PERFORMANCE TEST REPORT

Rendered to:

NAAMM
(NATIONAL ASSOCIATION OF ARCHITECTURAL METAL MANUFACTURERS)

PRODUCT: Metal Bar Gratings

TYPES: Steel & Aluminum (Plain & Serrated)

Report No.:	**E5221.01-106-31**
Report Date:	**06/02/15**
Report Revision Date:	**07/09/15**
Test Record Retention Date:	**03/30/19**

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PERFORMANCE TEST REPORT

Rendered to:

NAAMM
(NATIONAL ARCHITECTURAL ASSOCIATION OF METAL MANUFACTURERS)
800 Roosevelt Rd, Building C-312
Glen Ellyn, Illinois 60137

Report No.:	E5221.01-106-31
Test Dates:	03/27/15
Through:	03/30/15
Report Date:	06/02/15
Report Revision Date:	07/09/15
Test Record Retention Date:	03/30/19

Product: Metal Bar Gratings

Types: Steel & Aluminum (Plain & Serrated)

Project Summary: Architectural Testing, Inc., an Intertek company, ("Intertek-ATI"), was contracted by NAAMM to evaluate the load performance of their metal bar gratings.

Test Methods: The test specimens were evaluated in accordance with Load Test Procedures for MGB 531 Grating Treads, Third Edition, with the following procedure steps:

Part 1 - MGB 531 Loading

Apply a pre-load of 50lbs at mid-span. For treads over 5'-6", apply 25lbs at the third points of the span. Re- set gage to zero. Apply additional load of 300lbs at mid-span. For treads over 5'-6", apply additional loads of 300lbs at the third points of the span. Load(s) to be applied using a footprint area of 1" x 5" oriented with the long side perpendicular to the long direction of the tread. Place the 1" end of the footprint at the front edge of the tread nosing. Deflection recorded at mid-span and results compared to the value of L/240 of the span.

Part 2 - IBC Loading

Apply a load of 533lbs using a 2" x 2" footprint at four (4) specified locations along the tread.

Position 1 - Edge of the nosing at mid-span.
Position 2 - At mid-span, position the load just inside the nosing such that it straddles the second bearing bar inside the nosing
Position 3 - At least 5" inside the nosing, where alternate bearing bars are not welded. Apply the load on the first un-welded bar at mid-span.
Position 4 - On the same bar as position 3, except, that the load is applied on the un-welded bearing bar at the face of the carrier plate. Apply the load to the bar. Results recorded as pass or failure.

Test Methods: (Continued)

Part 3 - 29 CFR 1910.24(c) Loading

Shear - Load to be applied using a footprint area of 1" x 5" oriented with the long side perpendicular to the long direction of the tread. Place 1" end of the footprint at the front edge of the tread nosing 1/2" from the carrier plate at one end of the tread. Apply load per tread as specified in the loading table below. Results recorded as pass or failure.

Moment - Load to be applied using a footprint area of 1" x 5" oriented with the long side perpendicular to the long direction of the tread. Place 1" end of the footprint at the front edge of the tread at mid-span. Apply load per tread as specified in the loading table below. Results recorded as pass or failure.

Loading Table for Part 3		
Span	**Shear (lb_f)**	**Moment (lb_f)**
48" or less	1000	1000
50" or 51"	1063	1063
56"	1167	1167
63"	1313	1313
66"	1375	1375
72"	1500	1500
78"	1625	1625
100"	2084	2084
107"	2230	2230

Product Description: NAAMM suppliers shipped a total of 56 metal bar gratings (44 steel and 12 aluminum) to Intertek-ATI. Samples from each supplier were separated in to 4 categories as outlined by NAAMM based on size and test procedures. Each category to be tested contained 14 various size specimens from 31"-107".

Test Procedure: A flat platen was fabricated by Intertek-ATI and supported with industrial stands to meet the apparatus test requirements of being capable of supporting the largest span tread to be tested. The platen was placed on a Satec Universal Testing Machine (Y002011) to allow for specimens to be fully supported and level during testing. One of each size tread, from each category, was loaded and tested at a computer controlled rate to meet the maximum loads required for the requested MBG Loading Procedures.

Test Results: The results are reported in the following tables.

