RADCO TEST REPORT
Test Report No. RAD-3766
Project No. C9752

Negative Structural Performance Tests on ½" and ⅝" GLASROC® SHEATHING using Aerosmith fasteners per ASTM E330-02

Prepared for

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by

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November 15, 2005

TABLE OF CONTENTS

APPENDIX

1.0 INTRODUCTION

At the request of BPB America Inc. RADCO witnessed negative structural performance tests on ½" and ⅝" thick GlasRoc® Sheathing, using Aerosmith Brand fasteners, and with the attached framing configurations. The tests were conducted in accordance with ASTM E330-02, "Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference."

GlasRoc® Sheathing is an enhanced glass reinforced gypsum panel with an acrylic coating applied to one of the gypsum face surfaces, a continuous glass fiber mat fully embedded in the face and back, with a non-combustible water resistant core manufactured to the physical requirements of ASTM C 1177. GlasRoc® Sheathing brand panels are available in ½" and ⅝" Type X thicknesses, 4' widths with square edges and a number of lengths. The GlasRoc® Sheathing panel is intended for use as an exterior wall sheathing substrate and in exterior ceiling and soffit applications.

The GlasRoc® Sheathing is non-combustible with a Class 1 flame spread rating < 25 and a smoke-development rating < 50 when tested in accordance with ASTM E 84, CAN/ULC S102, UL 763, NFPA 255 and UBC 8-1 Standards.

Nominal ½" and ⅝" BPB America Inc. GlasRoc® Sheathing was selected from the BPB manufacturing facility in Cody, Wyoming on March 29, 2004 by RADCO personnel. Material was shipped to the BPB Technical Development Center, 14255 49th Street North, Suite 305, Clearwater, FL 33762. RADCO witnessed the unwrapping of the bundles and the random selection of the boards upon arrival in Clearwater, FL. The specimens were marked by RADCO to insure specimen integrity throughout the testing program.

At each stage of the project, care was taken by RADCO to ensure that the sample identification and traceability of the test samples were maintained. The identification and correlation of the samples were witnessed and the samples were tracked and logged at all times. The data generated was collected by RADCO and this report was prepared using only data generated by the testing witnessed at the BPB Technical Development Center.

Prior to each test, the condition of the equipment used was examined and verified to be operational and in current calibration. The test procedures followed were observed and documented by RADCO. RADCO's role in this project was to witness the sample fabrication, observe the testing and prepare a report based on all the testing that was witnessed. RADCO verified and confirmed that all procedures used by BPB testing personnel during the tests, were in accordance with the referenced test standard.

2.0 TEST SPECIMENS

Fabrication Date: July 18-22, 2005
Witnessed by: Joe DeTrapani, RADCO, Inc.
Fabrication Location: BPB America, 14255 49th Street, Clearwater, Florida 33762

RADCO witnessed the pretest preparation of 4' x 8' panels fabricated with ½" and ⅝" Glasroc® sheathing applied to one face of metal stud frames, with the following configurations.
All frames were assembled with #8x ½" metal to metal self drilling screws.

Aerosmith Fastening Systems- Versapin Model ST4100 Tool, using 2325A 1-1/4" Gripshank Pin.

(3) 4' x 8' panels with ⅝" GlasRoc® Sheathing w/ 22 ga. studs spaced at 24" o.c, fasteners, 8" o.c.
(3) 4' x 8' panels with ⅝" GlasRoc® Sheathing w/ 18 ga. studs spaced at 24" o.c, fasteners, 8" o.c.

(3) 4' x 8' panels with ⅝" GlasRoc® Sheathing w/ 16 ga. studs spaced at 24" o.c, fasteners 8" o.c.

(3) 4' x 8' panels with ⅝" GlasRoc® Sheathing w/ 16 ga. studs spaced at 16" o.c, fasteners 8" o.c.
(3) 4' x 8' panels with ⅝" GlasRoc® Sheathing w/ 16 ga. studs spaced at 24" o.c, fasteners 6" o.c.
(3) 4' x 8' panels with ½" GlasRoc® Sheathing w/ 22 ga. studs spaced at 16" o.c, fasteners 8" o.c.

Pre-Test Preparation:

The samples were attached to a 1" x 6" wood frame with (2) carriage bolts in the 4' sides and (3) carriage bolts in the 8' sides. This frame was then clamped into the test fixture. The exposed faces of the samples were taped to the perimeter of the test frame to prevent air leakage during pressure applications.

Deflection Gauge Locations

Note: All gauges were at the horizontal center line of the panel.

Gauge Locations for Sample with Studs Spaced at 16"o.c

Gauge: No. 1: Left Interior Stud
Gauge: No. 2: Vertical Centerline of the Panel
Gauge: No. 3: Right Interior Stud

Gauge Locations for Sample with Studs Spaced at 24" o.c.

Gauge: No. 1: Open panel between left stud and center stud of the frame.
Gauge: No. 2: Vertical centerline of the panel
Gauge: No. 3: Open panel between center stud and right side of the frame.

