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NAAMM
TEST REPORT

SCOPE OF WORK
ASTM D5456, SECTION 6.5.1 FLEXURAL LOAD EVALUATION OF EXPANDED METAL PANELS

REPORT NUMBER
Q2328.02-106-31 R1

TEST DATES
01/02/24 - 01/23/24

ISSUE DATE **REVISION DATE**
03/22/24 07/25/24

RECORD RETENTION END DATE
01/23/28

PAGES
14

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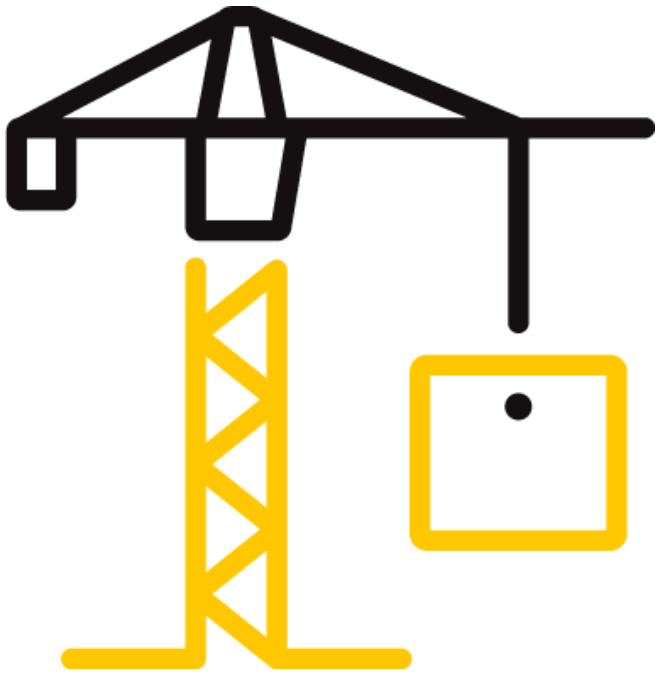
RT-R-AMER-Test-2827 (07/12/22)



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

SECTION 1
SCOPE

Products: Various Expanded Metal Panels

Architectural Testing, Inc. (an Intertek company) dba Intertek Building & Construction (B&C) was contracted by NAAMM (National Association of Architectural Metal Manufacturers) to evaluate Various Expanded Metal Panels in accordance with ASTM D5456, Section 6.5.1 Flexural Load. Results obtained are tested values and were secured by using the designated test methods. Testing was conducted at the Intertek B&C test facility in York, Pennsylvania.

This report does not constitute certification of this product nor an opinion or endorsement by this laboratory.

Unless differently required, Intertek reports apply the "Simple Acceptance" rule, also called "Shared Risk approach," of ILAC-G8:09/2019, Guidelines on Decision Rules and Statements of Conformity.

For INTERTEK B&C:

COMPLETED BY:	J. Rich Hammons	**REVIEWED BY:**	Dawn M. Chaney
TITLE:	Technician Team Lead Materials Laboratory	**TITLE:**	Laboratory Supervisor Materials Laboratory
SIGNATURE:	Digitally Signed by: James Hammons	**SIGNATURE:**	Digitally Signed by: Dawn M. Chaney
DATE:	07/25/24	**DATE:**	07/25/24

JRH:dmc/kae

130 Derry Court
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SECTION 2
SUMMARY OF TEST RESULTS

SPECIMEN ID		TEST SPAN (in)	CONCENTRATED LOAD AT 0.250 in. DEFLECTION (lb_f)	MEAN ELASTIC LIMIT		MOE (psi)
STYLE	NOMINAL WIDTH (in)			LOAD (lb_f)	DEFLECTION (in)	
3/4" 9#	12.0	24.0	128	64.6	0.14	3,420,000
		36.0	44.2	34.3	0.20	4,580,000
1-1/2" 9#	12.0	24.0	78.4	50.6	0.17	2,070,000
		36.0	32.0	20.0	0.17	3,420,000
1-1/2" 6#	12.0	24.0	164	135	0.22	2,000,000
		36.0	84.1	91.0	0.27	3,840,000
2#	12.0	24.0	201	497	0.58	1,820,000
		36.0	72.9	133	0.40	3,380,000
5#	12.0	24.0	526	1,020	0.45	1,870,000
		36.0	250	588	0.54	3,977,000
6.25#	12.0	24.0	684	1,700	0.59	1,930,000
		36.0	331	804	0.60	3,797,000
7#	12.0	24.0	758	1,640	0.54	2,003,000
		36.0	338	693	0.50	3,537,000

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Facsimile: 717-764-4129
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SECTION 3
TEST METHODS

The specimens were evaluated in accordance with the following:

ASTM D5456-21$^{\varepsilon 1}$, *Standard Specification for Evaluation of Structural Composite Lumber Products,* Section 6.5.1

