	8.8	10.6	12.6	14.8	17.2	19.7		
			C	116.7	77.8	58.4	46.7	38.9	33.4	29.2	25.9	23.3	21.2	19.5	18.0	16.7	15.6		1.23E+6
			D_c	0.3	0.6	1.1	1.8	2.5	3.4	4.5	5.7	7.0	8.5	10.1	11.8	13.7	15.8		
38 x 10	123.8	2,468.00	U	1,135.7	505.0	284.1	181.9	126.3	92.8	71.1	56.1	45.5	37.6	31.6	26.9	23.2	20.2	17.8	95,770
			D_u	0.4	0.8	1.4	2.2	3.2	4.3	5.6	7.1	8.8	10.6	12.6	14.8	17.2	19.7	22.4	
			C	173.2	115.5	86.6	69.3	57.8	49.5	43.3	38.5	34.7	31.5	28.9	26.7	24.8	23.1	21.7	1.82E+6
			D_c	0.3	0.6	1.1	1.8	2.5	3.4	4.5	5.7	7.0	8.5	10.1	11.8	13.7	15.8	17.9	
51 x 6	110.5	2,774.00	U	1,360.2	604.8	340.3	217.8	151.3	111.1	85.1	67.2	54.5	45.0	37.8	32.2	27.8	24.2	21.3	114,700
			D_u	0.3	0.6	1.1	1.6	2.4	3.2	4.2	5.3	6.6	7.9	9.5	11.1	12.9	14.8	16.8	
			C	207.4	138.3	103.7	83.0	69.2	59.3	51.9	46.1	41.5	37.7	34.6	31.9	29.6	27.7	25.9	2.91E+6
			D_c	0.2	0.5	0.8	1.3	1.9	2.6	3.4	4.3	5.3	6.4	7.6	8.9	10.3	11.8	13.4	
64 x 6	137.3	3,279.00	U	2,125.3	945.0	531.7	340.3	236.4	173.7	133.0	105.1	85.1	70.3	59.1	50.4	43.4	37.8	33.3	179,210
			D_u	0.2	0.5	0.8	1.3	1.9	2.6	3.4	4.3	5.3	6.4	7.6	8.9	10.3	11.8	13.4	
			C	324.1	216.1	162.1	129.7	108.1	92.6	81.1	72.1	64.9	59.0	54.0	49.9	46.3	43.2	40.5	5.69E+6
			D_c	0.2	0.4	0.7	1.1	1.5	2.1	2.7	3.4	4.2	5.1	6.1	7.1	8.2	9.5	10.8	
76 x 6	164.1	3,760.00	U	3,060.4	1,360.8	765.6	490.1	340.3	250.1	191.5	151.3	122.5	101.3	85.1	72.5	62.5	54.5	47.9	258,060
			D_u	0.2	0.4	0.7	1.1	1.6	2.1	2.8	3.5	4.4	5.3	6.3	7.4	8.6	9.9	11.2	
			C	466.7	311.2	233.4	186.8	155.6	133.4	116.7	103.8	93.4	84.9	77.8	71.8	66.7	62.3	58.4	9.83E+6
			D_c	0.1	0.3	0.6	0.9	1.3	1.7	2.2	2.8	3.5	4.2	5.0	5.9	6.9	7.9	9.0	
76 x 10	245.1	4,150.00	U	4,542.8	2,019.9	1,136.5	727.4	505.2	371.2	284.2	224.6	181.9	150.3	126.3	107.6	92.8	80.9	71.1	383,060
			D_u	0.2	0.4	0.7	1.1	1.6	2.1	2.8	3.5	4.4	5.3	6.3	7.4	8.6	9.9	11.2	
			C	692.8	462.0	346.5	277.2	231.0	198.0	173.3	154.0	138.6	126.0	115.5	106.6	99.0	92.4	86.7	14.59E+6
			D_c	0.1	0.3	0.6	0.9	1.3	1.7	2.2	2.8	3.5	4.2	5.0	5.9	6.9	7.9	9.0	

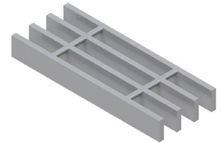
Spans and loads in red exceed a deflection of 6mm for uniform loads of 5kPa. Experience has shown that 6mm deflection is the maximum deflection to give pedestrian comfort, but can be exceeded for other types of loads at the discretion of the specifying professional.

24HW102 (mm)

# of Bars	2	3	4	5	6	7	8	9	10	11
6mm Bars	30	54	78	102	126	150	174	198	222	246
10mm Bars	34	58	82	106	130	154	178	202	226	250
# of Bars	12	13	14	15	16	17	18	19	20	21
6mm Bars	270	294	318	342	366	390	414	438	462	486
10mm Bars	274	298	322	346	370	394	418	442	466	490
# of Bars	22	23	24	25	26	27	28	29	30	31
6mm Bars	510	534	558	582	606	630	654	678	702	726
10mm Bars	514	538	562	586	610	634	658	682	706	730

LOAD TABLES - HD CLOSE-MESH

Grating Type: 24W102
Design Code: NAAMM MBG 534-19
Material: ASTM A1011CS Grade 250
Surface: Smooth



U = Safe Uniform Load (kPa)
D_u = Deflection Due to Safe Uniform Load (mm)
C = Safe Concentrated Load (kN/meter of grating width)
D_c = Deflection Due to Safe Concentrated Load (mm)
Allowable Extreme Fiber Stress = 137.9 MPa

Bearing Bar Size (mm)	Approx. Wieght (kg/m²)	Ped. Span (mm)	Load / Deflection	SPAN (mm) 305	457	610	762	915	1067	1219	1372	1524	1677	1829	1981	2134	2286	2438	Section Properties S_x (mm³)/m / I_x (mm⁴)/m
89 x 6	190.9	4,220.00	U	4,165.6	1,852.2	1,042.1	667.0	463.2	340.4	260.6	205.9	166.8	137.9	115.8	98.7	85.1	74.1	65.2	351,250
			D_u	0.2	0.3	0.6	0.9	1.4	1.8	2.4	3.0	3.8	4.5	5.4	6.3	7.4	8.4	9.6	
			C	635.3	423.6	317.7	254.2	211.8	181.6	158.9	141.2	127.1	115.6	105.9	97.8	90.8	84.7	79.5	15.61E+6
			D_c	0.1	0.3	0.5	0.8	1.1	1.5	1.9	2.4	3.0	3.6	4.3	5.1	5.9	6.8	7.7	
89 x 10	284.9	4,658.00	U	6,183.3	2,749.3	1,546.8	990.1	687.6	505.2	386.8	305.7	247.6	204.6	171.9	146.5	126.3	110.1	96.8	521390
			D_u	0.2	0.3	0.6	0.9	1.4	1.8	2.4	3.0	3.8	4.5	5.4	6.3	7.4	8.4	9.6	
			C	943.0	628.8	471.6	377.3	314.5	269.5	235.9	209.7	188.7	171.5	157.2	145.1	134.8	125.8	118.0	23.18E+6
			D_c	0.1	0.3	0.5	0.8	1.1	1.5	1.9	2.4	3.0	3.6	4.3	5.1	5.9	6.8	7.7	
102 x 6	217.7	4,665.00	U	5,440.8	2,419.2	1,361.1	871.2	605.1	444.6	340.4	269.0	217.9	180.1	151.3	128.9	111.2	96.8	85.2	458,780
			D_u	0.1	0.3	0.5	0.8	1.2	1.6	2.1	2.7	3.3	4.0	4.7	5.6	6.4	7.4	8.4	
			C	829.7	553.3	415.0	332.0	276.7	237.2	207.5	184.5	166.0	150.9	138.4	127.7	118.6	110.7	103.8	23.31E+6
			D_c	0.1	0.2	0.4	0.7	0.9	1.3	1.7	2.1	2.6	3.2	3.8	4.4	5.1	5.9	6.7	
102 x 10	324.7	5,149.00	U	8,076.1	3,591.0	2,020.4	1,293.2	898.1	659.9	505.3	399.2	323.4	267.3	224.6	191.4	165.0	143.7	126.4	681,000
			D_u	0.1	0.3	0.5	0.8	1.2	1.6	2.1	2.7	3.3	4.0	4.7	5.6	6.4	7.4	8.4	
			C	1,231.6	821.3	616.0	492.8	410.7	352.1	308.1	273.8	246.5	224.0	205.4	189.6	176.0	164.3	154.1	34.59E+6
			D_c	0.1	0.2	0.4	0.7	0.9	1.3	1.7	2.1	2.6	3.2	3.8	4.4	5.1	5.9	6.7	
127 x 10	404.3	6,087.00	U	12,618.9	5,610.9	3,156.8	2,020.6	1,403.3	1,031.1	789.5	623.8	505.3	417.6	350.9	299.0	257.8	224.6	197.5	1,064,070
			D_u	0.1	0.2	0.4	0.7	0.9	1.3	1.7	2.1	2.6	3.2	3.8	4.4	5.1	5.9	6.7	
			C	1,924.4	1,283.2	962.5	770.1	641.7	550.1	481.3	427.9	385.1	350.1	320.9	296.2	275.1	256.7	240.7	67.57E+6
			D_c	0.1	0.2	0.3	0.5	0.8	1.0	1.3	1.7	2.1	2.5	3.0	3.6	4.1	4.7	5.4	
152 x 10	483.8	6,979.00	U	18,171.3	8,079.7	4,545.8	2,909.7	2,020.8	1,484.8	1,136.8	898.3	727.6	601.3	505.3	430.6	371.3	323.4	284.4	1,532,260
			D_u	0.1	0.2	0.4	0.5	0.8	1.1	1.4	1.8	2.2	2.6	3.2	3.7	4.3	4.9	5.6	
			C	2,771.1	1,847.8	1,386.0	1,108.9	924.1	792.1	693.1	616.1	554.5	504.1	462.1	426.6	396.1	369.7	346.7	116.76E+6
			D_c	0.1	0.2	0.3	0.4	0.6	0.9	1.1	1.4	1.8	2.1	2.5	3.0	3.4	3.9	4.5	

Spans and loads in red exceed a deflection of 6mm for uniform loads of 5kPa. Experience has shown that 6mm deflection is the maximum deflection to give pedestrian comfort, but can be exceeded for other types of loads at the discretion of the specifying professional.

