



Progressive Engineering Inc.

**AEROSMITH FASTENING SYSTEMS /
NATIONAL GYPSUM COMPANY**

ASTM E330 Negative Windload Test
on 5/8" National Gypsum Company eXP® Sheathing (Vertical)
on 18 Gauge Steel Framing at 16" o.c. using 2385AG Pins at 8" o.c.

8/15/2019



This test report contains thirteen (13) pages, including the cover sheet. Any additions to, alterations of, or unauthorized use of excerpts from this report are expressly forbidden.

2019-6197

1. TITLE

ASTM E330 Negative Windload Test on 5/8" National Gypsum Company eXP® Sheathing (Vertical) on 18 Gauge Steel Framing at 16" o.c. using 2385AG Pins at 8" o.c.

2. OBJECTIVE

To apply a uniform load to the back side surface of the 5/8" National Gypsum Company eXP® Sheathing, using Aerosmith Pin 2385AG, until a failure is reached.

This test report pertains only to the specimens tested. It remains the sole responsibility of the manufacturer to provide a product consistent to that which was tested.

3. TESTED FOR

Aerosmith Fastening Systems
5621 Dividend Road
Indianapolis, IN 46241

National Gypsum Company
5901 Carnegie Blvd.
Charlotte, NC 28209

4. TESTING ORGANIZATION

Progressive Engineering Inc.

58640 State Road 15
Goshen, IN 46528
www.p-e-i.com

See IAS Evaluation Report TL-178 for ISO 17025 Accreditation.

5. TESTING PERSONNEL

Director of Testing - Jason R. Holdeman
Technician - Chris Stutzman



Tests were witnessed by Spencer Jessee with Aerosmith Fastening Systems and Brian Randall with National Gypsum Company.

6. REFERENCE STANDARDS

ASTM E330 - 14 Standard Test Method For Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference

7. TEST EQUIPMENT

- A. Water manometer (PEI No. 076)
- B. Pressure Transducer (PEI No. 970)
- C. Vacuum test fixture (PEI No. 372)
- E. Data Acquisition System (PEI No. 523)

8. TEST SPECIMEN

A. Sheathing

5/8" National Gypsum Company eXP® Sheathing - manufactured on 07/15/19. The sheathing consisted of a gypsum core with a purple glass mat on the face and back of the board. The glass mat was wrapped over the long edges of the board. The edges were square with no taper. The average measured thickness was .632". See Appendix for more details.

B. Frame

18 Ga. x 6" x 1-5/8" Steel Studs and 18 Ga. x 6" x 1-1/4" Steel Track. The studs had a designated printed identification on the inside, '600S162-43', and a tested yield strength of 45.9 ksi. See Appendix section for details.

C. Fasteners

1. Track to Stud - Two (2) #10 x 3/4" long wafer head self-drilling screws per stud end.
2. Sheathing to Frame - Aerosmith 2385AG PT2000 Gripshank Pin, with an average head diameter of .305" and an average shank diameter of .107".

9. TEST SPECIMEN CONSTRUCTION

- A. A 48" x 96" frame was assembled with the studs placed 16" o.c. using two (2) #10 x 3/4" long wafer head self-drilling screws per stud end.
- B. 2 mil plastic sheeting was loosely draped over the wall frame.
- C. A sheet of 5/8" x 48" x 96" National Gypsum eXP® Sheathing was laid on the pre-assembled frame. A total of three (3) specimens were constructed with vertically oriented 5/8" eXP® Sheathing. Vertical indicates that the long edge of the panel is parallel to the studs. The fasteners were fired 8" o.c. in the field and around the perimeter with the nail heads set flush to the board surface, or slightly above. The perimeter fasteners were spaced 3/8" in from the edge of the sheathing. Fasteners were installed by Spencer Jessee with Aerosmith Fastening Systems. See drawings for details.
- D. A cleat, 48" long was fastened to each end of the wall section. Three (3) holes per stud bay were drilled through the sheathing to ensure pressure equalization.