ASTM D4761-19, *Standard Test Methods for Mechanical Properties of Lumber and Wood-Based Structural Materials,* Section 7

SECTION 4
MATERIAL SOURCE

The materials were provided by NAAMM (National Association of Architectural Metal Manufacturers). The following was received in good condition on 12/18/23:

- Three (3) 3/4" 9#, 24-inch and 36-inch Expanded Metal Panels welded into steel frames
- Three (3) 1-1/2" 9#, 24-inch and 36-inch Expanded Metal Panels welded into steel frames
- Three (3) 1-1/2" 6#, 24-inch and 36-inch Expanded Metal Panels welded into steel frames
- Three (3) 2#, 24-inch and 36-inch Expanded Metal Panels welded into steel frames
- Three (3) 5#, 24-inch and 36-inch Expanded Metal Panels welded into steel frames
- Three (3) 6.25#, 24-inch and 36-inch Expanded Metal Panels welded into steel frames
- Three (3) 7#, 24-inch and 36-inch Expanded Metal Panels welded into steel frames

Refer to the product description photos in Section 10. The materials were tested as received. Representative materials/test specimens will be retained by Intertek B&C for a minimum of four years from the test completion date.

SECTION 5
LIST OF OFFICIAL OBSERVERS

NAME	COMPANY
J. Rich Hammons	Intertek B&C
Dawn M. Chaney	Intertek B&C

130 Derry Court
York, Pennsylvania 17406

Telephone: 717-764-7700
Facsimile: 717-764-4129
www.intertek.com/building

SECTION 6
TEST PROCEDURE

All conditioning of test specimens and test conditions were at standard laboratory conditions, unless otherwise reported. Refer to the test related photos in Section 10. Calibration certificates are available upon request.

ASTM D5456, Section 6.5.1 Flexural Load
Flexural load was evaluated in accordance with ASTM D5406, Section 6.5.1 (ref. ASTM D4761, Bending Flat-Wise-Center-Point Loading, Section 7). Flexural specimens were prepared for evaluation at test spans of 24 and 36-inches. Two inches at either end of the specimens (28 in. and 40 in. overall lengths as received) were spot welded at every second contact point of the lengthwise ends to 16.0 in. long sections of 3 in. steel angle iron to attain the desired test span for each series.

The framed specimens were individually clamped into a test fixture mounted upon the test stage of an Instron UTM (ICN: INT02020) equipped with a 30kN load cell (ICN: INT02023) to secure the specimen ends against movement and concentrated load was applied at the specimen midspan through a 1.25 in. diameter loading bar arranged perpendicular to the span of the specimen. To minimize the potential for seating error of the loading bar with regards to specimen deflection as measured by crosshead movement, a nominal 20 lbf preload was applied to the specimen. With this preload maintained, the measured load and deflection were balanced to zero to establish a suitable test initiation condition. A 2.0 in. range Instron deflectometer (ICN: INT01792) was employed at specimen midspan to verify measured deflection of the specimen and compressive force was applied at a rate of 0.1 in/min through both the 0.25 in. target deflection point and the graphically determined elastic limit load. In keeping with the load values presented in TABLE F as provided by NAAMM, flexural load was documented at 0.25 in. deflection from the zero-load condition for all specimens.

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SECTION 7
TEST SPECIMEN DESCRIPTIONS

TEST PROCEDURE	NUMBER OF SPECIMENS	NOMINAL SPECIMEN DIMENSIONS	VISUAL CHARACTERISTICS
ASTM D5406, Section 6.5.1 Flexural Load	3 per product type	28 in. x 16 in. x 3 in. (24-inch Span)	3/4" 9#, 1-1/2 9#, 1-1/2 6#, 2#, 5#, 6.25#, and 7# Expanded Metal Panels welded into steel frames
		40 in. x 16 in. x 3in. (36-inch Span)	

SECTION 8
TEST RESULTS

ASTM D5406, Section 6.5.1 Flexural Load - 3/4" 9#

SPECIMEN ID	TEST SPAN (in)	TABLE F REFERENCE DEFLECTION LIMIT (in)	CONCENTRATED LOAD AT TABLE F DEFLECTION (lb_f)	MEAN ELASTIC LIMIT		MOE (psi)
				LOAD (lb_f)	DEFLECTION (in)	
1	24.0	0.250	130	60.6	0.13	3,450,000
2			123	67.0	0.15	3,350,000
3			130	66.2	0.14	3,450,000
Average			**128**	**64.6**	**0.14**	**3,420,000**
1	36.0	0.250	52.1	35.8	0.18	5,240,000
2			41.7	32.4	0.20	4,370,000
3			38.9	34.8	0.23	4,130,000
Average			**44.2**	**34.3**	**0.20**	**4,580,000**