24HW102 (mm)

# of Bars	2	3	4	5	6	7	8	9	10	11
6mm Bars	30	54	78	102	126	150	174	198	222	246
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# of Bars	12	13	14	15	16	17	18	19	20	21
6mm Bars	270	294	318	342	366	390	414	438	462	486
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6mm Bars	510	534	558	582	606	630	654	678	702	726
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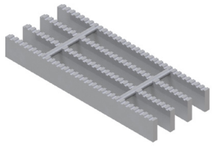
LOAD TABLES - HD CLOSE-MESH

Grating Type: **24W102**
Design Code: **NAAMM MBG 534-19**
Material: **ASTM A1011CS Grade 250**
Surface: **Serrated**



U = Safe Uniform Load (kPa)
D_u = Deflection Due to Safe Uniform Load (mm)
C = Safe Concentrated Load (kN/meter of grating width)
D_c = Deflection Due to Safe Concentrated Load (mm)
Allowable Extreme Fiber Stress = 137.9 MPa

Bearing Bar Size (mm)	Approx. Wieght (kg/m²)	Ped. Span (mm)	Load / Deflection	SPAN (mm) 305	457	610	762	915	1067	1219	1372	1524	1677	1829	1981	2134	2286	2438	Section Properties S_x (mm³)/m	I_x (mm⁴)/m
25 x 6	56.9	1,327.00	U	190.3	84.6	47.6	30.5	21.2	15.5	11.9	9.4								16,040	
			D_u	0.7	1.6	2.8	4.4	6.3	8.6	11.2	14.2									
			C	29.0	19.3	14.5	11.6	9.7	8.3	7.3	6.5								152.42E+3	
			D_c	0.6	1.3	2.2	3.5	5.1	6.9	9.0	11.4									
32 x 6	70.4	1,649.00	U	340.0	151.2	85.1	54.5	37.8	27.8	21.3	16.8	13.6	11.3						28,670	
			D_u	0.5	1.2	2.1	3.3	4.7	6.4	8.4	10.6	13.1	15.9							
			C	51.9	34.6	25.9	20.8	17.3	14.8	13.0	11.5	10.4	9.4						364.16E+3	
			D_c	0.4	0.9	1.7	2.6	3.8	5.2	6.7	8.5	10.5	12.7							
38 x 6	83.7	1,947.00	U	529.7	235.5	132.5	84.8	58.9	43.3	33.1	26.2	21.2	17.5	14.7	12.6				44,660	
			D_u	0.4	0.9	1.7	2.6	3.8	5.2	6.7	8.5	10.5	12.7	15.2	17.8					
			C	80.8	53.9	40.4	32.3	26.9	23.1	20.2	18.0	16.2	14.7	13.5	12.4				707.89E+3	
			D_c	0.3	0.8	1.3	2.1	3.0	4.1	5.4	6.8	8.4	10.2	12.1	14.2					
38 x 10	123.8	2,150.00	U	786.2	349.6	196.7	125.9	87.4	64.2	49.2	38.9	31.5	26.0	21.9	18.6	16.1	14.0		66,300	
			D_u	0.4	0.9	1.7	2.6	3.8	5.2	6.7	8.5	10.5	12.7	15.2	17.8	20.6	23.7			
			C	119.9	79.9	60.0	48.0	40.0	34.3	30.0	26.7	24.0	21.8	20.0	18.5	17.1	16.0		1.05E+6	
			D_c	0.3	0.8	1.3	2.1	3.0	4.1	5.4	6.8	8.4	10.2	12.1	14.2	16.5	18.9			
51 x 6	110.5	2,507.00	U	1,039.1	462.0	259.9	166.4	115.6	84.9	65.0	51.4	41.6	34.4	28.9	24.6	21.2	18.5	16.3	87,620	
			D_u	0.3	0.7	1.2	1.9	2.7	3.7	4.8	6.1	7.5	9.1	10.8	12.7	14.7	16.9	19.2		
			C	158.5	105.7	79.3	63.4	52.8	45.3	39.6	35.2	31.7	28.8	26.4	24.4	22.6	21.1	19.8	1.95E+6	
			D_c	0.2	0.5	1.0	1.5	2.2	2.9	3.8	4.9	6.0	7.3	8.7	10.2	11.8	13.5	15.4		
64 x 6	137.3	3,028.00	U	1,718.5	764.1	429.9	275.2	191.1	140.4	107.5	84.9	68.8	56.9	47.8	40.7	35.1	30.6	26.9	144,910	
			D_u	0.2	0.5	0.9	1.5	2.1	2.9	3.7	4.7	5.8	7.1	8.4	9.9	11.5	13.1	15.0		
			C	262.1	174.8	131.1	104.9	87.4	74.9	65.5	58.3	52.4	47.7	43.7	40.3	37.5	35.0	32.8	4.14E+6	
			D_c	0.2	0.4	0.7	1.2	1.7	2.3	3.0	3.8	4.7	5.7	6.7	7.9	9.2	10.5	12.0		
76 x 6	164.1	3,520.00	U	2,567.9	1,141.8	642.4	411.2	285.6	209.8	160.7	126.9	102.8	85.0	71.4	60.8	52.5	45.7	40.2	216,540	
			D_u	0.2	0.4	0.8	1.2	1.7	2.3	3.1	3.9	4.8	5.8	6.9	8.1	9.4	10.8	12.2		
			C	391.6	261.1	195.9	156.7	130.6	111.9	98.0	87.1	78.4	71.2	65.3	60.3	56.0	52.2	49.0	7.56E+6	
			D_c	0.2	0.3	0.6	1.0	1.4	1.9	2.4	3.1	3.8	4.6	5.5	6.5	7.5	8.6	9.8		
76 x 10	245.1	3,886.00	U	3,811.8	1,694.9	953.6	610.4	423.9	311.5	238.5	188.4	152.6	126.1	106.0	90.3	77.9	67.8	59.7	321,420	
			D_u	0.2	0.4	0.8	1.2	1.7	2.3	3.1	3.9	4.8	5.8	6.9	8.1	9.4	10.8	12.2		
			C	581.3	387.6	290.7	232.6	193.8	166.2	145.4	129.2	116.3	105.7	96.9	89.5	83.1	77.5	72.7	11.22E+6	
			D_c	0.2	0.3	0.6	1.0	1.4	1.9	2.4	3.1	3.8	4.6	5.5	6.5	7.5	8.6	9.8		

Spans and loads in red exceed a deflection of 6mm for uniform loads of 5kPa. Experience has shown that 6mm deflection is the maximum deflection to give pedestrian comfort, but can be exceeded for other types of loads at the discretion of the specifying professional.

24HW102 (mm)

# of Bars	2	3	4	5	6	7	8	9	10	11
6mm Bars	30	54	78	102	126	150	174	198	222	246
10mm Bars	34	58	82	106	130	154	178	202	226	250
# of Bars	12	13	14	15	16	17	18	19	20	21
6mm Bars	270	294	318	342	366	390	414	438	462	486
10mm Bars	274	298	322	346	370	394	418	442	466	490
# of Bars	22	23	24	25	26	27	28	29	30	31
6mm Bars	510	534	558	582	606	630	654	678	702	726
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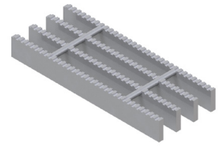
LOAD TABLES - HD CLOSE-MESH

Grating Type: **24W102**
Design Code: **NAAMM MBG 534-19**
Material: **ASTM A1011CS Grade 250**
Surface: **Serrated**



U = Safe Uniform Load (kPa)
D_u = Deflection Due to Safe Uniform Load (mm)
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Allowable Extreme Fiber Stress = 137.9 MPa

Bearing Bar Size (mm)	Approx. Wieght (kg/m²)	Ped. Span (mm)	Load / Deflection	SPAN (mm) 305	457	610	762	915	1067	1219	1372	1524	1677	1829	1981	2134	2286	2438	Section Properties S_x (mm³)/m	I_x (mm⁴)/m
89 x 6	190.9	3,990.00	U	3,587.4	1,595.1	897.4	574.4	398.9	293.1	224.4	177.3	143.6	118.7	99.8	85.0	73.3	63.8	56.1	302,500	
			D_u	0.2	0.4	0.6	1.0	1.5	2.0	2.6	3.3	4.0	4.9	5.8	6.8	7.9	9.1	10.3		
			C	547.1	364.8	273.6	218.9	182.4	156.4	136.8	121.6	109.5	99.5	91.2	84.2	78.2	73.0	68.4	12.48E+6	
			D_c	0.1	0.3	0.5	0.8	1.2	1.6	2.1	2.6	3.2	3.9	4.7	5.5	6.3	7.3	8.3		
89 x 10	284.9	4,405.00	U	5,325.0	2,367.7	1,332.1	852.7	592.2	435.1	333.1	263.2	213.2	176.2	148.1	126.2	108.8	94.8	83.3	449020	
			D_u	0.2	0.4	0.6	1.0	1.5	2.0	2.6	3.3	4.0	4.9	5.8	6.8	7.9	9.1	10.3		
			C	812.1	541.5	406.2	325.0	270.8	232.1	203.1	180.6	162.5	147.7	135.4	125.0	116.1	108.3	101.6	18.52E+6	
			D_c	0.1	0.3	0.5	0.8	1.2	1.6	2.1	2.6	3.2	3.9	4.7	5.5	6.3	7.3	8.3		
102 x 6	217.7	4,443.00	U	4,776.9	2,124.0	1,195.0	764.9	531.2	390.3	298.9	236.1	191.3	158.1	132.8	113.2	97.6	85.0	74.8	402,800	
			D_u	0.1	0.3	0.6	0.9	1.3	1.7	2.2	2.8	3.5	4.2	5.0	5.9	6.9	7.9	9.0		
			C	728.5	485.8	364.4	291.5	242.9	208.2	182.2	162.0	145.8	132.5	121.5	112.1	104.1	97.2	91.1	19.17E+6	
			D_c	0.1	0.3	0.4	0.7	1.0	1.4	1.8	2.3	2.8	3.4	4.0	4.7	5.5	6.3	7.2		
102 x 10	324.7	4,904.00	U	7,090.7	3,152.8	1,773.8	1,135.4	788.5	579.4	443.6	350.5	283.9	234.7	197.2	168.0	144.9	126.2	111.0	597,910	
			D_u	0.1	0.3	0.6	0.9	1.3	1.7	2.2	2.8	3.5	4.2	5.0	5.9	6.9	7.9	9.0		
			C	1,081.3	721.0	540.8	432.7	360.6	309.1	270.5	240.4	216.4	196.7	180.3	166.5	154.6	144.3	135.3	28.46E+6	
			D_c	0.1	0.3	0.4	0.7	1.0	1.4	1.8	2.3	2.8	3.4	4.0	4.7	5.5	6.3	7.2		
127 x 10	404.3	5,856.00	U	11,379.2	5,059.6	2,846.7	1,822.1	1,265.5	929.8	711.9	562.5	455.6	376.6	316.4	269.6	232.5	202.5	178.1	959,520	
			D_u	0.1	0.2	0.4	0.7	1.0	1.4	1.8	2.2	2.8	3.3	4.0	4.7	5.4	6.2	7.1		
			C	1,735.3	1,157.1	867.9	694.4	578.7	496.0	434.0	385.8	347.2	315.7	289.4	267.1	248.0	231.5	217.1	57.86E+6	
			D_c	0.1	0.2	0.4	0.6	0.8	1.1	1.4	1.8	2.2	2.7	3.2	3.7	4.3	5.0	5.7		
152 x 10	483.8	6,758.00	U	16,677.1	7,415.3	4,172.0	2,670.4	1,854.6	1,362.7	1,043.3	824.4	667.8	551.9	463.8	395.2	340.7	296.8	261.0	1,406,260	
			D_u	0.1	0.2	0.4	0.6	0.8	1.1	1.5	1.9	2.3	2.8	3.3	3.9	4.5	5.1	5.8		
			C	2,543.3	1,695.9	1,272.0	1,017.7	848.1	727.0	636.1	565.5	508.9	462.7	424.1	391.5	363.5	339.3	318.2	102.66E+6	
			D_c	0.1	0.2	0.3	0.5	0.7	0.9	1.2	1.5	1.8	2.2	2.6	3.1	3.6	4.1	4.7		