Materials:
½" and ⅝" GlasRoc® Sheathing conforming to ASTM C1177
Nominal 2 x 4, 16,18, and 22 Gauge Metal Wall Studs
4 mil thickness plastic sheeting
#8x ½" metal to metal self drilling screws

Equipment:
Deflection Gauges MITUTOYO CORP. Model: IDS-1010E
Switch Box MITUTOYO CORP. Code No.: 982-531-1
Switch Box and Laptop Computer
Testing Apparatus
Pressure Gauges
Variable power to vacuum pump by:
Emerson Industrial Controls
Manometers DYWER (inches of water)
Calibration 6/9/05 Certification Nos.: T24895.1 and T24895.2
Vacuum Pump ROOTS DRESSER

Rai Blower Root IDNo.:863-742-020
BALDOR INDUSTRIAL MOTORS
Cat No. M3611T: Spec. 36A01-1868

3.0 TEST PROCEDURE AND RESULTS

The samples were clamped to the test apparatus and a 31.21 psf pre-load was applied for 10 seconds. After a 1 minute recovery, the deflection gauges were cleared and testing began. The first load was 10 psf load, held for 10 seconds and applied to the sample for 10 seconds, deflection readings were taken and then the load was increased in 10 psi increments, taking deflection readings at each increment, while holding each pressure for 10 seconds. This procedure continued in 10 psf increments until failure occurred.

On the date of testing, the weather conditions were 87 degrees Fahrenheit, with 81% relative humidity.

Types of Failure:
Types of failure included fastener failures where the fastener withdrew, board failures where the fastener held fast and pulled through the board, and board fastener failures due to deep impact of the fastener where the fastener pulled through the board. Failures occured at either the center beams, or at the edges. For full details on individual test results' failures see attached data sheets in the appendix. Deflections reported in data sheets are the average of gauges 1 and 3, as described in the test specimens' description.

Results:

Ultimate Load (psf)

PANELS WITH AEROSMITH 2325A 1-1/4" Gripshank Pins	⅝ GlasRoc® Sheathing Panels					½" Glasroc® Sheathing
	22 ga 24" o.c. Fasteners 8" o.c.	18 ga 24" o.c. Fasteners 8" o.c.	16 ga 24" o.c. Fasteners 8" o.c.	16 ga 16" o.c. Fasteners 8" o.c.	16 ga 24" o.c. Fasteners 6" o.c.	22 ga 16" o.c. Fasteners 8" o.c.
Test # 1	62.4	55.9	50.7	91.0	70.2	62.4
Test #2	49.4	58.5	50.7	92.3	61.1	49.4
Test # 3	50.7	49.4	59.8	72.8	61.1	50.7
Average	54.2	54.6	53.7	85.4	64.1	54.2
Standard Deviation	5.8	3.8	4.3	8.9	4.3	5.8

******END OF REPORT******

APPENDIX

Load vs. Deflection Tables (A-1)
Load vs. Deflection Charts (B-1 through B-6)
Photographs:
Test Specimen Details (C-1through C-2)
Fastening tools used (D-1)
Test Specimen Failures (E-1)
Drawings:
Steel stud wall frame 16" and 24" o.c.
Test frame connection 16" and 24" o.c.

Note: All deflection readings for all tables are the average readings from gauges 1 and 3 of test.

Table 1 Aerosmith 2325A Gripshank V
5/8" 22 Ga 24" O.C. Fasteners
Glasroc Studs 8" O.C.

Load	Deflection (in)		
psf	Panel 1	Panel 2	Panel 3
0.00	0.0000	0.0000	0.0000
10.4	0.1030	0.0755	0.0950
20.8	0.1925	0.144	0.1755
31.2	0.2840	0.217	0.2525
41.6	0.4030	0.338	0.3655
52	0.5330		
62.4			
72.8			
Ultimate			
Load	62.4	49.4	50.7

Table 2 Aerosmith 2325A Gripshank pins
5/8" 18 Ga 24" O.C. Fasteners
Glasroc Studs 8" O.C.

Load	Deflection (in)		
psf	Panel 1	Panel 2	Panel 3
0.00	0.0000	0.0000	0.0000
10.4	0.0695	0.0715	0.0980
20.8	0.1285	0.1300	0.1355
31.2	0.1835	0.1915	0.1950
41.6	0.2495	0.2555	0.1970
52	0.3170	0.3325	0.2730
62.4			
72.8			
Ultimate			
Load	55.9	58.5	49.4

Table 3 Aerosmith 2325A Gripshank pins
5/8" 16 Ga 24" O.C. Fasteners
Glasroc Studs 8" O.C.

Load	Deflection (in)		
psf	Panel 1	Panel 2	Panel 3
0.00	0.0000	0.0000	0.0000
10.4	0.0720	0.0655	0.1475
20.8	0.1360	0.1215	0.2205
31.2	0.1990	0.1790	0.2235
41.6	0.2650	0.2460	0.3125
52			0.4410
62.4			0.5840
72.8			
Ultimate			
Load	50.7	50.7	59.8

Table 4 Aerosmith 2325A Gripshank pins
5/8" 16 Ga 16" O.C. Fasteners
Glasroc Studs 8" O.C.

Load	Deflection (in)		
psf	Panel 1	Panel 2	Panel 3
0.00	0.0000	0.0000	0.0000
10.4	0.0478	0.0600	0.0520
20.8	0.0890	0.1230	0.1000
31.2	0.1298	0.1850	0.1420
41.6	0.1775	0.2430	0.1918
52	0.2280	0.3080	0.2403
62.4	0.2735	0.3700	0.2892
72.8			
Ultimate			
Load	91	92.3	72.8