10. TEST SET-UP

A wall panel was placed in a test fixture with the Sheathing side down. The bearing supports were set 96" apart, such that the cleats rested on the supports, at each end of the wall. A section of steel track was set 32" in from each end of the wall and screwed to each stud to reduce stud rotation. The edges of the polyethylene sheeting that was placed between the wall frame and the Sheathing during construction were taped to the test fixture.

11. TEST PROCEDURE

The data acquisition system was initiated and set to record at 2 samples per second. A preload of 50% of the anticipated ultimate load was applied to the specimen and held for a minimum of 10 seconds and then released. After one (1) minute of no load the load reading was recorded. The load was then increased to 10 PSF and held for 10 seconds when the load reading was again recorded. The load was then released for one (1) minute and load reading was again recorded. The above process was continued in 10 PSF increments until a failure occurred.

Failure is considered, board flexural failure, board pull-over at a fastener, fastener withdrawal from the frame, and/or frame failure. The maximum load, in PSF, was recovered from the data acquisition system.

The load was applied at a gradual rate of approximately 1 PSF per second, and not in excess of 2 PSF per second.

Note: Periodically during the testing, a water manometer was used as a secondary verification device.

12. TEST RESULTS

ASTM E330 Negative Wind Load - Vertical Orientation

5/8" National Gypsum eXP® Sheathing w/ 8" o.c. 2385AG Pins

Test No.	Ultimate Load
6197-18GA-eXP-1	87.5 psf
6197-18GA-eXP-2	88.0 psf
6197-18GA-eXP-3	86.2 psf
Average	87.0 psf
<i>Standard Deviation</i>	<i>0.9 psf</i>
<i>COV%</i>	<i>1.1%</i>

See attached data pages for details.

Progressive Engineering Inc.
ASTM E330 Negative Wind Load

Date: 8/15/2019

Client: Aerosmith Fastening Systems /
 National Gypsum Company

Specimen: 48" x 96" x 5/8" Thick eXP® Sheathing

One (1) 5/8" x 48" x 96" panel fastened to a 48" x 96" frame consisting of 18 gauge steel studs spaced at 16" o.c. Sheathing was fastened to framing by Spencer Jessee of Aerosmith, using 2385AG Aerosmith Pins.

Test Conditions

Temperature: 71 °F

Humidity: 55%

Board Thickness: 5/8"

Board Orientation: **Vertical**

Fastener Type: 2385AG Pin

Fastener Spacing (perimeter): 8" o.c.

Fastener Spacing (field): 8" o.c.

Test #: 6197-18GA-eXP-1

Target Ultimate Load		Pre Load		Linear Transducer Location
90 PSF		40 PSF	10 sec	None Used
Load in PSF	Time Held in seconds	Comments/Observations		
0	---	No Comment		
10	10	No Comment		
0	60	No Comment		
20	10	No Comment		
0	60	No Comment		
30	10	No Comment		
0	60	No Comment		
40	10	No Comment		
0	60	No Comment		
50	10	No Comment		
0	60	No Comment		
60	10	No Comment		
0	60	No Comment		
70	10	No Comment		
0	60	No Comment		
80	10	First popping occurred around 71 PSF		
0	60	No Comment		
90	-	Sample failure occurred while approaching 90 PSF increment		

Ultimate Load: **87.5 PSF**

Failure: Sheathing pulled over fasteners along both inner-studs when maximum load was reached.

Progressive Engineering Inc.
ASTM E330 Negative Wind Load

Date: 8/15/2019

Client: Aerosmith Fastening Systems /
 National Gypsum Company

Specimen: 48" x 96" x 5/8" Thick eXP® Sheathing

One (1) 5/8" x 48" x 96" panel fastened to a 48" x 96" frame consisting of 18 gauge steel studs spaced at 16" o.c. Sheathing was fastened to framing by Spencer Jessee of Aerosmith, using 2385AG Aerosmith Pins.