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ASTM D5406, Section 6.5.1 Flexural Load - 1-1/2" 9#

SPECIMEN ID	TEST SPAN (in)	TABLE F REFERENCE DEFLECTION LIMIT (in)	CONCENTRATED LOAD AT TABLE F DEFLECTION (lb_f)	MEAN ELASTIC LIMIT		MOE (psi)
				LOAD (lb_f)	DEFLECTION (in)	
1	24.0	0.250	79.9	50.7	0.17	2,140,000
2			76.7	50.9	0.18	2,010,000
3			78.5	50.1	0.17	2,050,000
Average			**78.4**	**50.6**	**0.17**	**2,070,000**
1	36.0	0.250	31.5	19.8	0.17	3,260,000
2			34.6	20.1	0.16	3,830,000
3			30.0	20.0	0.18	3,170,000
Average			**32.0**	**20.0**	**0.17**	**3,420,000**

ASTM D5406, Section 6.5.1 Flexural Load - 1-1/2" 6#

SPECIMEN ID	TEST SPAN (in)	TABLE F REFERENCE DEFLECTION LIMIT (in)	CONCENTRATED LOAD AT TABLE F DEFLECTION (lb_f)	MEAN ELASTIC LIMIT		MOE (psi)
				LOAD (lb_f)	DEFLECTION (in)	
1	24.0	0.250	149	147	0.25	1,990,000
2			194	131	0.18	2,040,000
3			148	127	0.22	1,960,000
Average			**164**	**135**	**0.22**	**2,000,000**
1	36.0	0.250	83.1	85.3	0.26	3,720,000
2			87.9	100	0.28	4,000,000
3			81.4	87.7	0.27	3,800,000
Average			**84.1**	**91.0**	**0.27**	**3,840,000**

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ASTM D5406, Section 6.5.1 Flexural Load - 2#

SPECIMEN ID	TEST SPAN (in)	TABLE F REFERENCE DEFLECTION LIMIT (in)	CONCENTRATED LOAD AT TABLE F DEFLECTION (lb_f)	MEAN ELASTIC LIMIT		MOE (psi)
				LOAD (lb_f)	DEFLECTION (in)	
1	24.0	0.250	201	555	0.64	1,840,000
2			188	471	0.57	1,740,000
3			215	464	0.52	1,890,000
Average			**201**	**497**	**0.58**	**1,820,000**
1	36.0	0.250	89.7	139	0.37	3,490,000
2			50.0	121	0.44	3,230,000
3			78.9	140	0.40	3,420,000
Average			**72.9**	**133**	**0.40**	**3,380,000**

ASTM D5406, Section 6.5.1 Flexural Load - 5#

SPECIMEN ID	TEST SPAN (in)	TABLE F REFERENCE DEFLECTION LIMIT (in)	CONCENTRATED LOAD AT TABLE F DEFLECTION (lb_f)	MEAN ELASTIC LIMIT		MOE (psi)
				LOAD (lb_f)	DEFLECTION (in)	
1	24.0	0.250	633	1,020	0.42	1,890,000
2			513	1,020	0.45	1,880,000
3			433	1,030	0.48	1,840,000
Average			**526**	**1,020**	**0.45**	**1,870,000**
1	36.0	0.250	248	580	0.53	4,390,000
2			235	585	0.53	3,510,000
3			266	598	0.55	4,030,000
Average			**250**	**588**	**0.54**	**3,977,000**

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ASTM D5406, Section 6.5.1 Flexural Load - 6.25#

SPECIMEN ID	TEST SPAN (in)	TABLE F REFERENCE DEFLECTION LIMIT (in)	CONCENTRATED LOAD AT TABLE F DEFLECTION (lb_f)	MEAN ELASTIC LIMIT		MOE (psi)
				LOAD (lb_f)	DEFLECTION (in)	
1	24.0	0.250	674	1,590	0.57	1,890,000
2			635	1,700	0.61	1,920,000
3			743	1,800	0.59	1,980,000
Average			**684**	**1,700**	**0.59**	**1,930,000**
1	36.0	0.250	325	738	0.56	3,730,000
2			331	884	0.66	3,780,000
3			338	789	0.57	3,880,000
Average			**331**	**804**	**0.60**	**3,797,000**

ASTM D5406, Section 6.5.1 Flexural Load - 7#

SPECIMEN ID	TEST SPAN (in)	TABLE F REFERENCE DEFLECTION LIMIT (in)	CONCENTRATED LOAD AT TABLE F DEFLECTION (lb_f)	MEAN ELASTIC LIMIT		MOE (psi)
				LOAD (lb_f)	DEFLECTION (in)	
1	24.0	0.250	753	1,570	0.52	1,950,000
2			716	1,530	0.54	1,900,000
3			804	1,830	0.56	2,160,000
Average			**758**	**1,640**	**0.54**	**2,003,000**
1	36.0	0.250	341	688	0.50	3,510,000
2			336	689	0.50	3,500,000
3			338	703	0.50	3,600,000
Average			**338**	**693**	**0.50**	**3,537,000**

SECTION 9
CONCLUSION

The requested test methods do not contain specific performance requirements. Results are reported as obtained.