Note: test 2 was read on center gauge only

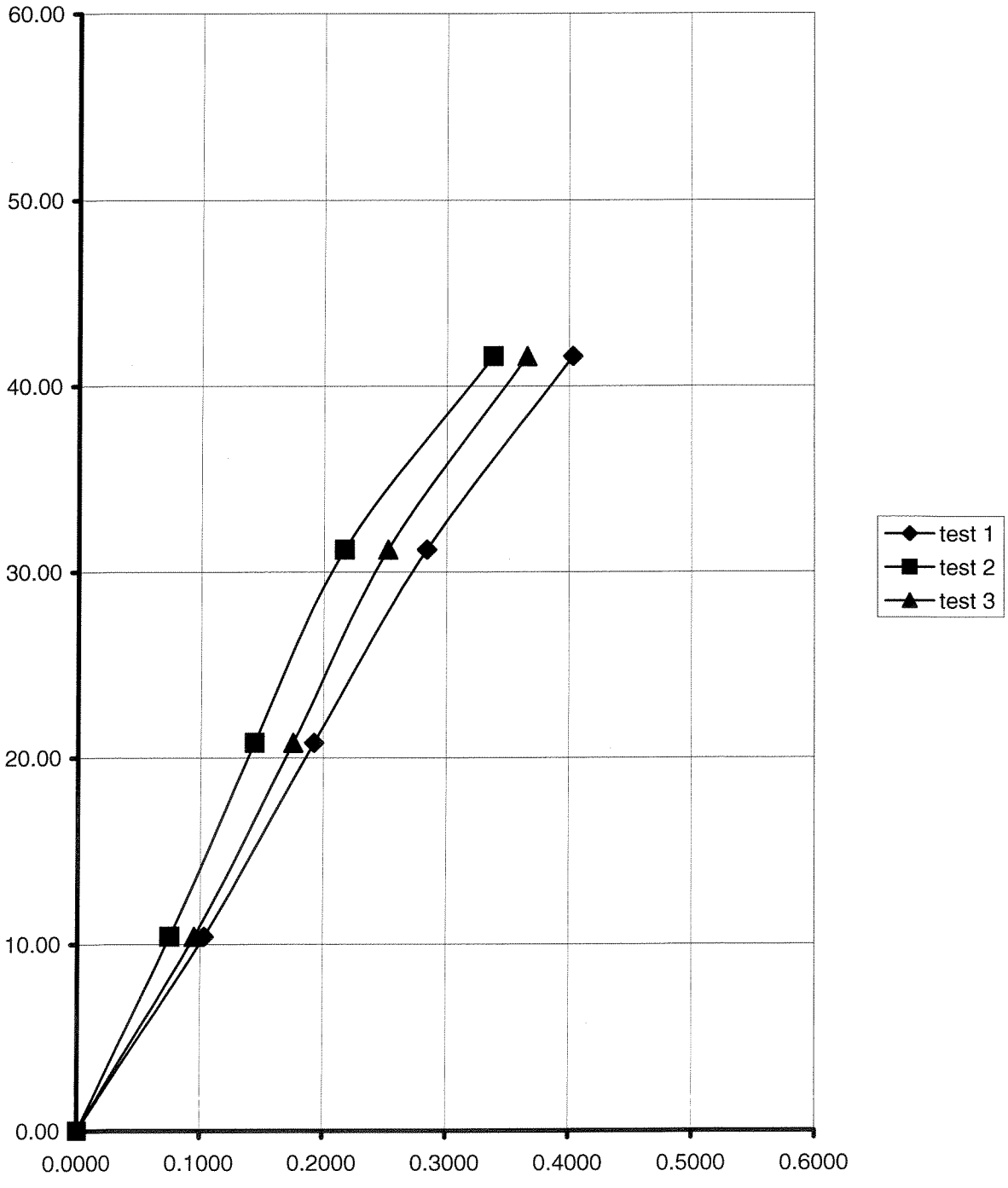
Table 5 Aerosmith 2325A Gripshank pins
5/8" 16 Ga 24" O.C. Fasteners
Glasroc Studs 6" O.C.

Load	Deflection (in)		
psf	Panel 1	Panel 2	Panel 3
0.00	0.0000	0.0000	0.0000
10.4	0.0645	0.0615	0.0560
20.8	0.1225	0.1180	0.1075
31.2	0.1790	0.2305	0.1570
41.6	0.2395	0.3095	0.2135
52	0.3120	0.3695	0.2820
62.4	0.3825		
72.8			
Ultimate			
Load	70.2	61.1	61.1