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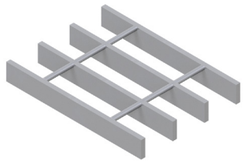
# of Bars	2	3	4	5	6	7	8	9	10	11
6mm Bars	30	54	78	102	126	150	174	198	222	246
10mm Bars	34	58	82	106	130	154	178	202	226	250
# of Bars	12	13	14	15	16	17	18	19	20	21
6mm Bars	270	294	318	342	366	390	414	438	462	486
10mm Bars	274	298	322	346	370	394	418	442	466	490
# of Bars	22	23	24	25	26	27	28	29	30	31
6mm Bars	510	534	558	582	606	630	654	678	702	726
10mm Bars	514	538	562	586	610	634	658	682	706	730

LOAD TABLES - WIDE-GAP

Grating Type: 48HW102
Design Code: NAAMM MBG 534-19
Material: ASTM A1011CS Grade 250
Surface: Smooth



U = Safe Uniform Load (kPa)
D_u = Deflection Due to Safe Uniform Load (mm)
C = Safe Concentrated Load (kN/meter of grating width)
D_c = Deflection Due to Safe Concentrated Load (mm)
Allowable Extreme Fiber Stress = 137.9 MPa

Bearing Bar Size (mm)	Approx. Wieght (kg/m²)	Ped. Span (mm)	Load / Deflection	SPAN (mm) 305	457	610	762	915	1067	1219	1372	1524	1677	1829	1981	2134	2286	2438	Section Properties S_x (mm³)/m	I_x (mm⁴)/m
25 x 6	31.3	1,387.00	U	170.0	75.6	42.5	27.2	18.9	13.9	10.6	8.4	6.8							14,340	
			D_u	0.5	1.2	2.1	3.3	4.7	6.4	8.4	10.6	13.1								
			C	25.9	17.3	13.0	10.4	8.6	7.4	6.5	5.8	5.2							182.08E+3	
			D_c	0.4	0.9	1.7	2.6	3.8	5.2	6.7	8.5	10.5								
32 x 6	38.1	1,641.00	U	266.5	118.5	66.7	42.7	29.6	21.8	16.7	13.2	10.7	8.8						22,470	
			D_u	0.4	0.9	1.7	2.6	3.8	5.1	6.7	8.5	10.5	12.7							
			C	40.6	27.1	20.3	16.3	13.6	11.6	10.2	9.0	8.1	7.4						357.31E+3	
			D_c	0.3	0.8	1.3	2.1	3.0	4.1	5.4	6.8	8.4	10.2							
38 x 6	44.7	1,880.00	U	382.6	170.1	95.7	61.3	42.5	31.3	23.9	18.9	15.3	12.7	10.6	9.1				32,260	
			D_u	0.4	0.8	1.4	2.2	3.2	4.3	5.6	7.1	8.8	10.6	12.6	14.8					
			C	58.3	38.9	29.2	23.3	19.5	16.7	14.6	13.0	11.7	10.6	9.7	9.0				614.52E+3	
			D_c	0.3	0.6	1.1	1.8	2.5	3.4	4.5	5.7	7.0	8.5	10.1	11.8					
38 x 10	64.2	2,075.00	U	567.9	252.5	142.1	90.9	63.1	46.4	35.5	28.1	22.7	18.8	15.8	13.5	11.6			47,880	
			D_u	0.4	0.8	1.4	2.2	3.2	4.3	5.6	7.1	8.8	10.6	12.6	14.8	17.2				
			C	86.6	57.7	43.3	34.7	28.9	24.8	21.7	19.3	17.3	15.8	14.4	13.3	12.4			912.17E+3	
			D_c	0.3	0.6	1.1	1.8	2.5	3.4	4.5	5.7	7.0	8.5	10.1	11.8	13.7				
51 x 6	58.1	2,332.00	U	680.1	302.4	170.1	108.9	75.6	55.6	42.5	33.6	27.2	22.5	18.9	16.1	13.9	12.1	10.6	57,350	
			D_u	0.3	0.6	1.1	1.6	2.4	3.2	4.2	5.3	6.6	7.9	9.5	11.1	12.9	14.8	16.8		
			C	103.7	69.2	51.9	41.5	34.6	29.6	25.9	23.1	20.8	18.9	17.3	16.0	14.8	13.8	13.0	1.46E+6	
			D_c	0.2	0.5	0.8	1.3	1.9	2.6	3.4	4.3	5.3	6.4	7.6	8.9	10.3	11.8	13.4		
64 x 6	71.5	2,757.00	U	1,062.7	472.5	265.8	170.2	118.2	86.8	66.5	52.5	42.6	35.2	29.6	25.2	21.7	18.9	16.6	89,610	
			D_u	0.2	0.5	0.8	1.3	1.9	2.6	3.4	4.3	5.3	6.4	7.6	8.9	10.3	11.8	13.4		
			C	162.1	108.1	81.1	64.8	54.0	46.3	40.5	36.0	32.4	29.5	27.0	24.9	23.2	21.6	20.3	2.84E+6	
			D_c	0.2	0.4	0.7	1.1	1.5	2.1	2.7	3.4	4.2	5.1	6.1	7.1	8.2	9.5	10.8		
76 x 6	84.9	3,161.00	U	1,530.2	680.4	382.8	245.0	170.2	125.0	95.7	75.6	61.3	50.6	42.6	36.3	31.3	27.2	23.9	129,030	
			D_u	0.2	0.4	0.7	1.1	1.6	2.1	2.8	3.5	4.4	5.3	6.3	7.4	8.6	9.9	11.2		
			C	233.4	155.6	116.7	93.4	77.8	66.7	58.4	51.9	46.7	42.5	38.9	35.9	33.4	31.1	29.2	4.92E+6	
			D_c	0.1	0.3	0.6	0.9	1.3	1.7	2.2	2.8	3.5	4.2	5.0	5.9	6.9	7.9	9.0		
76 x 10	125.8	3,490.00	U	2,271.4	1,010.0	568.2	363.7	252.6	185.6	142.1	112.3	91.0	75.2	63.2	53.8	46.4	40.4	35.5	191,530	
			D_u	0.2	0.4	0.7	1.1	1.6	2.1	2.8	3.5	4.4	5.3	6.3	7.4	8.6	9.9	11.2		
			C	346.4	231.0	173.3	138.6	115.5	99.0	86.6	77.0	69.3	63.0	57.8	53.3	49.5	46.2	43.3	7.30E+6	
			D_c	0.1	0.3	0.6	0.9	1.3	1.7	2.2	2.8	3.5	4.2	5.0	5.9	6.9	7.9	9.0		

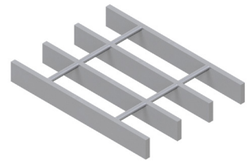
Spans and loads in red exceed a deflection of 6mm for uniform loads of 5kPa. Experience has shown that 6mm deflection is the maximum deflection to give pedestrian comfort, but can be exceeded for other types of loads at the discretion of the specifying professional.

48HW102 (mm)

# of Bars	2	3	4	5	6	7	8	9	10	11
6mm Bars	54	102	150	198	246	294	342	390	438	486
10mm Bars	58	106	154	202	250	298	346	394	442	490
# of Bars	12	13	14	15	16	17	18	19	20	21
6mm Bars	534	582	630	678	726	774	822	870	918	966
10mm Bars	538	586	634	682	730	778	826	874	922	970

LOAD TABLES - WIDE-GAP

Grating Type: 48HW102
Design Code: NAAMM MBG 534-19
Material: ASTM A1011CS Grade 250
Surface: Smooth



U = Safe Uniform Load (kPa)
D_u = Deflection Due to Safe Uniform Load (mm)
C = Safe Concentrated Load (kN/meter of grating width)
D_c = Deflection Due to Safe Concentrated Load (mm)
Allowable Extreme Fiber Stress = 137.9 MPa