130 Derry Court
York, Pennsylvania 17406

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Facsimile: 717-764-4129
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SECTION 10
PHOTOGRAPHS

Photo No. 1
Typical Pretest Condition Restriction Frame Reinforced Specimen Detail
(3/4" 9# Product Depicted: 24-inch Span)

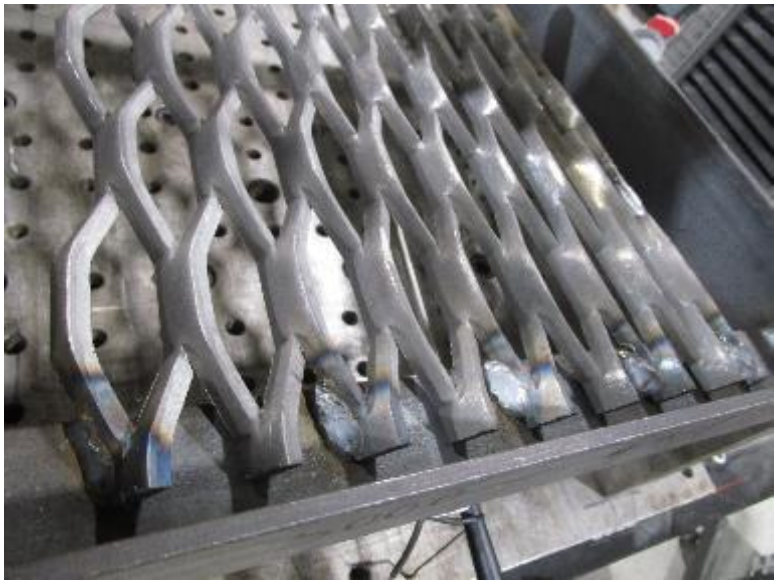

Photo No. 2
Typical Angle Iron Restriction Fixturing End-Weld Detail
(Weld-Points to Inside Lip of Angle Iron Endcap to Define 24 or 36-inch Test Span)

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Photo No. 3
Typical 24-inch Span Concentrated Load Restriction Frame Test Fixturing

Photo No. 4
Typical 36-inch Span Concentrated Load Restriction Frame Test Fixturing

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Photo No. 5
Typical Test Setup with Midspan Deflection External Deflectometer in Place

Photo No. 6
Zero Load/Deflection Condition (Post Pre-Load) Loading Rod Contact Detail

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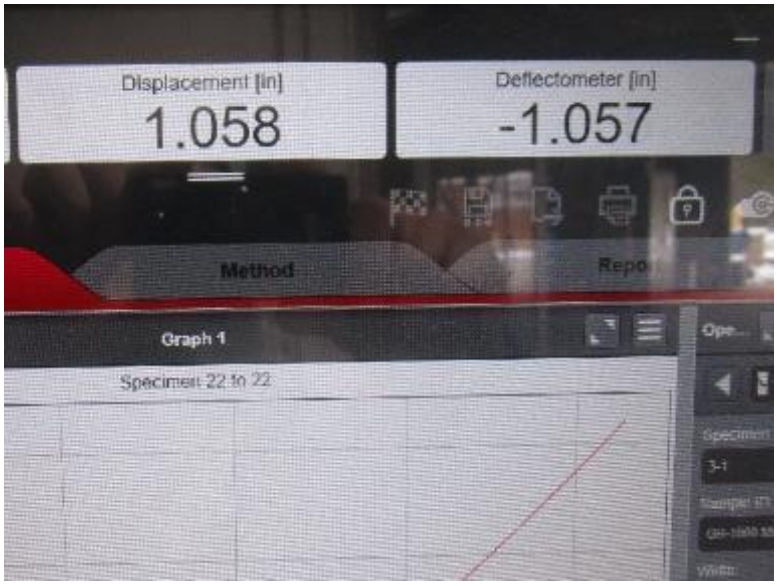

Photo No. 7
Verification of Crosshead Movement-Extensometer Measurement Consistency

Photo No. 8
Typical Post-Evaluation Specimen Permanent Deformation Specimen Condition
(Loading Nose Shown Reset to Pretest Zero Load/Deflection Position)

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Facsimile: 717-764-4129
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SECTION 11
REVISION LOG

REVISION #	DATE	PAGES	REVISION
0	03/22/24	N/A	Original Report Issue
1	07/25/24	3, 6, 7, 8, & 9	Updated Results for Mean Elastic Limit and MOE within Summary of Test Results and Test Results Sections