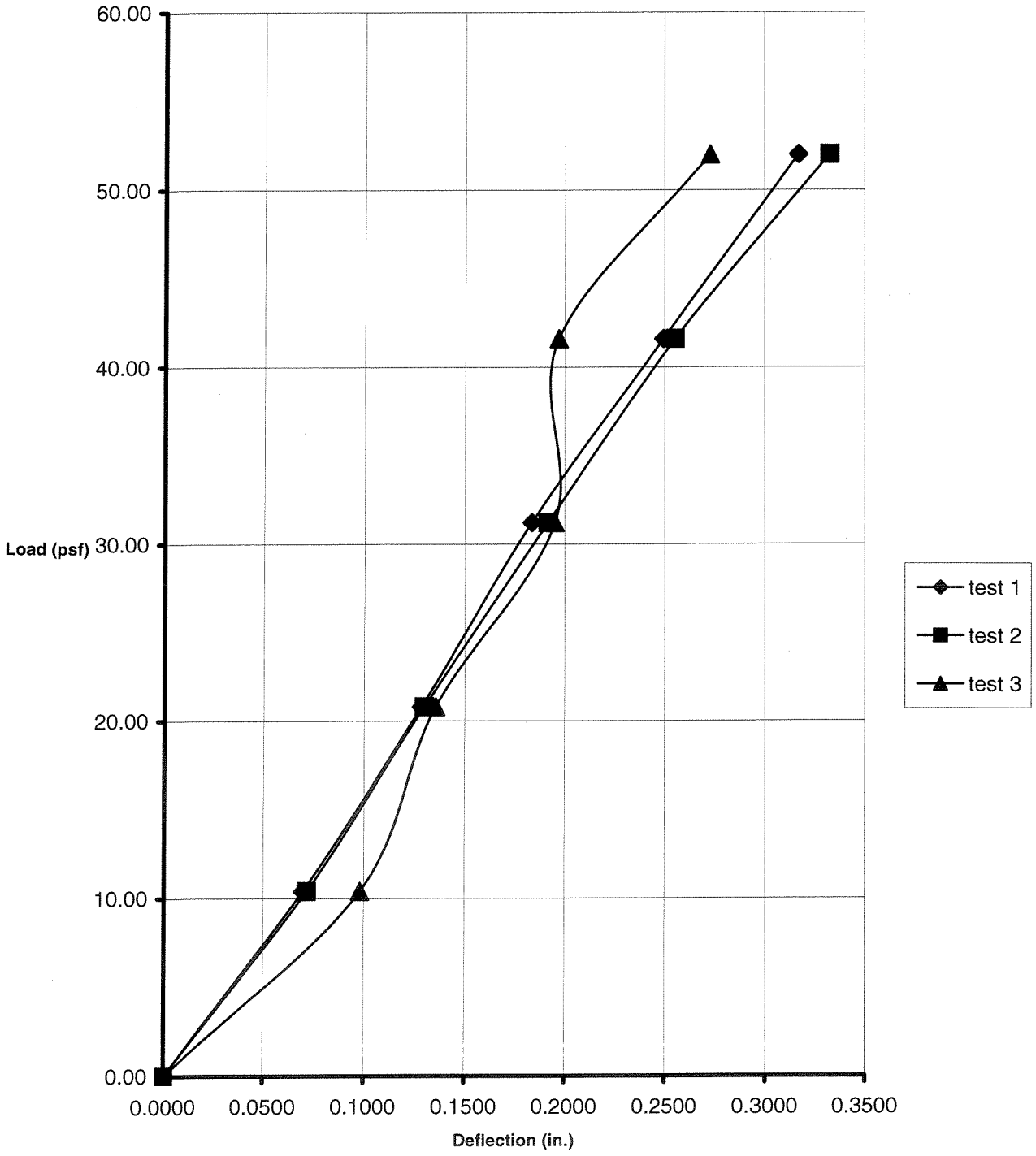
Table 6 Aerosmith 2325A Gripshank VI
1/2" 22 Ga 16" O.C. Fasteners
Glasroc Studs 8" O.C.

Load	Deflection (in)		
psf	Panel 1	Panel 2	Panel 3
0.00	0	0	0
10.4	0.0805	0.0783	missing
20.8	0.1505	0.1448	missing
31.2	0.223	0.212	missing
41.6	0.312	0.3	missing
52	0.306	0.2085	
62.4			
72.8			
Ultimate			
Load	62.4	49.4	50.7

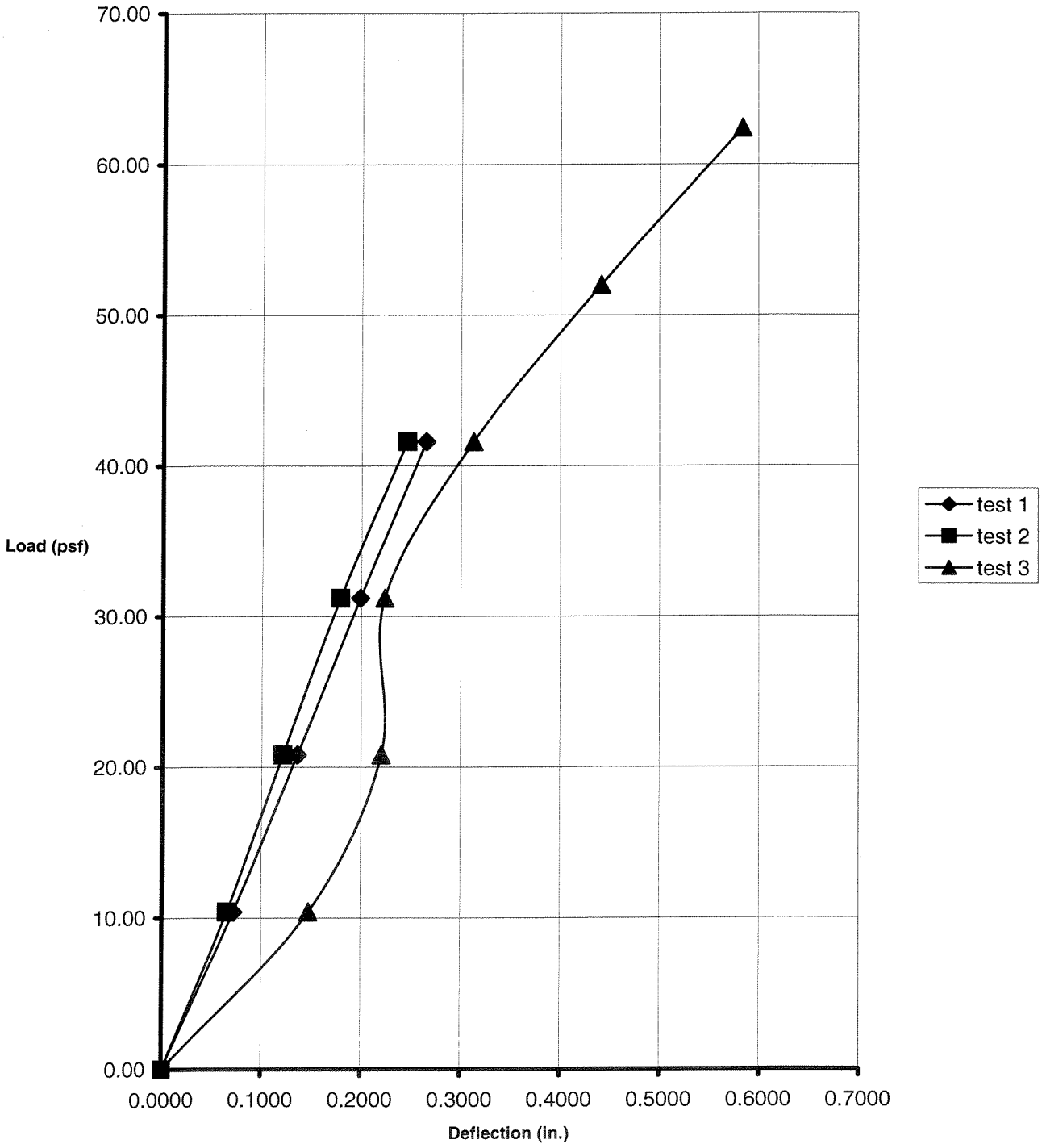
Graph 1-Load vs. Deflection- Panel with 5/8" GlasRoc® Sheathing - 22 gauge studs at 24 " o.c., Aerosmith fasteners at 8" o.c.