Test Conditions

Temperature: 71 °F

Humidity: 55%

Board Thickness: 5/8"

Board Orientation: **Vertical**

Fastener Type: 2385AG Pin

Fastener Spacing (perimeter): 8" o.c.

Fastener Spacing (field): 8" o.c.

Test #: 6197-18GA-eXP-2

Target Ultimate Load		Pre Load		Linear Transducer Location
90 PSF		40 PSF	10 sec	None Used
Load in PSF	Time Held in seconds	Comments/Observations		
0	---	No Comment		
10	10	No Comment		
0	60	No Comment		
20	10	No Comment		
0	60	No Comment		
30	10	No Comment		
0	60	No Comment		
40	10	No Comment		
0	60	No Comment		
50	10	No Comment		
0	60	No Comment		
60	10	No Comment		
0	60	No Comment		
70	10	No Comment		
0	60	No Comment		
80	10	No Comment		
0	60	No Comment		
90	-	Sample failure occurred while approaching 90 PSF increment		

Ultimate Load: **88.0 PSF**

Failure: Sheathing pulled over fasteners along both inner-studs when maximum load was reached.

Progressive Engineering Inc.
ASTM E330 Negative Wind Load

Date: 8/15/2019

Client: Aerosmith Fastening Systems /
 National Gypsum Company

Specimen: 48" x 96" x 5/8" Thick eXP® Sheathing

One (1) 5/8" x 48" x 96" panel fastened to a 48" x 96" frame consisting of 18 gauge steel studs spaced at 16" o.c. Sheathing was fastened to framing by Spencer Jessee of Aerosmith, using 2385AG Aerosmith Pins.

Test Conditions

Temperature: 71 °F

Humidity: 50%

Board Thickness: 5/8"

Board Orientation: **Vertical**

Fastener Type: 2385AG Pin

Fastener Spacing (perimeter): 8" o.c.

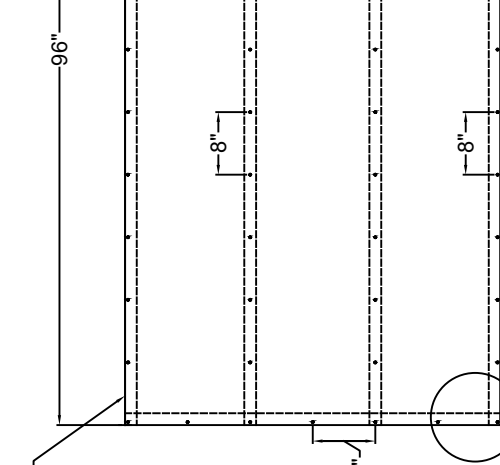
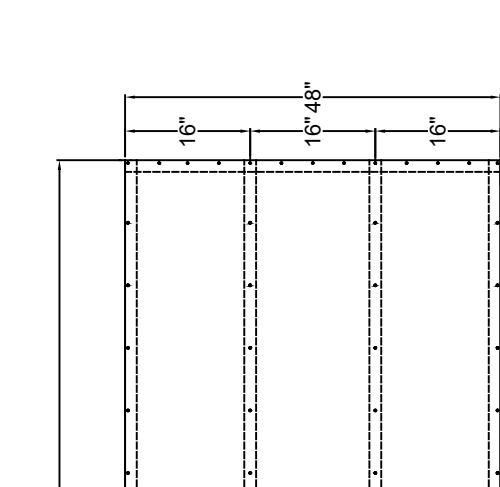
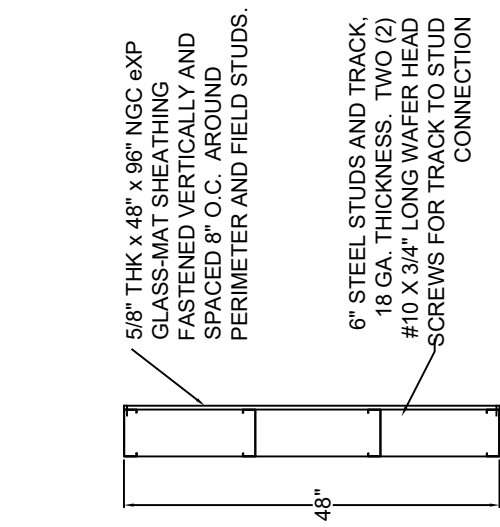
Fastener Spacing (field): 8" o.c.