Bearing Bar Size (mm)	Approx. Wieght (kg/m²)	Ped. Span (mm)	Load / Deflection	SPAN (mm) 305	457	610	762	915	1067	1219	1372	1524	1677	1829	1981	2134	2286	2438	Section Properties S_x (mm³)/m	I_x (mm⁴)/m
89 x 6	98.3	3,549.00	U	2,082.8	926.1	521.0	333.5	231.6	170.2	130.3	103.0	83.4	68.9	57.9	49.4	42.6	37.1	32.6	175,630	
			D_u	0.2	0.3	0.6	0.9	1.4	1.8	2.4	3.0	3.8	4.5	5.4	6.3	7.4	8.4	9.6		
			C	317.6	211.8	158.9	127.1	105.9	90.8	79.4	70.6	63.6	57.8	53.0	48.9	45.4	42.4	39.7	7.81E+6	
			D_c	0.1	0.3	0.5	0.8	1.1	1.5	1.9	2.4	3.0	3.6	4.3	5.1	5.9	6.8	7.7		
89 x 10	145.7	3,917.00	U	3,091.6	1,374.7	773.4	495.1	343.8	252.6	193.4	152.8	123.8	102.3	86.0	73.3	63.2	55.0	48.4	260700	
			D_u	0.2	0.3	0.6	0.9	1.4	1.8	2.4	3.0	3.8	4.5	5.4	6.3	7.4	8.4	9.6		
			C	471.5	314.4	235.8	188.7	157.2	134.8	117.9	104.8	94.3	85.8	78.6	72.6	67.4	62.9	59.0	11.59E+6	
			D_c	0.1	0.3	0.5	0.8	1.1	1.5	1.9	2.4	3.0	3.6	4.3	5.1	5.9	6.8	7.7		
102 x 6	111.7	3,923.00	U	2,720.4	1,209.6	680.5	435.6	302.5	222.3	170.2	134.5	108.9	90.0	75.6	64.5	55.6	48.4	42.6	229,390	
			D_u	0.1	0.3	0.5	0.8	1.2	1.6	2.1	2.7	3.3	4.0	4.7	5.6	6.4	7.4	8.4		
			C	414.9	276.6	207.5	166.0	138.3	118.6	103.8	92.2	83.0	75.5	69.2	63.9	59.3	55.3	51.9	11.65E+6	
			D_c	0.1	0.2	0.4	0.7	0.9	1.3	1.7	2.1	2.6	3.2	3.8	4.4	5.1	5.9	6.7		
102 x 10	165.6	4,330.00	U	4,038.1	1,795.5	1,010.2	646.6	449.1	329.9	252.6	199.6	161.7	133.6	112.3	95.7	82.5	71.9	63.2	340,500	
			D_u	0.1	0.3	0.5	0.8	1.2	1.6	2.1	2.7	3.3	4.0	4.7	5.6	6.4	7.4	8.4		
			C	615.8	410.6	308.0	246.4	205.4	176.0	154.0	136.9	123.2	112.0	102.7	94.8	88.0	82.2	77.0	17.30E+6	
			D_c	0.1	0.2	0.4	0.7	0.9	1.3	1.7	2.1	2.6	3.2	3.8	4.4	5.1	5.9	6.7		
127 x 10	205.4	5,119.00	U	6,309.5	2,805.4	1,578.4	1,010.3	701.7	515.5	394.7	311.9	252.6	208.8	175.5	149.5	128.9	112.3	98.7	532,030	
			D_u	0.1	0.2	0.4	0.7	0.9	1.3	1.7	2.1	2.6	3.2	3.8	4.4	5.1	5.9	6.7		
			C	962.2	641.6	481.3	385.0	320.9	275.0	240.7	213.9	192.5	175.0	160.5	148.1	137.5	128.4	120.4	33.78E+6	
			D_c	0.1	0.2	0.3	0.5	0.8	1.0	1.3	1.7	2.1	2.5	3.0	3.6	4.1	4.7	5.4		
152 x 10	245.1	5,869.00	U	9,085.6	4,039.8	2,272.9	1,454.8	1,010.4	742.4	568.4	449.1	363.8	300.7	252.7	215.3	185.6	161.7	142.2	766,130	
			D_u	0.1	0.2	0.4	0.5	0.8	1.1	1.4	1.8	2.2	2.6	3.2	3.7	4.3	4.9	5.6		
			C	1,385.6	923.9	693.0	554.4	462.1	396.1	346.6	308.1	277.3	252.1	231.1	213.3	198.0	184.8	173.3	58.38E+6	
			D_c	0.1	0.2	0.3	0.4	0.6	0.9	1.1	1.4	1.8	2.1	2.5	3.0	3.4	3.9	4.5		

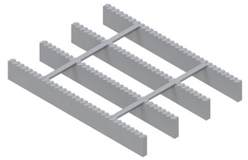
Spans and loads in red exceed a deflection of 6mm for uniform loads of 5kPa. Experience has shown that 6mm deflection is the maximum deflection to give pedestrian comfort, but can be exceeded for other types of loads at the discretion of the specifying professional.

48HW102 (mm)

# of Bars	2	3	4	5	6	7	8	9	10	11
6mm Bars	54	102	150	198	246	294	342	390	438	486
10mm Bars	58	106	154	202	250	298	346	394	442	490
# of Bars	12	13	14	15	16	17	18	19	20	21
6mm Bars	534	582	630	678	726	774	822	870	918	966
10mm Bars	538	586	634	682	730	778	826	874	922	970

LOAD TABLES - WIDE-GAP

Grating Type: 48HW102
Design Code: NAAMM MBG 534-19
Material: ASTM A1011CS Grade 250
Surface: Serrated



U = Safe Uniform Load (kPa)
D_u = Deflection Due to Safe Uniform Load (mm)
C = Safe Concentrated Load (kN/meter of grating width)
D_c = Deflection Due to Safe Concentrated Load (mm)
Allowable Extreme Fiber Stress = 137.9 MPa

Bearing Bar Size (mm)	Approx. Wieght (kg/m²)	Ped. Span (mm)	Load / Deflection	SPAN (mm) 305	457	610	762	915	1067	1219	1372	1524	1677	1829	1981	2134	2286	2438	Section Properties S_x (mm³)/m / I_x (mm⁴)/m
25 x 6	31.3	1,116.00	U	95.1	42.3	23.8	15.2	10.6	7.8	6.0									8,020
			D_u	0.7	1.6	2.8	4.4	6.3	8.6	11.2									
			C	14.5	9.7	7.3	5.8	4.8	4.1	3.6									76.21E+3
			D_c	0.6	1.3	2.2	3.5	5.1	6.9	9.0									
32 x 6	38.1	1,387.00	U	170.0	75.6	42.5	27.2	18.9	13.9	10.6	8.4	6.8							14,340
			D_u	0.5	1.2	2.1	3.3	4.7	6.4	8.4	10.6	13.1							
			C	25.9	17.3	13.0	10.4	8.6	7.4	6.5	5.8	5.2							182.08E+3
			D_c	0.4	0.9	1.7	2.6	3.8	5.2	6.7	8.5	10.5							
38 x 6	44.7	1,638.00	U	264.8	117.8	66.3	42.4	29.5	21.6	16.6	13.1	10.6	8.8						22,330
			D_u	0.4	0.9	1.7	2.6	3.8	5.2	6.7	8.5	10.5	12.7						
			C	40.4	26.9	20.2	16.2	13.5	11.5	10.1	9.0	8.1	7.3						353.95E+3
			D_c	0.3	0.8	1.3	2.1	3.0	4.1	5.4	6.8	8.4	10.2						
38 x 10	64.2	1,808.00	U	393.1	174.8	98.3	62.9	43.7	32.1	24.6	19.4	15.7	13.0	10.9					33,150
			D_u	0.4	0.9	1.7	2.6	3.8	5.2	6.7	8.5	10.5	12.7	15.2					
			C	59.9	40.0	30.0	24.0	20.0	17.1	15.0	13.3	12.0	10.9	10.0					525.39E+3
			D_c	0.3	0.8	1.3	2.1	3.0	4.1	5.4	6.8	8.4	10.2	12.1					
51 x 6	58.1	2,108.00	U	519.5	231.0	130.0	83.2	57.8	42.5	32.5	25.7	20.8	17.2	14.4	12.3	10.6			43,810
			D_u	0.3	0.7	1.2	1.9	2.7	3.7	4.8	6.1	7.5	9.1	10.8	12.7	14.7			
			C	79.2	52.8	39.6	31.7	26.4	22.6	19.8	17.6	15.9	14.4	13.2	12.2	11.3			972.54E+3
			D_c	0.2	0.5	1.0	1.5	2.2	2.9	3.8	4.9	6.0	7.3	8.7	10.2	11.8			
64 x 6	71.5	2,546.00	U	859.2	382.1	215.0	137.6	95.6	70.2	53.8	42.5	34.4	28.4	23.9	20.4	17.6	15.3	13.4	72,450
			D_u	0.2	0.5	0.9	1.5	2.1	2.9	3.7	4.7	5.8	7.1	8.4	9.9	11.5	13.1	15.0	
			C	131.0	87.4	65.5	52.4	43.7	37.5	32.8	29.1	26.2	23.8	21.9	20.2	18.7	17.5	16.4	2.07E+6
			D_c	0.2	0.4	0.7	1.2	1.7	2.3	3.0	3.8	4.7	5.7	6.7	7.9	9.2	10.5	12.0	
76 x 6	84.9	2,960.00	U	1,284.0	570.9	321.2	205.6	142.8	104.9	80.3	63.5	51.4	42.5	35.7	30.4	26.2	22.9	20.1	108,270
			D_u	0.2	0.4	0.8	1.2	1.7	2.3	3.1	3.9	4.8	5.8	6.9	8.1	9.4	10.8	12.2	
			C	195.8	130.6	97.9	78.4	65.3	56.0	49.0	43.5	39.2	35.6	32.7	30.1	28.0	26.1	24.5	3.78E+6
			D_c	0.2	0.3	0.6	1.0	1.4	1.9	2.4	3.1	3.8	4.6	5.5	6.5	7.5	8.6	9.8	
76 x 10	125.8	3,267.00	U	1,905.9	847.4	476.8	305.2	212.0	155.7	119.2	94.2	76.3	63.1	53.0	45.2	38.9	33.9	29.8	160,710
			D_u	0.2	0.4	0.8	1.2	1.7	2.3	3.1	3.9	4.8	5.8	6.9	8.1	9.4	10.8	12.2	
			C	290.6	193.8	145.4	116.3	96.9	83.1	72.7	64.6	58.2	52.9	48.5	44.7	41.5	38.8	36.4	5.61E+6
			D_c	0.2	0.3	0.6	1.0	1.4	1.9	2.4	3.1	3.8	4.6	5.5	6.5	7.5	8.6	9.8	

Spans and loads in red exceed a deflection of 6mm for uniform loads of 5kPa. Experience has shown that 6mm deflection is the maximum deflection to give pedestrian comfort, but can be exceeded for other types of loads at the discretion of the specifying professional.

48HW102 (mm)

# of Bars	2	3	4	5	6	7	8	9	10	11
6mm Bars	54	102	150	198	246	294	342	390	438	486
10mm Bars	58	106	154	202	250	298	346	394	442	490
# of Bars	12	13	14	15	16	17	18	19	20	21
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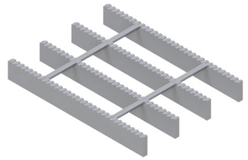
LOAD TABLES - WIDE-GAP

Grating Type: 48HW102
Design Code: NAAMM MBG 534-19
Material: ASTM A1011CS Grade 250
Surface: Serrated



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Allowable Extreme Fiber Stress = 137.9 MPa