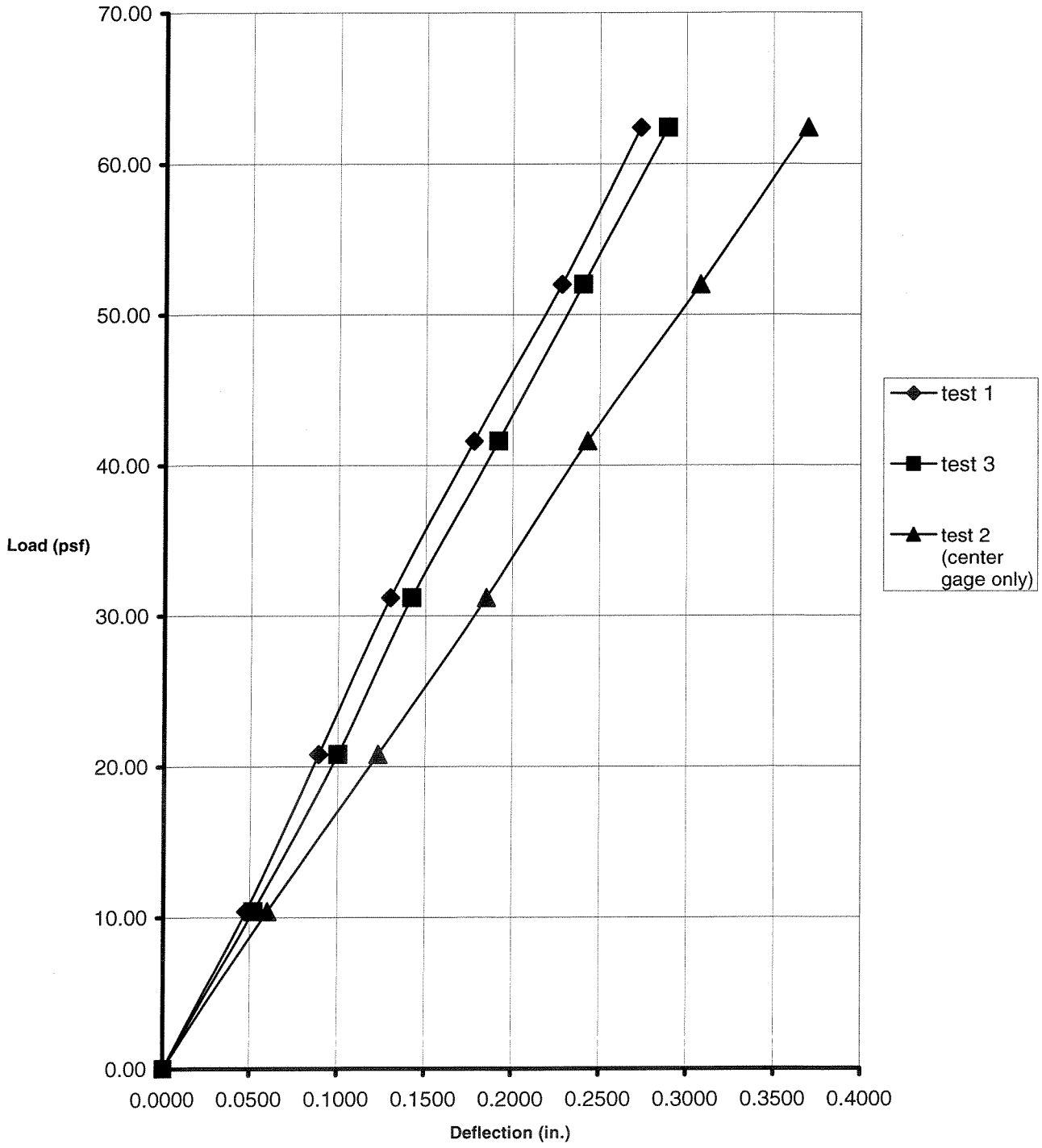
Graph 2-Load vs. Deflection- Panel with 5/8" GlasRoc® Sheathing - 18 gauge studs at 24 " o.c., Aerosmith fasteners at 8" o.c.