Part 1 Procedure: MBG 531 Loading					
Grating Treads					
Specimen	**Measurements (in)**		**Deflection**	**L/240 Value**	**Pass/Fail**
	Length	**Depth**			
A1	41.00	1.00	0.03	0.17	Pass
B2	34.00	1.00	0.08	0.14	Pass
C1	56.00	1.25	0.20	0.23	Pass
D1	50.00	1.25	0.21	0.21	Pass
E1	66.00	1.50	0.20	0.28	Pass
F1-F&L	63.00	1.50	0.19	0.26	Pass
F1-Harsco	78.00	2.00	0.26	0.32	Pass
G1	72.00	2.00	0.26	0.30	Pass
H1	107.00	2.50	0.05	0.45	Pass
I1	100.00	2.50	0.27	0.42	Pass
J1	34.00	1.25	0.14	0.14	Pass
K1	31.00	1.25	0.12	0.13	Pass
L1	51.00	1.75	0.20	0.21	Pass
M1	46.00	1.75	0.17	0.19	Pass

Test Results: (Continued)

Part 2 Procedure: IBC Loading						
Grating Treads				Test Position	Peak Load (lbf)	Pass/Fail
Specimen	Type	Measurements (in)				
		Length	Depth			
A2	Steel	41	1.00	1	533	Pass
				2	533	Pass
				3	533	Pass
				4	533	Pass
B2	Steel	34	1.00	1	533	Pass
				2	533	Pass
				3	533	Pass
				4	533	Pass
C2	Steel	56	1.25	1	533	Pass
				2	533	Pass
				3	533	Pass
				4	533	Pass
D2	Steel	50	1.25	1	533	Pass
				2	533	Pass
				3	533	Pass
				4	533	Pass
E2	Steel	66	1.50	1	533	Pass
				2	533	Pass
				3	533	Pass
				4	533	Pass

Test Results: (Continued)

Part 2 Procedure: **IBC Loading** (Continued)						
Grating Treads				**Test Position**	**Peak Load (lbf)**	**Pass/Fail**
Specimen	**Type**	**Measurements (in)**				
		Length	**Depth**			
F2-F&L	Steel	63	1.50	1	533	Pass
				2	533	Pass
				3	533	Pass
				4	533	Pass
F2-Harsco	Steel	78	2.00	1	533	Pass
				2	533	Pass
				3	533	Pass
				4	533	Pass
G2	Steel	72	2.00	1	533	Pass
				2	533	Pass
				3	533	Pass
				4	533	Pass
H2	Steel	107	2.50	1	533	Pass
				2	533	Pass
				3	533	Pass
				4	533	Pass
I2	Steel	100	2.50	1	533	Pass
				2	533	Pass
				3	533	Pass
				4	533	Pass

Test Results: (Continued)

Part 2 Procedure: **IBC Loading** (Continued)						
Grating Treads				**Test Position**	**Peak Load (lbf)**	**Pass/Fail**
Specimen	**Type**	**Measurements (in)**				
		Length	**Depth**			
J2	Aluminum	34	1.25	1	533	Pass
				2	533	Pass
				3	533	Pass
				4	533	Pass
K2	Aluminum	31	1.25	1	533	Pass
				2	533	Pass
				3	533	Pass
				4	533	Pass
L2	Aluminum	51	1.75	1	533	Pass
				2	533	Pass
				3	533	Pass
				4	533	Pass
M2	Aluminum	46	1.75	1	533	Pass
				2	533	Pass
				3	533	Pass
				4	533	Pass

Test Results: (Continued)

Procedure 3 - 29 CFR 1910.24 (c) Shear Loading					
Grating Treads		Measurements		Load (lbf)	Pass/Fail
Specimen	Type	Length	Depth		
A3S	Steel	41	1	1000	Pass
B3S	Steel	34	1	1000	Pass
C3S	Steel	56	1.25	1167	Pass
D3S	Steel	50	1.25	1063	Pass
E3S	Steel	66	1.5	1375	Pass
F3S-F&L	Steel	63	1.5	1313	Pass
F3S-Harsco	Steel	78	2	1625	Pass
G3S	Steel	72	2	1500	Pass
H3S	Steel	107	2.5	2230	Pass
I3S	Steel	100	2.5	2084	Pass
J3S	Aluminum	34	1.25	1000	Pass
K3S	Aluminum	31	1.25	1000	Pass
L3S	Aluminum	51	1.75	1063	Pass
M3S	Aluminum	46	1.75	1000	Pass