Test #: 6197-18GA-eXP-3

Target Ultimate Load		Pre Load		Linear Transducer Location
90 PSF		40 PSF	10 sec	None Used
Load in PSF	Time Held in seconds	Comments/Observations		
0	---	No Comment		
10	10	No Comment		
0	60	No Comment		
20	10	No Comment		
0	60	No Comment		
30	10	No Comment		
0	60	No Comment		
40	10	No Comment		
0	60	No Comment		
50	10	No Comment		
0	60	No Comment		
60	10	No Comment		
0	60	No Comment		
70	10	No Comment		
0	60	No Comment		
80	10	No Comment		
0	60	No Comment		
90	-	Sample failure occurred while approaching 90 PSF increment		

Ultimate Load: **86.2 PSF**

Failure: Sheathing pulled over fasteners along both inner-studs when maximum load was reached.



AEROSMITH PIN,
PART NO. 2385AG,
WITH AN AVERAGE
HEAD DIA. OF .305"
AND AN AVERAGE SHANK
DIAMETER OF .107"

**5/8" NGC eXP GLASS-MAT
SHEATHING
FASTENER DETAIL**

THIS DRAWING IS A PART OF TEST REPORT NO. 2019-6197

This drawing and all information contained herein is the property of PROGRESSIVE ENGINEERING, INC. and is not to be reproduced without the written permission of PEI. PEI assumes no responsibility for unauthorized use of this drawing.