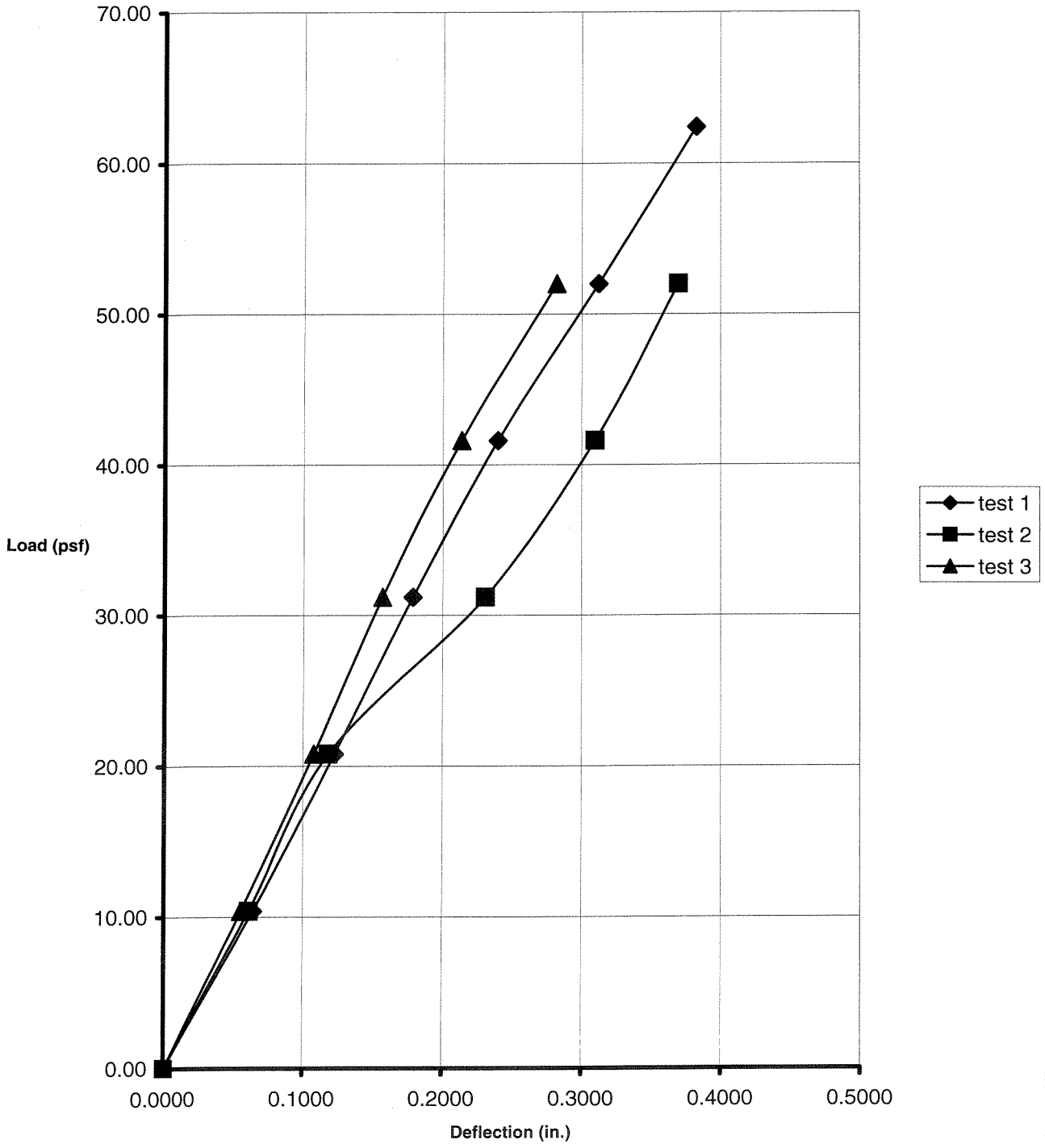
Graph 3-Load vs. Deflection- Panel with 5/8" GlasRoc® Sheathing - 16 gauge studs at 24 " o.c., Aerosmith fasteners at 8" o.c.