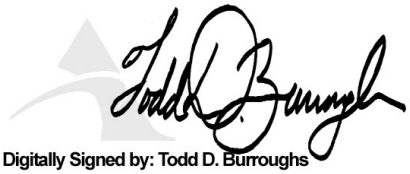
Procedure 3 - 29 CFR 1910.24 (c) Moment Loading					
Grating Treads		Measurements (in)		Load (lbf)	Pass/Fail
Specimen	Type	Length	Depth		
A3M	Steel	41	1	1000	Pass
B3M	Steel	34	1	1000	Pass
C3M	Steel	56	1.25	1167	Pass
D3M	Steel	50	1.25	1063	Pass
E3M	Steel	66	1.5	1375	Pass
F3M-F&L	Steel	63	1.5	1313	Pass
F3M-Harsco	Steel	78	2	1625	Pass
G3M	Steel	72	2	1500	Pass
H3M	Steel	107	2.5	2230	Pass
I3M	Steel	100	2.5	2084	Pass
J3M	Aluminum	34	1.25	1000	Pass
K3M	Aluminum	31	1.25	1000	Pass
L3M	Aluminum	51	1.75	1063	Pass
M3M	Aluminum	46	1.75	1000	Pass

Intertek-ATI will service this report for the entire test record retention period. Test records that are retained such as detailed drawings, datasheets, representative samples of test specimens, or other pertinent project documentation will be retained by Intertek-ATI for the entire test record retention period.

Results obtained are tested values and were secured by using the designated tested methods. This report does not constitute certification of this product nor an opinion or endorsement by this laboratory. It is the exclusive property of the client so named herein and relates only to specimens tested. This report may not be reproduced, except in full, without the written approval of Intertek-ATI.

For INTERTEK-ATI:

Erik Scallorn
Technician
Components / Materials Testing



Todd D. Burroughs
Project Development Coordinator
Components / Materials Testing

ES:gh/kf

Attachments (pages) This report is complete only when all attachments listed are included.
Appendix A - Photographs (6)

Revision Log

Rev. #	Date	Page(s)	Revision(s)
0	06/02/15	N/A	Original report issue
1	07/09/15	3	Updated data accuracy