CLIENT: **Aerosmith / NGC**
TITLE: **5/8" NGC eXP SHEATHING TO A 16" O.C. FRAME WITH 8" O.C. FASTENERS**

DWN. BY: J. HOLDEMAN	REVISED ON:
DATE: 8/27/2019	
SCALE:	
JOB NO. 2019-6197	
DWG. NO. B1	

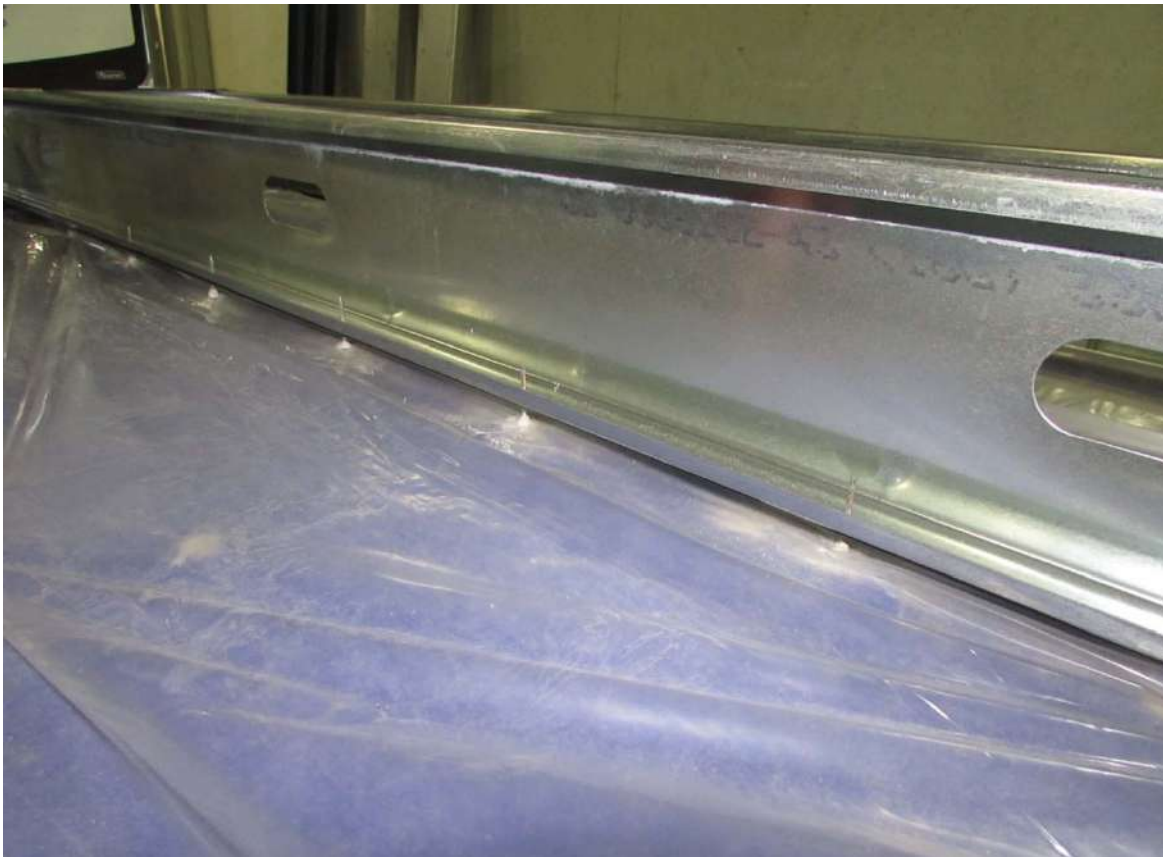


Progressive Engineering Inc.
58640 State Road 15
Goshen, IN 46528
Phone (574) 533-0337
Fax (574) 533-9736

www.p-e-i.com



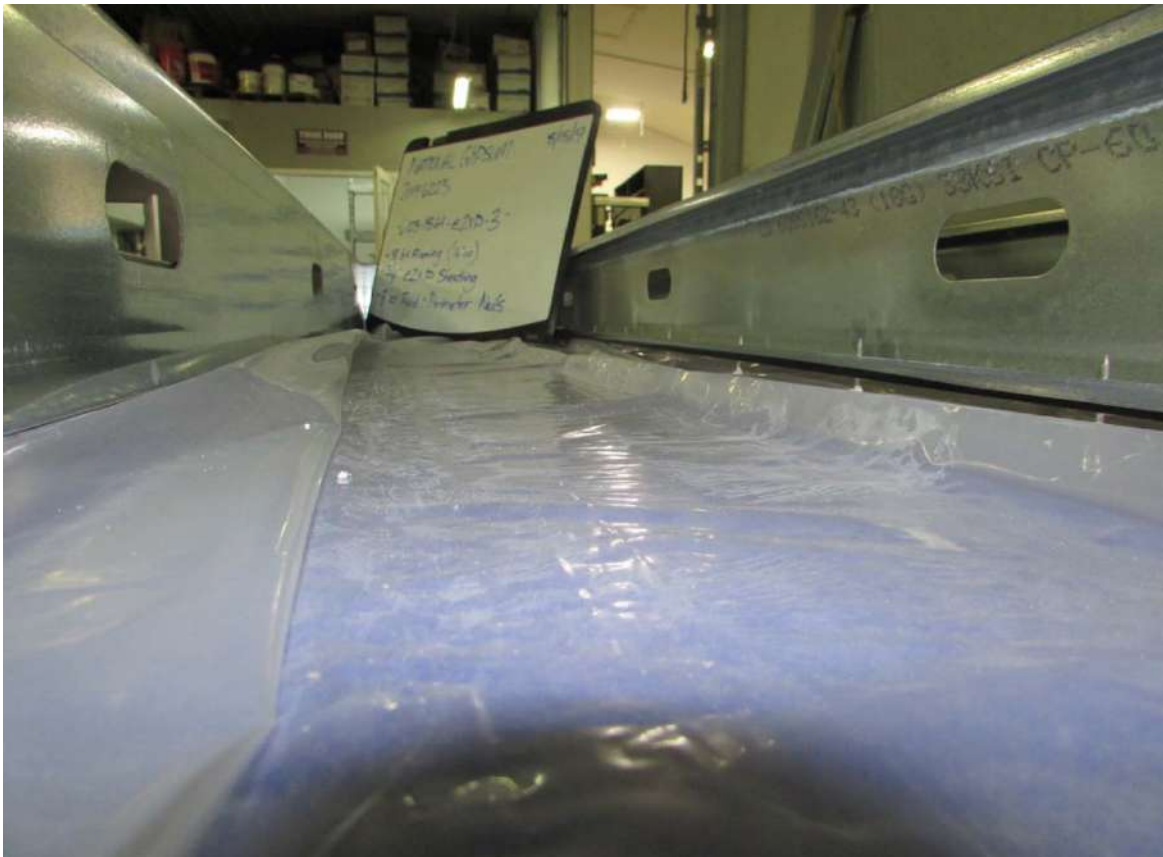
Typical Setup - 18 Gauge Framing w/ 8" o.c. Aerosmith Pins