Bearing Bar Size (mm)	Approx. Wieght (kg/m²)	Ped. Span (mm)	Load / Deflection	SPAN (mm) 305	457	610	762	915	1067	1219	1372	1524	1677	1829	1981	2134	2286	2438	Section Properties S_x (mm³)/m / I_x (mm⁴)/m
89 x 6	98.3	3,356.00	U	1,793.7	797.5	448.7	287.2	199.5	146.6	112.2	88.7	71.8	59.4	49.9	42.5	36.6	31.9	28.1	151,250
			D_u	0.2	0.4	0.6	1.0	1.5	2.0	2.6	3.3	4.0	4.9	5.8	6.8	7.9	9.1	10.3	
			C	273.5	182.4	136.8	109.5	91.2	78.2	68.4	60.8	54.7	49.8	45.6	42.1	39.1	36.5	34.2	6.24E+6
			D_c	0.1	0.3	0.5	0.8	1.2	1.6	2.1	2.6	3.2	3.9	4.7	5.5	6.3	7.3	8.3	
89 x 10	145.7	3,704.00	U	2,662.5	1,183.9	666.1	426.3	296.1	217.6	166.6	131.6	106.6	88.1	74.0	63.1	54.4	47.4	41.7	224510
			D_u	0.2	0.4	0.6	1.0	1.5	2.0	2.6	3.3	4.0	4.9	5.8	6.8	7.9	9.1	10.3	
			C	406.0	270.7	203.1	162.5	135.4	116.1	101.6	90.3	81.2	73.9	67.7	62.5	58.0	54.2	50.8	9.26E+6
			D_c	0.1	0.3	0.5	0.8	1.2	1.6	2.1	2.6	3.2	3.9	4.7	5.5	6.3	7.3	8.3	
102 x 6	111.7	3,736.00	U	2,388.5	1,062.0	597.5	382.5	265.6	195.2	149.4	118.1	95.6	79.0	66.4	56.6	48.8	42.5	37.4	201,400
			D_u	0.1	0.3	0.6	0.9	1.3	1.7	2.2	2.8	3.5	4.2	5.0	5.9	6.9	7.9	9.0	
			C	364.2	242.9	182.2	145.8	121.5	104.1	91.1	81.0	72.9	66.3	60.7	56.1	52.1	48.6	45.6	9.59E+6
			D_c	0.1	0.3	0.4	0.7	1.0	1.4	1.8	2.3	2.8	3.4	4.0	4.7	5.5	6.3	7.2	
102 x 10	165.6	4,124.00	U	3,545.3	1,576.4	886.9	567.7	394.3	289.7	221.8	175.3	142.0	117.3	98.6	84.0	72.4	63.1	55.5	298,950
			D_u	0.1	0.3	0.6	0.9	1.3	1.7	2.2	2.8	3.5	4.2	5.0	5.9	6.9	7.9	9.0	
			C	540.7	360.5	270.4	216.4	180.3	154.5	135.2	120.2	108.2	98.4	90.2	83.2	77.3	72.1	67.6	14.23E+6
			D_c	0.1	0.3	0.4	0.7	1.0	1.4	1.8	2.3	2.8	3.4	4.0	4.7	5.5	6.3	7.2	
127 x 10	205.4	4,924.00	U	5,689.6	2,529.8	1,423.3	911.0	632.7	464.9	355.9	281.3	227.8	188.3	158.2	134.8	116.2	101.3	89.0	479,760
			D_u	0.1	0.2	0.4	0.7	1.0	1.4	1.8	2.2	2.8	3.3	4.0	4.7	5.4	6.2	7.1	
			C	867.7	578.6	434.0	347.2	289.3	248.0	217.0	192.9	173.6	157.8	144.7	133.6	124.0	115.8	108.5	28.93E+6
			D_c	0.1	0.2	0.4	0.6	0.8	1.1	1.4	1.8	2.2	2.7	3.2	3.7	4.3	5.0	5.7	
152 x 10	245.1	5,683.00	U	8,338.6	3,707.7	2,086.0	1,335.2	927.3	681.3	521.7	412.2	333.9	276.0	231.9	197.6	170.4	148.4	130.5	703,130
			D_u	0.1	0.2	0.4	0.6	0.8	1.1	1.5	1.9	2.3	2.8	3.3	3.9	4.5	5.1	5.8	
			C	1,271.6	847.9	636.0	508.9	424.1	363.5	318.1	282.7	254.5	231.3	212.1	195.7	181.8	169.6	159.1	51.33E+6
			D_c	0.1	0.2	0.3	0.5	0.7	0.9	1.2	1.5	1.8	2.2	2.6	3.1	3.6	4.1	4.7	

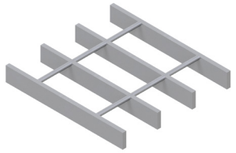
Spans and loads in red exceed a deflection of 6mm for uniform loads of 5kPa. Experience has shown that 6mm deflection is the maximum deflection to give pedestrian comfort, but can be exceeded for other types of loads at the discretion of the specifying professional.

48HW102 (mm)

# of Bars	2	3	4	5	6	7	8	9	10	11
6mm Bars	54	102	150	198	246	294	342	390	438	486
10mm Bars	58	106	154	202	250	298	346	394	442	490
# of Bars	12	13	14	15	16	17	18	19	20	21
6mm Bars	534	582	630	678	726	774	822	870	918	966
10mm Bars	538	586	634	682	730	778	826	874	922	970

LOAD TABLES - EXTRA-WIDE-GAP

Grating Type: 60HW102
Design Code: NAAMM MBG 534-19
Material: ASTM A1011CS Grade 250
Surface: Smooth



U = Safe Uniform Load (kPa)
D_u = Deflection Due to Safe Uniform Load (mm)
C = Safe Concentrated Load (kN/meter of grating width)
D_c = Deflection Due to Safe Concentrated Load (mm)
Allowable Extreme Fiber Stress = 137.9 MPa

Bearing Bar Size (mm)	Approx. Wieght (kg/m²)	Ped. Span (mm)	Load / Deflection	SPAN (mm) 305	457	610	762	915	1067	1219	1372	1524	1677	1829	1981	2134	2286	2438	Section Properties S_x (mm³)/m / I_x (mm⁴)/m
25 x 6	26.2	1,312.00	U	136.0	60.5	34.0	21.8	15.1	11.1	8.5	6.7								11,470
			D_u	0.5	1.2	2.1	3.3	4.7	6.4	8.4	10.6								
			C	20.7	13.8	10.4	8.3	6.9	5.9	5.2	4.6								145.66E+3
			D_c	0.4	0.9	1.7	2.6	3.8	5.2	6.7	8.5								
32 x 6	31.7	1,552.00	U	213.2	94.8	53.3	34.1	23.7	17.4	13.3	10.5	8.5	7.1						17,980
			D_u	0.4	0.9	1.7	2.6	3.8	5.1	6.7	8.5	10.5	12.7						
			C	32.5	21.7	16.3	13.0	10.8	9.3	8.1	7.2	6.5	5.9						285.84E+3
			D_c	0.3	0.8	1.3	2.1	3.0	4.1	5.4	6.8	8.4	10.2						
38 x 6	37.0	1,778.00	U	306.0	136.1	76.6	49.0	34.0	25.0	19.1	15.1	12.3	10.1	8.5					25,810
			D_u	0.4	0.8	1.4	2.2	3.2	4.3	5.6	7.1	8.8	10.6	12.6					
			C	46.7	31.1	23.3	18.7	15.6	13.3	11.7	10.4	9.3	8.5	7.8					491.61E+3
			D_c	0.3	0.6	1.1	1.8	2.5	3.4	4.5	5.7	7.0	8.5	10.1					
38 x 10	52.8	1,962.00	U	454.3	202.0	113.6	72.7	50.5	37.1	28.4	22.5	18.2	15.0	12.6	10.8				38,310
			D_u	0.4	0.8	1.4	2.2	3.2	4.3	5.6	7.1	8.8	10.6	12.6	14.8				
			C	69.3	46.2	34.7	27.7	23.1	19.8	17.3	15.4	13.9	12.6	11.6	10.7				729.74E+3
			D_c	0.3	0.6	1.1	1.8	2.5	3.4	4.5	5.7	7.0	8.5	10.1	11.8				
51 x 6	47.9	2,206.00	U	544.1	241.9	136.1	87.1	60.5	44.5	34.0	26.9	21.8	18.0	15.1	12.9	11.1	9.7		45,880
			D_u	0.3	0.6	1.1	1.6	2.4	3.2	4.2	5.3	6.6	7.9	9.5	11.1	12.9	14.8		
			C	83.0	55.3	41.5	33.2	27.7	23.7	20.8	18.4	16.6	15.1	13.8	12.8	11.9	11.1		1.17E+6
			D_c	0.2	0.5	0.8	1.3	1.9	2.6	3.4	4.3	5.3	6.4	7.6	8.9	10.3	11.8		
64 x 6	58.7	2,608.00	U	850.1	378.0	212.7	136.1	94.5	69.5	53.2	42.0	34.0	28.1	23.6	20.1	17.4	15.1	13.3	71,680
			D_u	0.2	0.5	0.8	1.3	1.9	2.6	3.4	4.3	5.3	6.4	7.6	8.9	10.3	11.8	13.4	
			C	129.6	86.4	64.8	51.9	43.2	37.1	32.4	28.8	25.9	23.6	21.6	20.0	18.5	17.3	16.2	2.28E+6
			D_c	0.2	0.4	0.7	1.1	1.5	2.1	2.7	3.4	4.2	5.1	6.1	7.1	8.2	9.5	10.8	
76 x 6	69.6	2,990.00	U	1,224.2	544.3	306.2	196.0	136.1	100.0	76.6	60.5	49.0	40.5	34.0	29.0	25.0	21.8	19.2	103,230
			D_u	0.2	0.4	0.7	1.1	1.6	2.1	2.8	3.5	4.4	5.3	6.3	7.4	8.6	9.9	11.2	
			C	186.7	124.5	93.4	74.7	62.3	53.4	46.7	41.5	37.4	34.0	31.1	28.7	26.7	24.9	23.4	3.93E+6
			D_c	0.1	0.3	0.6	0.9	1.3	1.7	2.2	2.8	3.5	4.2	5.0	5.9	6.9	7.9	9.0	
76 x 10	103.1	3,300.00	U	1,817.1	808.0	454.6	291.0	202.1	148.5	113.7	89.8	72.8	60.1	50.5	43.1	37.1	32.3	28.4	153,230
			D_u	0.2	0.4	0.7	1.1	1.6	2.1	2.8	3.5	4.4	5.3	6.3	7.4	8.6	9.9	11.2	
			C	277.1	184.8	138.6	110.9	92.4	79.2	69.3	61.6	55.5	50.4	46.2	42.7	39.6	37.0	34.7	5.84E+6
			D_c	0.1	0.3	0.6	0.9	1.3	1.7	2.2	2.8	3.5	4.2	5.0	5.9	6.9	7.9	9.0	

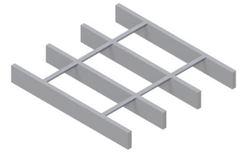
Spans and loads in red exceed a deflection of 6mm for uniform loads of 5kPa. Experience has shown that 6mm deflection is the maximum deflection to give pedestrian comfort, but can be exceeded for other types of loads at the discretion of the specifying professional.