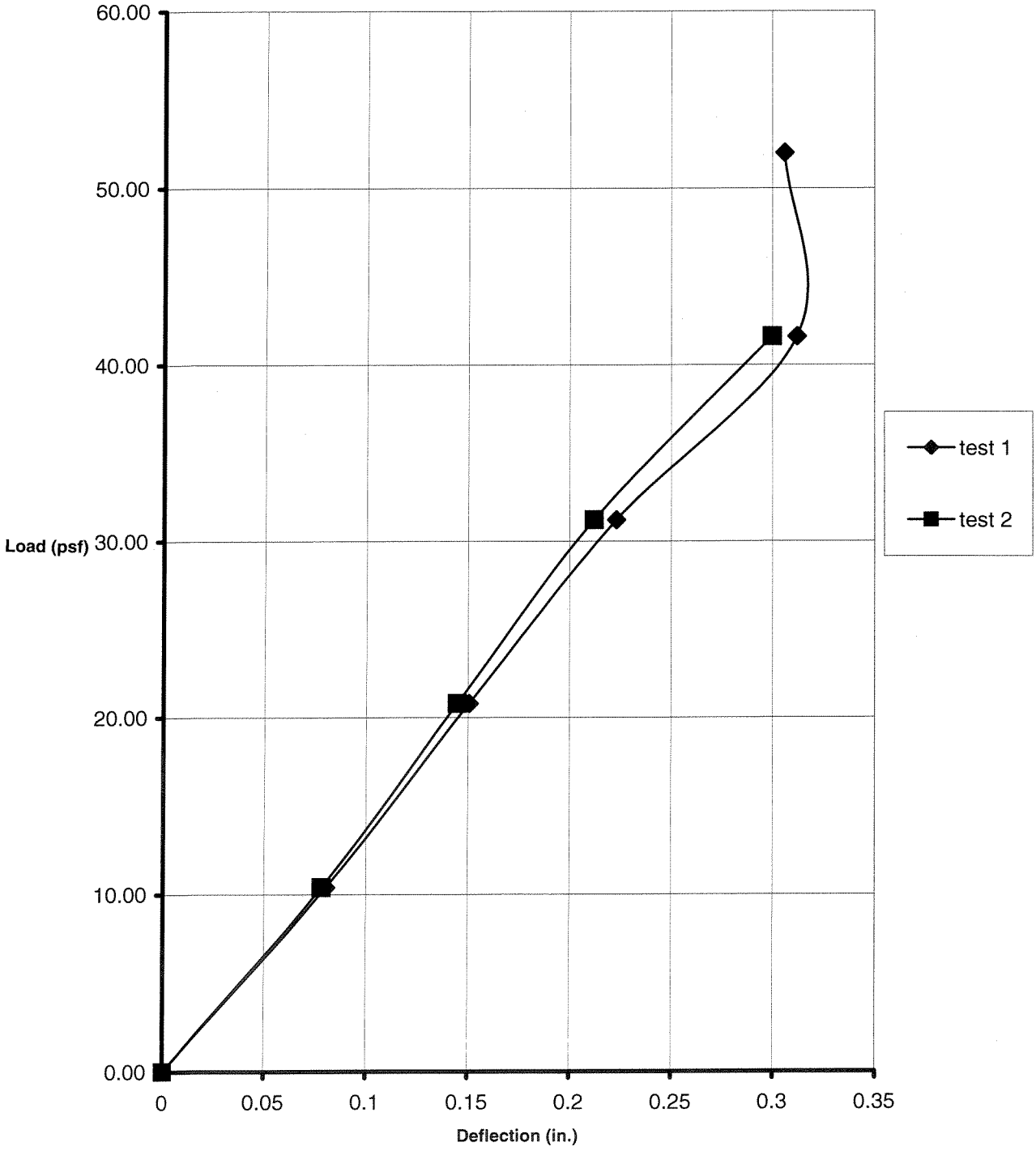
Graph 4-Load vs. Deflection- Panel with 5/8" GlasRoc® Sheathing - 16 gauge studs at 16 " o.c., Aerosmith fasteners at 8" o.c.

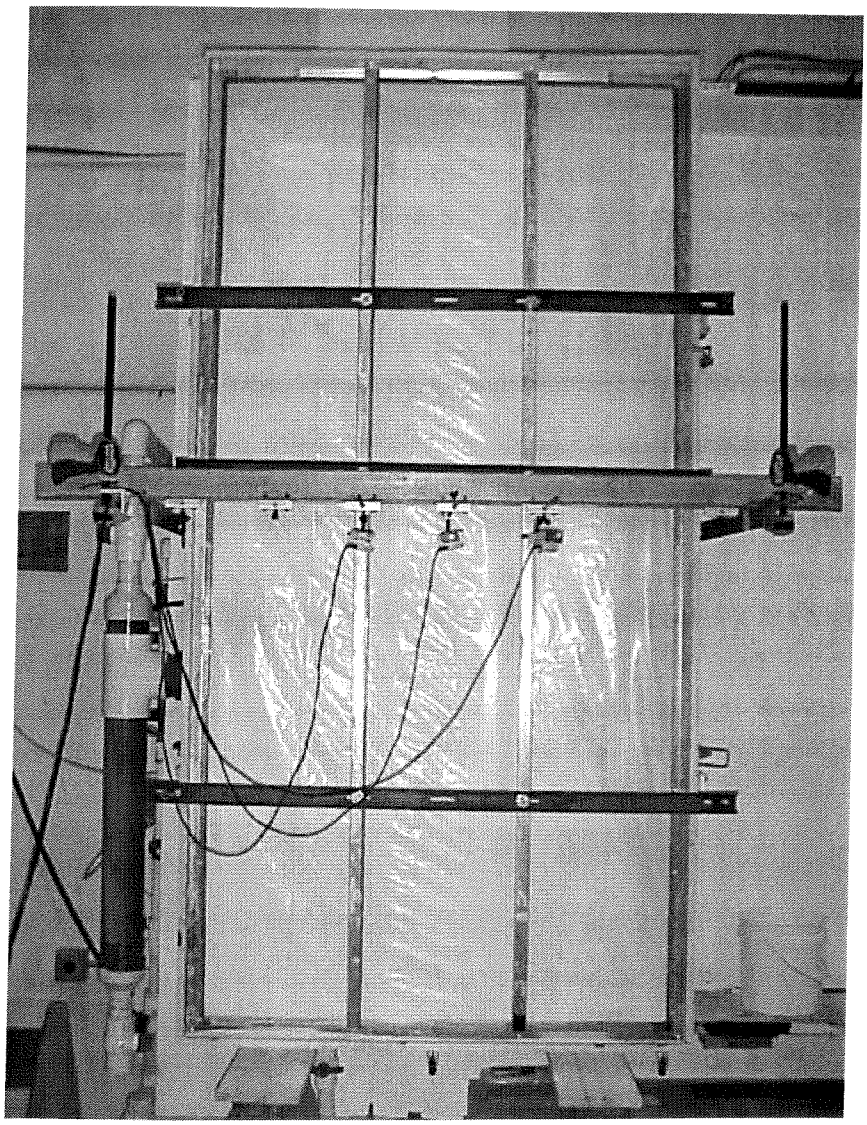


Graph 5-Load vs. Deflection- Panel with 5/8" GlasRoc® Sheathing - 16 gauge studs at 24 " o.c., Aerosmith fasteners at 6" o.c.