6197-18GA-eXP-1 Sample Failure



6197-18GA-eXP-2 Sample Failure



6197-18GA-eXP-3 Sample Failure



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APPENDIX

**AEROSMITH FASTENING SYSTEMS /
NATIONAL GYPSUM COMPANY**
2019-6197

Progressive Engineering Inc.
ASTM E8-16a Tensile Test (Rectangular)

Date: 7/16/2019

Temperature: 72°F

Client: Aerosmith Fastening Systems / National Gypsum Company

Humidity: 56% R.H.

Specimen: Steel coupons taken from 18ga. steel studs.

Load Rate (in/min): 0.125

Specimen No.	Sample Width	Sample Thick.	Cross-Sectional Area (in ²)	Load at 0.2% offset (lbf)	Max Load (lbf)	Yield Strength 0.2% offset (ksi)	Ultimate Strength (ksi)	Elongation at Break (%)	Failure Mode
19-6197-18ga-1	0.501"	0.0435"	0.02179	992	1,139	45.5	52.3	27.8%	b
19-6197-18ga-2	0.502"	0.0435"	0.02184	1,002	1,155	45.9	52.9	26.3%	a
19-6197-18ga-3	0.501"	0.0435"	0.02179	1,011	1,152	46.4	52.8	26.6%	d
Average	0.501"	0.0435"	0.02181	1,002	1,149	45.9	52.7	26.9%	

Failure Codes

- a - Specimen broke perpendicular to edge near center of reduced section.
- b - Specimen broke at an angle near center of reduced section.
- c - Perpendicular break between radius and center of reduced section
- d - Specimen broke at an angle between radius and center of reduced section

- e - Specimen broke at an angle near radius.
- f - Specimen broke perpendicular to edge near radius.
- g - Specimen broke perpendicular to edge near grips.

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Board Weight and Thickness

Date: 8/12/2019

Client: Aerosmith Fastening Systems /
National Gypsum Company

Temperature: 72° F

Humidity: 50%

Specimen: 5/8" eXP® Sheathing

Sample No.	Weight (lbs)	*Thickness (in)	Board Code
6223-58-1	77.4	.631	27 07/15/19 22:54
6223-58-2	77.8	.635	27 07/15/19 22:54
6223-58-3	77.8	.631	27 07/15/19 22:54
6223-58-4	77.6	.629	27 07/15/19 22:55
6223-58-5	77.6	.631	27 07/15/19 22:55
6223-58-6	77	.632	27 07/15/19 22:54
6223-58-7	77.9	.634	27 07/15/19 22:54
6223-58-8	77.7	.631	27 07/15/19 22:55
6223-58-9	78	.630	27 07/15/19 22:55
6223-58-10	77.9	.636	27 07/15/19 22:56

Min:	77.0	.629
Max:	78.0	.636
Average:	77.7	.632

* These thickness measurements were taken for informational purposes only.