60HW102 (mm)

# of Bars	2	3	4	5	6	7	8	9	10	11
6mm Bars	66	126	186	246	306	366	426	486	546	606
10mm Bars	70	130	190	250	310	370	430	490	550	610
# of Bars	12	13	14	15	16	17	18	19	20	21
6mm Bars	666	726	786	846	906	966	1026	1086	1146	1206
10mm Bars	670	730	790	850	910	970	1030	1090	1150	1210

LOAD TABLES - EXTRA-WIDE-GAP

Grating Type: 60HW102
Design Code: NAAMM MBG 534-19
Material: ASTM A1011CS Grade 250
Surface: Smooth



U = Safe Uniform Load (kPa)
D_u = Deflection Due to Safe Uniform Load (mm)
C = Safe Concentrated Load (kN/meter of grating width)
D_c = Deflection Due to Safe Concentrated Load (mm)
Allowable Extreme Fiber Stress = 137.9 MPa

Bearing Bar Size (mm)	Approx. Wieght (kg/m²)	Ped. Span (mm)	Load / Deflection	SPAN (mm) 305	457	610	762	915	1067	1219	1372	1524	1677	1829	1981	2134	2286	2438	Section Properties S_x (mm³)/m / I_x (mm⁴)/m
89 x 6	80.4	3,356.00	U	1,666.2	740.9	416.8	266.8	185.3	136.1	104.2	82.4	66.7	55.1	46.3	39.5	34.0	29.7	26.1	140,500
			D_u	0.2	0.3	0.6	0.9	1.4	1.8	2.4	3.0	3.8	4.5	5.4	6.3	7.4	8.4	9.6	
			C	254.1	169.4	127.1	101.7	84.7	72.6	63.6	56.5	50.8	46.2	42.4	39.1	36.3	33.9	31.8	6.25E+6
			D_c	0.1	0.3	0.5	0.8	1.1	1.5	1.9	2.4	3.0	3.6	4.3	5.1	5.9	6.8	7.7	
89 x 10	119.2	3,705.00	U	2,473.3	1,099.7	618.7	396.0	275.1	202.1	154.7	122.3	99.0	81.9	68.8	58.6	50.5	44.0	38.7	208560
			D_u	0.2	0.3	0.6	0.9	1.4	1.8	2.4	3.0	3.8	4.5	5.4	6.3	7.4	8.4	9.6	
			C	377.2	251.5	188.7	150.9	125.8	107.8	94.3	83.9	75.5	68.6	62.9	58.1	53.9	50.3	47.2	9.27E+6
			D_c	0.1	0.3	0.5	0.8	1.1	1.5	1.9	2.4	3.0	3.6	4.3	5.1	5.9	6.8	7.7	
102 x 6	91.3	3,710.00	U	2,176.3	967.7	544.4	348.5	242.0	177.8	136.2	107.6	87.1	72.0	60.5	51.6	44.5	38.7	34.1	183,510
			D_u	0.1	0.3	0.5	0.8	1.2	1.6	2.1	2.7	3.3	4.0	4.7	5.6	6.4	7.4	8.4	
			C	331.9	221.3	166.0	132.8	110.7	94.9	83.0	73.8	66.4	60.4	55.3	51.1	47.4	44.3	41.5	9.32E+6
			D_c	0.1	0.2	0.4	0.7	0.9	1.3	1.7	2.1	2.6	3.2	3.8	4.4	5.1	5.9	6.7	
102 x 10	135.3	4,095.00	U	3,230.5	1,436.4	808.1	517.3	359.3	264.0	202.1	159.7	129.4	106.9	89.8	76.5	66.0	57.5	50.6	272,400
			D_u	0.1	0.3	0.5	0.8	1.2	1.6	2.1	2.7	3.3	4.0	4.7	5.6	6.4	7.4	8.4	
			C	492.6	328.5	246.4	197.1	164.3	140.8	123.2	109.5	98.6	89.6	82.2	75.8	70.4	65.7	61.6	13.84E+6
			D_c	0.1	0.2	0.4	0.7	0.9	1.3	1.7	2.1	2.6	3.2	3.8	4.4	5.1	5.9	6.7	
127 x 10	167.5	4,841.00	U	5,047.6	2,244.3	1,262.7	808.2	561.3	412.4	315.8	249.5	202.1	167.0	140.4	119.6	103.1	89.8	79.0	425,630
			D_u	0.1	0.2	0.4	0.7	0.9	1.3	1.7	2.1	2.6	3.2	3.8	4.4	5.1	5.9	6.7	
			C	769.8	513.3	385.0	308.0	256.7	220.0	192.5	171.1	154.0	140.0	128.4	118.5	110.0	102.7	96.3	27.03E+6
			D_c	0.1	0.2	0.3	0.5	0.8	1.0	1.3	1.7	2.1	2.5	3.0	3.6	4.1	4.7	5.4	
152 x 10	199.7	5,550.00	U	7,268.5	3,231.9	1,818.3	1,163.9	808.3	593.9	454.7	359.3	291.0	240.5	202.1	172.2	148.5	129.4	113.8	612,900
			D_u	0.1	0.2	0.4	0.5	0.8	1.1	1.4	1.8	2.2	2.6	3.2	3.7	4.3	4.9	5.6	
			C	1,108.4	739.1	554.4	443.6	369.6	316.8	277.2	246.4	221.8	201.6	184.8	170.6	158.4	147.9	138.7	46.70E+6
			D_c	0.1	0.2	0.3	0.4	0.6	0.9	1.1	1.4	1.8	2.1	2.5	3.0	3.4	3.9	4.5	

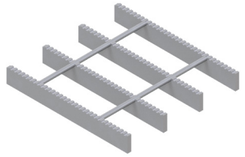
Spans and loads in red exceed a deflection of 6mm for uniform loads of 5kPa. Experience has shown that 6mm deflection is the maximum deflection to give pedestrian comfort, but can be exceeded for other types of loads at the discretion of the specifying professional.

60HW102 (mm)

# of Bars	2	3	4	5	6	7	8	9	10	11
6mm Bars	66	126	186	246	306	366	426	486	546	606
10mm Bars	70	130	190	250	310	370	430	490	550	610
# of Bars	12	13	14	15	16	17	18	19	20	21
6mm Bars	666	726	786	846	906	966	1026	1086	1146	1206
10mm Bars	670	730	790	850	910	970	1030	1090	1150	1210

LOAD TABLES - EXTRA-WIDE-GAP

Grating Type: 60HW102
Design Code: NAAMM MBG 534-19
Material: ASTM A1011CS Grade 250
Surface: Serrated



U = Safe Uniform Load (kPa)
D_u = Deflection Due to Safe Uniform Load (mm)
C = Safe Concentrated Load (kN/meter of grating width)
D_c = Deflection Due to Safe Concentrated Load (mm)
Allowable Extreme Fiber Stress = 137.9 MPa

Bearing Bar Size (mm)	Approx. Wieght (kg/m²)	Ped. Span (mm)	Load / Deflection	SPAN (mm) 305	457	610	762	915	1067	1219	1372	1524	1677	1829	1981	2134	2286	2438	Section Properties S_x (mm³)/m / I_x (mm⁴)/m
25 x 6	26.2	1,055.00	U	76.1	33.8	19.0	12.2	8.5	6.2										6,420
			D_u	0.7	1.6	2.8	4.4	6.3	8.6										
			C	11.6	7.7	5.8	4.6	3.9	3.3										60.97E+3
			D_c	0.6	1.3	2.2	3.5	5.1	6.9										
32 x 6	31.7	1,312.00	U	136.0	60.5	34.0	21.8	15.1	11.1	8.5	6.7								11,470
			D_u	0.5	1.2	2.1	3.3	4.7	6.4	8.4	10.6								
			C	20.7	13.8	10.4	8.3	6.9	5.9	5.2	4.6								145.66E+3
			D_c	0.4	0.9	1.7	2.6	3.8	5.2	6.7	8.5								
38 x 6	37.0	1,549.00	U	211.9	94.2	53.0	33.9	23.6	17.3	13.3	10.5	8.5	7.0						17,870
			D_u	0.4	0.9	1.7	2.6	3.8	5.2	6.7	8.5	10.5	12.7						
			C	32.3	21.5	16.2	12.9	10.8	9.2	8.1	7.2	6.5	5.9						283.16E+3
			D_c	0.3	0.8	1.3	2.1	3.0	4.1	5.4	6.8	8.4	10.2						
38 x 10	52.8	1,710.00	U	314.5	139.8	78.7	50.4	35.0	25.7	19.7	15.5	12.6	10.4	8.7					26,520
			D_u	0.4	0.9	1.7	2.6	3.8	5.2	6.7	8.5	10.5	12.7	15.2					
			C	48.0	32.0	24.0	19.2	16.0	13.7	12.0	10.7	9.6	8.7	8.0					420.31E+3
			D_c	0.3	0.8	1.3	2.1	3.0	4.1	5.4	6.8	8.4	10.2	12.1					
51 x 6	47.9	1,994.00	U	415.6	184.8	104.0	66.6	46.2	34.0	26.0	20.5	16.6	13.8	11.6	9.8	8.5			35,050
			D_u	0.3	0.7	1.2	1.9	2.7	3.7	4.8	6.1	7.5	9.1	10.8	12.7	14.7			
			C	63.4	42.3	31.7	25.4	21.1	18.1	15.9	14.1	12.7	11.5	10.6	9.8	9.1			778.03E+3
			D_c	0.2	0.5	1.0	1.5	2.2	2.9	3.8	4.9	6.0	7.3	8.7	10.2	11.8			
64 x 6	58.7	2,408.00	U	687.4	305.6	172.0	110.1	76.4	56.2	43.0	34.0	27.5	22.7	19.1	16.3	14.0	12.2	10.8	57,960
			D_u	0.2	0.5	0.9	1.5	2.1	2.9	3.7	4.7	5.8	7.1	8.4	9.9	11.5	13.1	15.0	
			C	104.8	69.9	52.4	41.9	35.0	30.0	26.2	23.3	21.0	19.1	17.5	16.1	15.0	14.0	13.1	1.65E+6
			D_c	0.2	0.4	0.7	1.2	1.7	2.3	3.0	3.8	4.7	5.7	6.7	7.9	9.2	10.5	12.0	
76 x 6	69.6	2,800.00	U	1,027.2	456.7	257.0	164.5	114.2	83.9	64.3	50.8	41.1	34.0	28.6	24.3	21.0	18.3	16.1	86,610
			D_u	0.2	0.4	0.8	1.2	1.7	2.3	3.1	3.9	4.8	5.8	6.9	8.1	9.4	10.8	12.2	
			C	156.6	104.5	78.3	62.7	52.2	44.8	39.2	34.8	31.3	28.5	26.1	24.1	22.4	20.9	19.6	3.02E+6
			D_c	0.2	0.3	0.6	1.0	1.4	1.9	2.4	3.1	3.8	4.6	5.5	6.5	7.5	8.6	9.8	
76 x 10	103.1	3,090.00	U	1,524.7	677.9	381.4	244.1	169.6	124.6	95.4	75.4	61.1	50.5	42.4	36.1	31.2	27.1	23.9	128,570
			D_u	0.2	0.4	0.8	1.2	1.7	2.3	3.1	3.9	4.8	5.8	6.9	8.1	9.4	10.8	12.2	
			C	232.5	155.0	116.3	93.0	77.5	66.5	58.2	51.7	46.5	42.3	38.8	35.8	33.2	31.0	29.1	4.49E+6
			D_c	0.2	0.3	0.6	1.0	1.4	1.9	2.4	3.1	3.8	4.6	5.5	6.5	7.5	8.6	9.8	

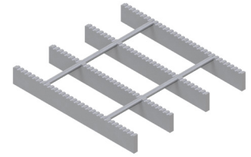
Spans and loads in red exceed a deflection of 6mm for uniform loads of 5kPa. Experience has shown that 6mm deflection is the maximum deflection to give pedestrian comfort, but can be exceeded for other types of loads at the discretion of the specifying professional.