APPENDIX A

Photographs

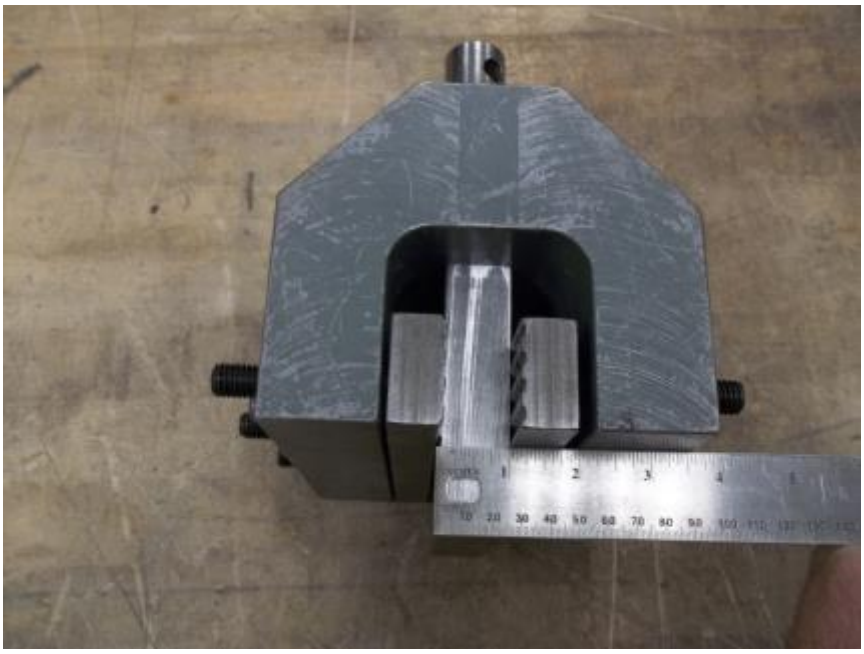


Photo No. 1
MBG 531 Loading Part One - 1"x 5" Footprint

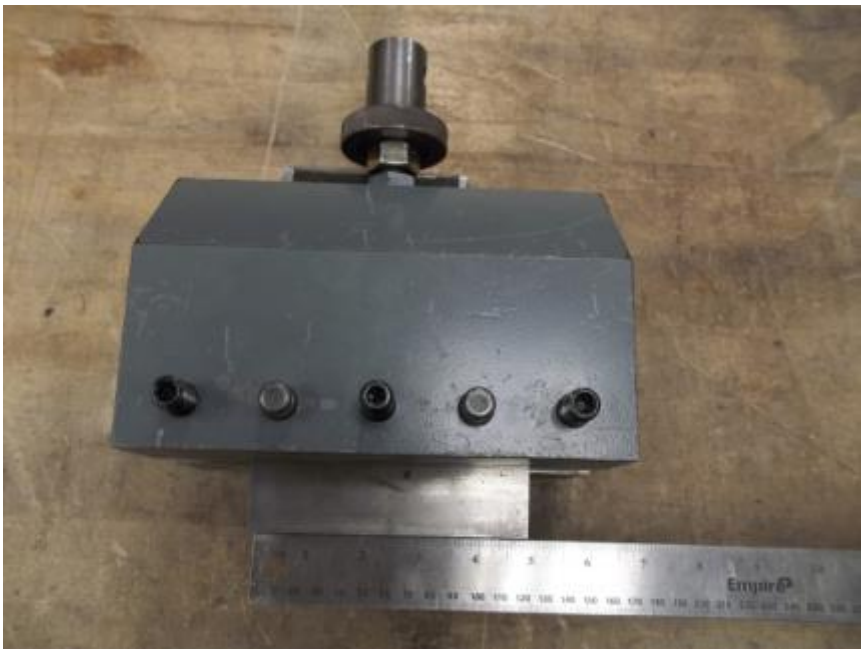


Photo No. 2
MBG 531 Loading Part One - 1"x 5" Footprint

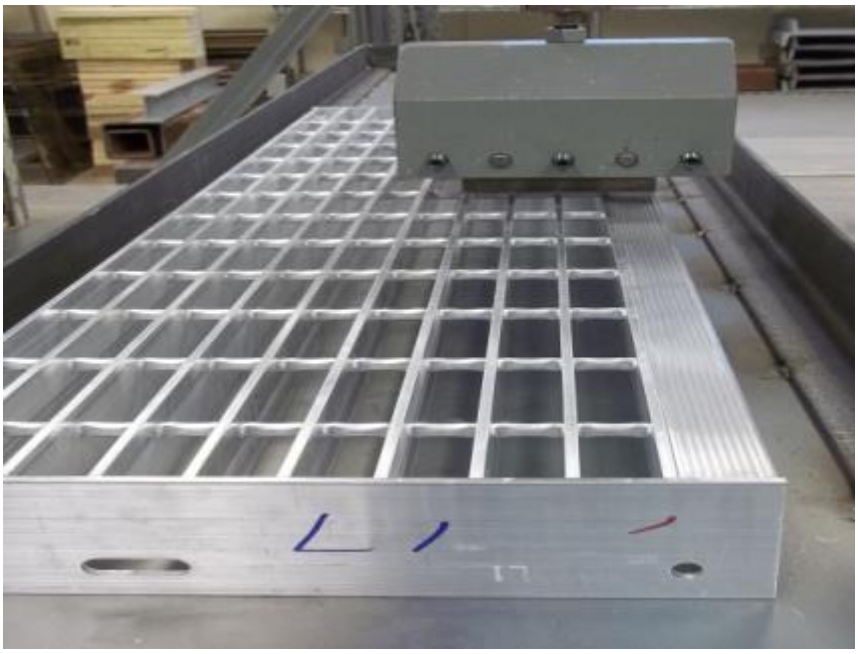


Photo No. 3
MBG 531 Loading - Part One - 300lb Load at Mid-Span

Photo No. 4
Part 1 -MBG 531 Loading 1"x 5" Footprint (x 2)

Photo No. 5
Part 1 -MBG Loading - 300lb Load at each 3rd Point
(Treads span over 5'6")