60HW102 (mm)

# of Bars	2	3	4	5	6	7	8	9	10	11
6mm Bars	66	126	186	246	306	366	426	486	546	606
10mm Bars	70	130	190	250	310	370	430	490	550	610
# of Bars	12	13	14	15	16	17	18	19	20	21
6mm Bars	666	726	786	846	906	966	1026	1086	1146	1206
10mm Bars	670	730	790	850	910	970	1030	1090	1150	1210

LOAD TABLES - EXTRA-WIDE-GAP

Grating Type: 60HW102
Design Code: NAAMM MBG 534-19
Material: ASTM A1011CS Grade 250
Surface: Serrated



U = Safe Uniform Load (kPa)
D_u = Deflection Due to Safe Uniform Load (mm)
C = Safe Concentrated Load (kN/meter of grating width)
D_c = Deflection Due to Safe Concentrated Load (mm)
Allowable Extreme Fiber Stress = 137.9 MPa

Bearing Bar Size (mm)	Approx. Wieght (kg/m²)	Ped. Span (mm)	Load / Deflection	SPAN (mm) 305	457	610	762	915	1067	1219	1372	1524	1677	1829	1981	2134	2286	2438	Section Properties S_x (mm³)/m / I_x (mm⁴)/m
89 x 6	80.4	3,173.00	U	1,435.0	638.0	359.0	229.8	159.6	117.2	89.8	70.9	57.5	47.5	39.9	34.0	29.3	25.5	22.5	121,000
			D_u	0.2	0.4	0.6	1.0	1.5	2.0	2.6	3.3	4.0	4.9	5.8	6.8	7.9	9.1	10.3	
			C	218.8	145.9	109.5	87.6	73.0	62.6	54.7	48.7	43.8	39.8	36.5	33.7	31.3	29.2	27.4	4.99E+6
			D_c	0.1	0.3	0.5	0.8	1.2	1.6	2.1	2.6	3.2	3.9	4.7	5.5	6.3	7.3	8.3	
89 x 10	119.2	3,503.00	U	2,130.0	947.1	532.9	341.1	236.9	174.0	133.3	105.3	85.3	70.5	59.2	50.5	43.5	37.9	33.3	179610
			D_u	0.2	0.4	0.6	1.0	1.5	2.0	2.6	3.3	4.0	4.9	5.8	6.8	7.9	9.1	10.3	
			C	324.8	216.6	162.5	130.0	108.3	92.9	81.2	72.2	65.0	59.1	54.2	50.0	46.4	43.3	40.6	7.41E+6
			D_c	0.1	0.3	0.5	0.8	1.2	1.6	2.1	2.6	3.2	3.9	4.7	5.5	6.3	7.3	8.3	
102 x 6	91.3	3,533.00	U	1,910.8	849.6	478.0	306.0	212.5	156.1	119.5	94.5	76.5	63.2	53.1	45.3	39.0	34.0	29.9	161,120
			D_u	0.1	0.3	0.6	0.9	1.3	1.7	2.2	2.8	3.5	4.2	5.0	5.9	6.9	7.9	9.0	
			C	291.4	194.3	145.7	116.6	97.2	83.3	72.9	64.8	58.3	53.0	48.6	44.9	41.7	38.9	36.5	7.67E+6
			D_c	0.1	0.3	0.4	0.7	1.0	1.4	1.8	2.3	2.8	3.4	4.0	4.7	5.5	6.3	7.2	
102 x 10	135.3	3,900.00	U	2,836.3	1,261.1	709.5	454.2	315.4	231.8	177.4	140.2	113.6	93.9	78.9	67.2	57.9	50.5	44.4	239,160
			D_u	0.1	0.3	0.6	0.9	1.3	1.7	2.2	2.8	3.5	4.2	5.0	5.9	6.9	7.9	9.0	
			C	432.5	288.4	216.3	173.1	144.2	123.6	108.2	96.2	86.6	78.7	72.1	66.6	61.8	57.7	54.1	11.38E+6
			D_c	0.1	0.3	0.4	0.7	1.0	1.4	1.8	2.3	2.8	3.4	4.0	4.7	5.5	6.3	7.2	
127 x 10	167.5	4,657.00	U	4,551.7	2,023.8	1,138.7	728.8	506.2	371.9	284.8	225.0	182.3	150.6	126.6	107.9	93.0	81.0	71.2	383,810
			D_u	0.1	0.2	0.4	0.7	1.0	1.4	1.8	2.2	2.8	3.3	4.0	4.7	5.4	6.2	7.1	
			C	694.1	462.9	347.2	277.8	231.5	198.4	173.6	154.3	138.9	126.3	115.8	106.8	99.2	92.6	86.8	23.14E+6
			D_c	0.1	0.2	0.4	0.6	0.8	1.1	1.4	1.8	2.2	2.7	3.2	3.7	4.3	5.0	5.7	
152 x 10	199.7	5,375.00	U	6,670.9	2,966.1	1,668.8	1,068.2	741.9	545.1	417.3	329.8	267.1	220.8	185.5	158.1	136.3	118.7	104.4	562,510
			D_u	0.1	0.2	0.4	0.6	0.8	1.1	1.5	1.9	2.3	2.8	3.3	3.9	4.5	5.1	5.8	
			C	1,017.3	678.4	508.8	407.1	339.3	290.8	254.5	226.2	203.6	185.1	169.6	156.6	145.4	135.7	127.3	41.06E+6
			D_c	0.1	0.2	0.3	0.5	0.7	0.9	1.2	1.5	1.8	2.2	2.6	3.1	3.6	4.1	4.7	

Spans and loads in red exceed a deflection of 6mm for uniform loads of 5kPa. Experience has shown that 6mm deflection is the maximum deflection to give pedestrian comfort, but can be exceeded for other types of loads at the discretion of the specifying professional.

60HW102 (mm)

# of Bars	2	3	4	5	6	7	8	9	10	11
6mm Bars	66	126	186	246	306	366	426	486	546	606
10mm Bars	70	130	190	250	310	370	430	490	550	610
# of Bars	12	13	14	15	16	17	18	19	20	21
6mm Bars	666	726	786	846	906	966	1026	1086	1146	1206
10mm Bars	670	730	790	850	910	970	1030	1090	1150	1210

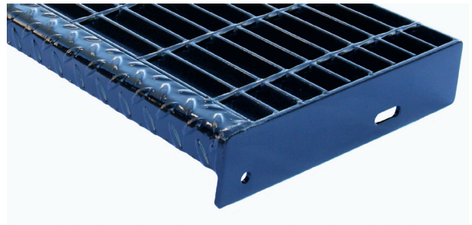
Welded steel stair treads are the most widely used for their strength and ease of installation and are universally used in most industrial and commercial applications. Both can be ordered with a serrated surface for additional safety.

Rectangular bar stair treads provide a high strength and stiffness-to-weight ratio and are available with a serrated surface when additional safety is required.

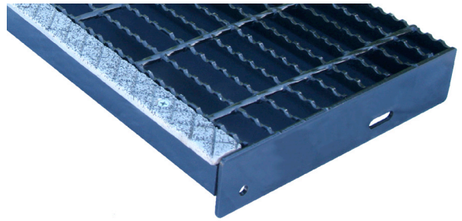
All stair treads are custom fabricated to meet the size, width and length specifications of a particular job. In addition, end plates can be custom fabricated to meet special bolt hole size or location requirements.

Steel nosings are available to add strength at the point of greatest impact and provide a definitive visible edge for extra safety. Choose our checkered plate nosing for normal use.

Stair Tread Types



Checker Plate Nosing (CP)



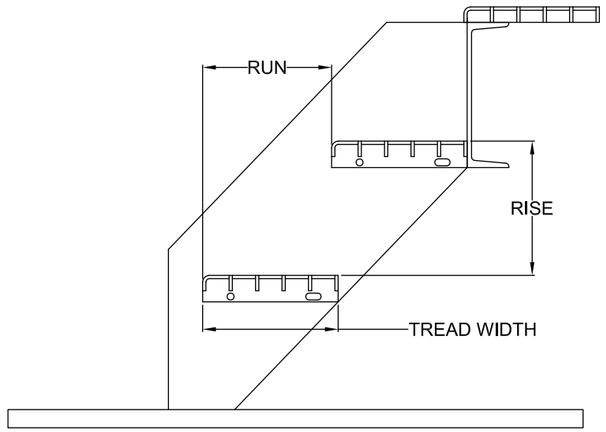
Cast Aluminum Abrasive Nosing (CAA)

Standard Sizes

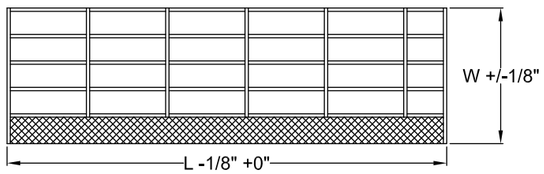
Bearing Bars: 1” x 3⁄16”, 1-1⁄4” x 3⁄16”, 1-1⁄2” x 3⁄16”
Widths: 9-3⁄4”, 10-15⁄16”, 12-1⁄8”
Lengths: 30”, 36”

All standard sizes available in painted and galvanized finishes.
Custom sizes can be provided also per the dimensions shown in the tables on p. 91.

Stair Tread Tolerances and Details



Typical Stair Tread Stringer Detail



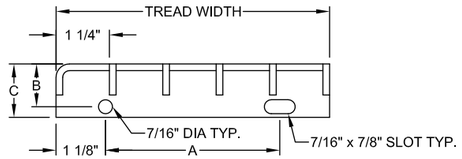
Tread Length and Width Tolerance

End Plate Dimensions

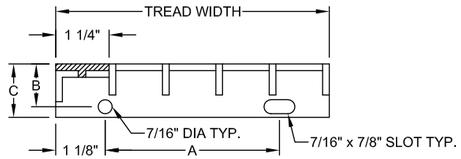
Grating Depth	“B” Dimension	“C” Dimension
up to 1-1⁄4”	1-3⁄4”	2-1⁄2”
1-1⁄2”	2-1⁄4”	3”

See Tread Width and Bolt Hole Spacing for “A” Dimension

CHECKER PLATE NOSING



CAST ALUMINUM ABRASIVE NOSING



Tread Width and Bolt Hole Spacing

19W4

No. of Bearing Bars and Nosing	Bearing Bar 3⁄16”	**Bolt Hole Spacing “A”
	Tread Width	
5	6-3⁄16”	2-1⁄2”
6	7-3⁄8”	4-1⁄2”
7	8-9⁄16”	4-1⁄2”
8	9-3⁄4”	7”
9	10-15⁄16”	7”
10	12-1⁄8”	7”

**See Drawing Above

11W4

No. of Bearing Bars and Nosing	Bearing Bar 3⁄16”	**Bolt Hole Spacing “A”
	Tread Width	
9	6-15⁄16”	2-1⁄2”
11	8-5⁄16”	4-1⁄2”
13	8-9⁄16”	4-1⁄2”
15	11-1⁄16”	7”
16	11-3⁄4”	7”
18	13-1⁄8”	7”

**See Drawing Above

Maximum Tread Length (in)

Bar Size (in)	Smooth			Serrated		
	19W4	11W4	7W4	19W4	11W4	7W4
1 x 3⁄16	41	51	59	34	45	51
1¼ x 3⁄16	56	66	66	50	58	66
1½ x 3⁄16	66	66	76	63	66	68

Data Created Based on NAAMM 531-17:
1. 300-lb point load at center, loading only first five bars, up to 5‘-6”.
2. 300-lb point loads at third-points, loading only first five bars, when > 5‘-6”.
3. L/240 deflection limit on both.

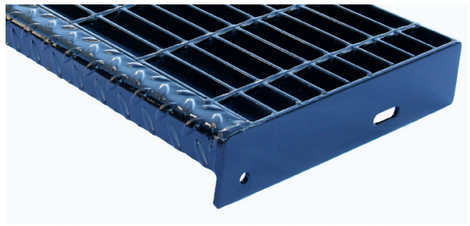
Welded steel stair treads are the most widely used for their strength and ease of installation and are universally used in most industrial and commercial applications. Both can be ordered with a serrated surface for additional safety.

Rectangular bar stair treads provide a high strength and stiffness-to-weight ratio and are available with a serrated surface when additional safety is required.

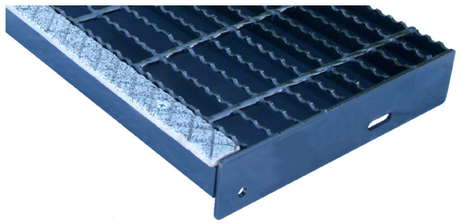
All stair treads are custom fabricated to meet the size, width and length specifications of a particular job. In addition, end plates can be custom fabricated to meet special bolt hole size or location requirements.

Steel nosings are available to add strength at the point of greatest impact and provide a definitive visible edge for extra safety. Choose our checkered plate nosing for normal use.

Stair Tread Types



Checker Plate Nosing (CP)



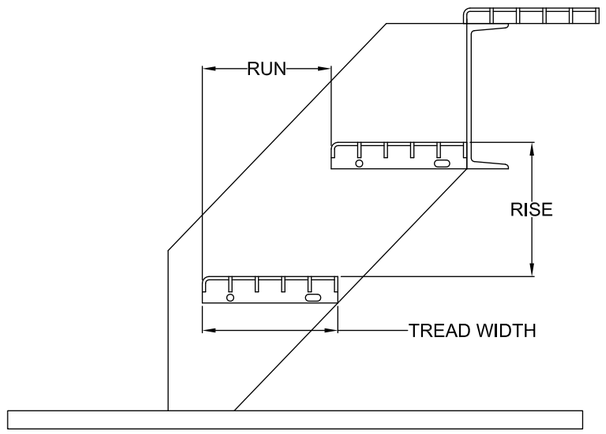
Cast Aluminum Abrasive Nosing (CAA)

Standard Sizes

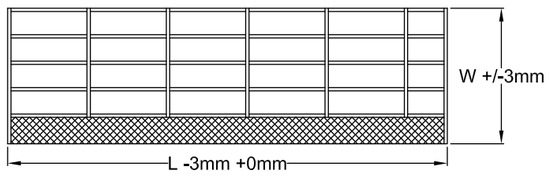
Bearing Bars: 25mm x 5mm, 32mm x 5mm, 38mm x 5mm
Widths: 248mm, 278mm, 308mm
Lengths: 762mm, 914mm

All standard sizes available in painted and galvanized finishes.
Custom sizes can be provided also per the dimensions shown in the tables on p. 93.

Stair Tread Tolerances and Details



Typical Stair Tread Stringer Detail



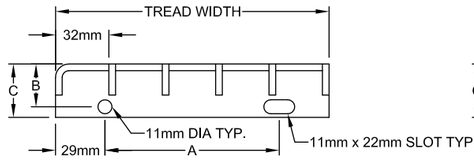
Tread Length and Width Tolerance

End Plate Dimensions

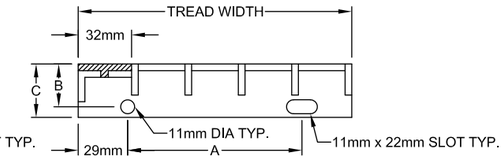
Grating Depth	"B" Dimension	"C" Dimension
up to 32m	44mm	64mm
38mm	57mm	76mm

See Tread Width and Bolt Hole Spacing for "A" Dimension

CHECKER PLATE NOSING



CAST ALUMINUM ABRASIVE NOSING



Tread Width and Bolt Hole Spacing

19W4

No. of Bearing Bars and Nosing	Bearing Bar 5mm	**Bolt Hole Spacing "A"
Tread Width		
5	157mm	64mm
6	187mm	115mm
7	217mm	115mm
8	248mm	178mm
9	278mm	178mm
10	308mm	178mm

**See Drawing Above

11W4

No. of Bearing Bars and Nosing	Bearing Bar 5mm	**Bolt Hole Spacing "A"
Tread Width		
9	176mm	64mm
11	211mm	115mm
13	217mm	115mm
15	281mm	178mm
16	298mm	178mm
18	333mm	178mm

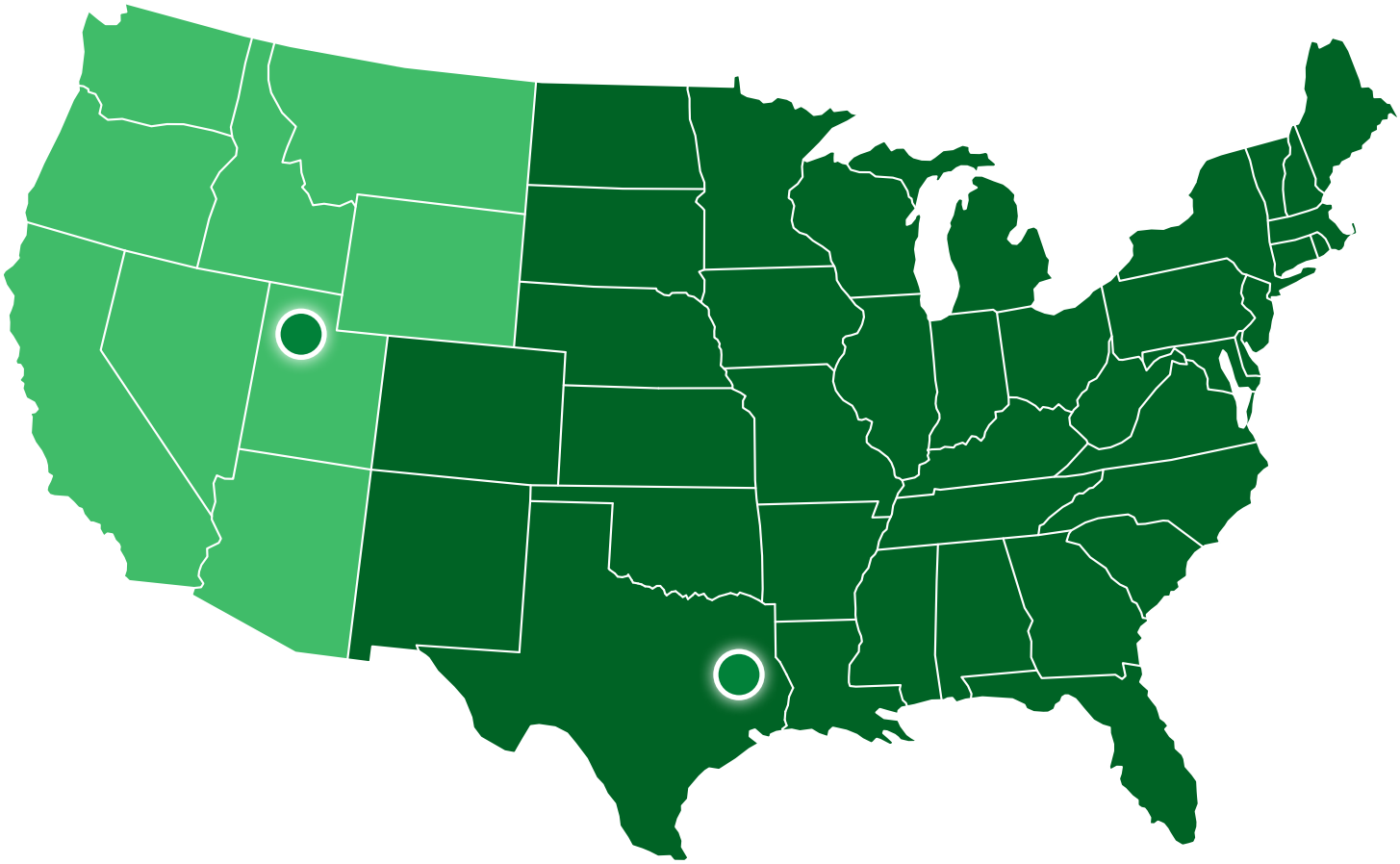
**See Drawing Above

Maximum Tread Length (mm)

Bar Size (mm)	Smooth			Serrated		
	19W4	11W4	7W4	19W4	11W4	7W4
25 x 5	1041	1295	1498	863	1143	1295
32 x 5	1422	1676	1676	1270	1473	1676
38 x 5	1676	1676	1930	1600	1676	1727

Data Created Based on NAAMM 531-17:
1. 1.32kN point load at center, loading only first five bars, up to 1.7m.
2. 1.32kN point loads at third-points, loading only first five bars, when > 1.7m.
3. L/240 deflection limit on both.

Vulcraft Grating Plant Locations



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