Photo No. 6
Part 2 - IBC Loading - 533lb Load at Position 1

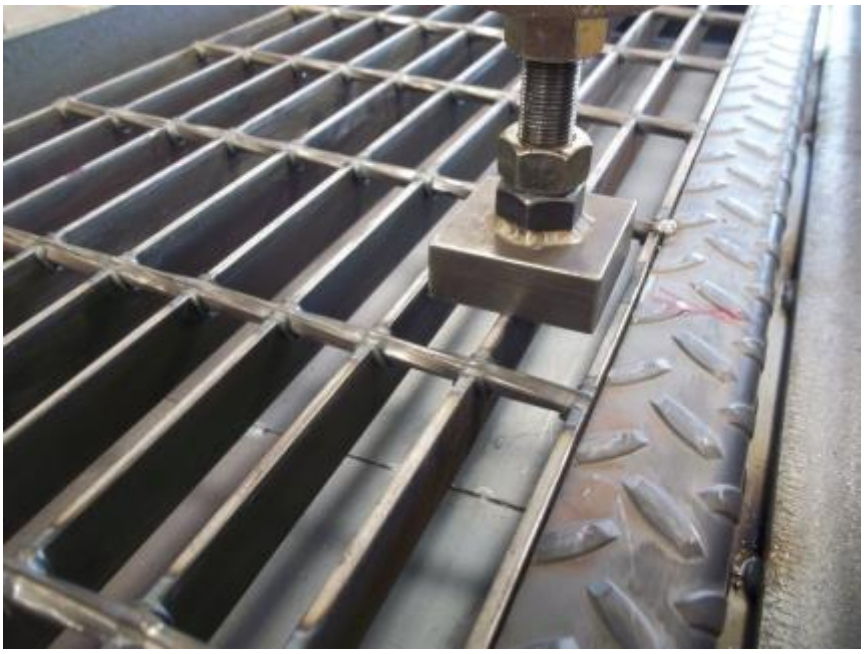


Photo No. 7
Part 2 - IBC Loading -533lb Load at Position 2

Photo No. 8
Part 2 - IBC Loading -533lb Load at Position 3

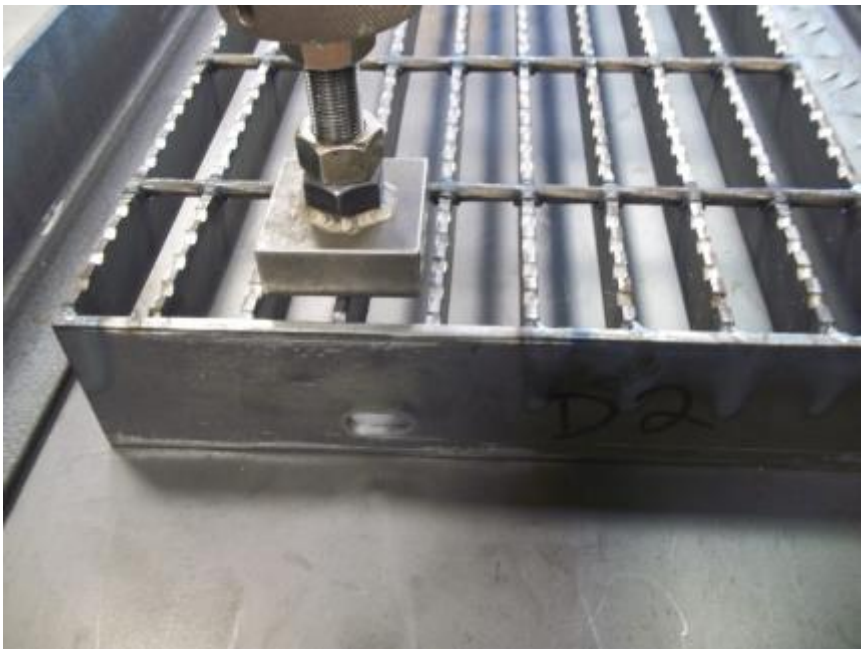


Photo No. 9
Part 2 - IBC Loading -533lb Load at Position 4

Photo No. 10
Part 3 - 29 CFR 1910.24(c) Loading Shear

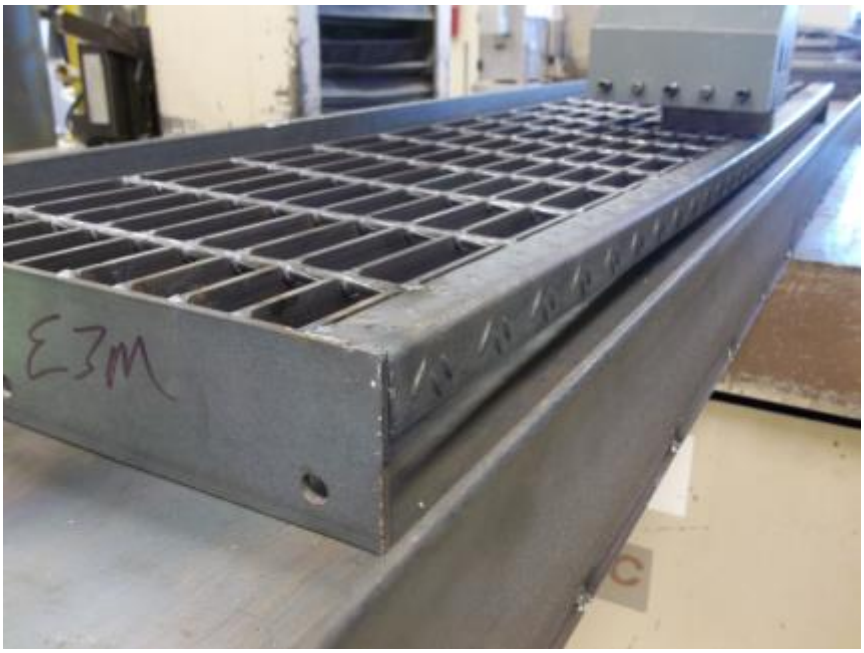


Photo No. 11
Part 3 - 29 CFR 1910.24(c) Loading Moment