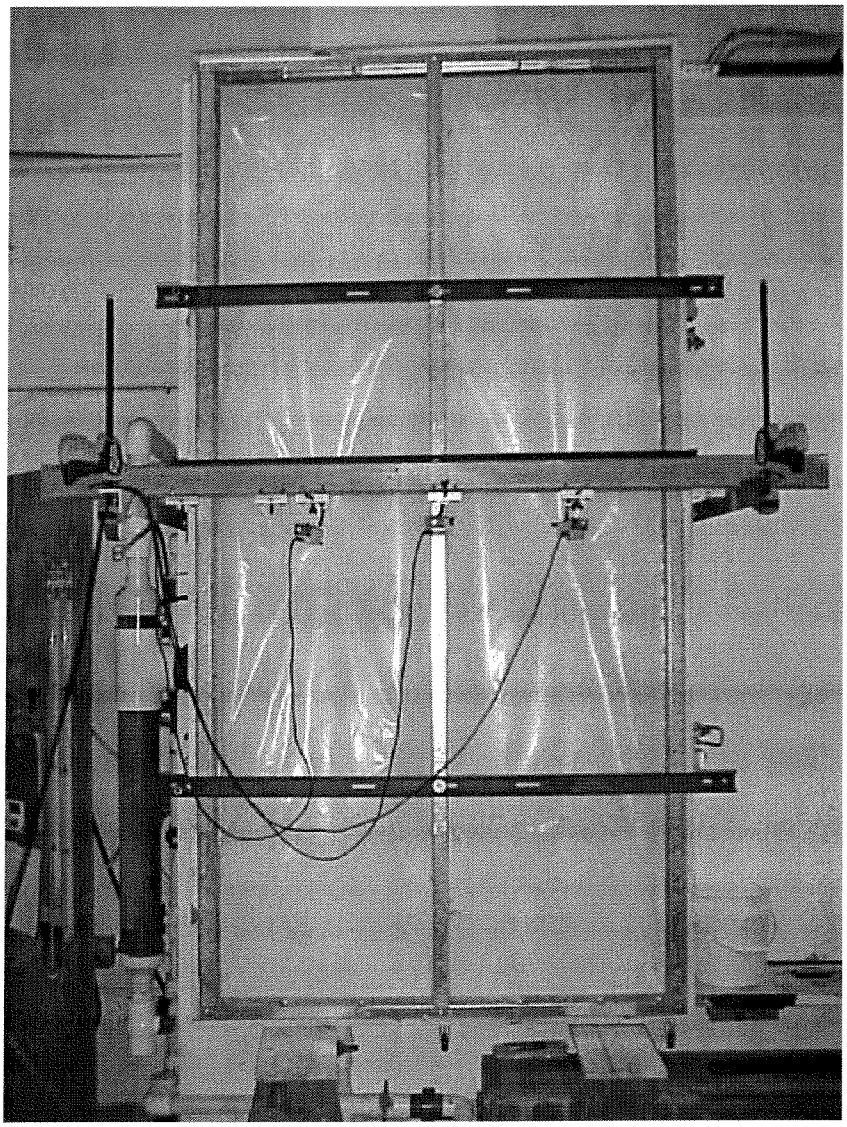


Graph 6-Load vs. Deflection- Panel with 1/2" GlasRoc® Sheathing - 22 gauge studs at 16 " o.c., Aerosmith fasteners at 8" o.c.

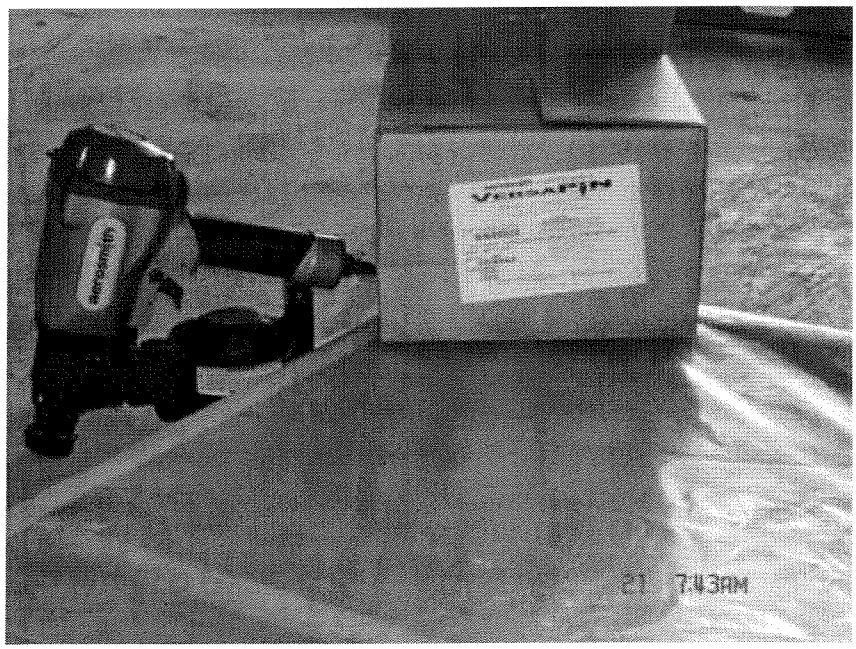




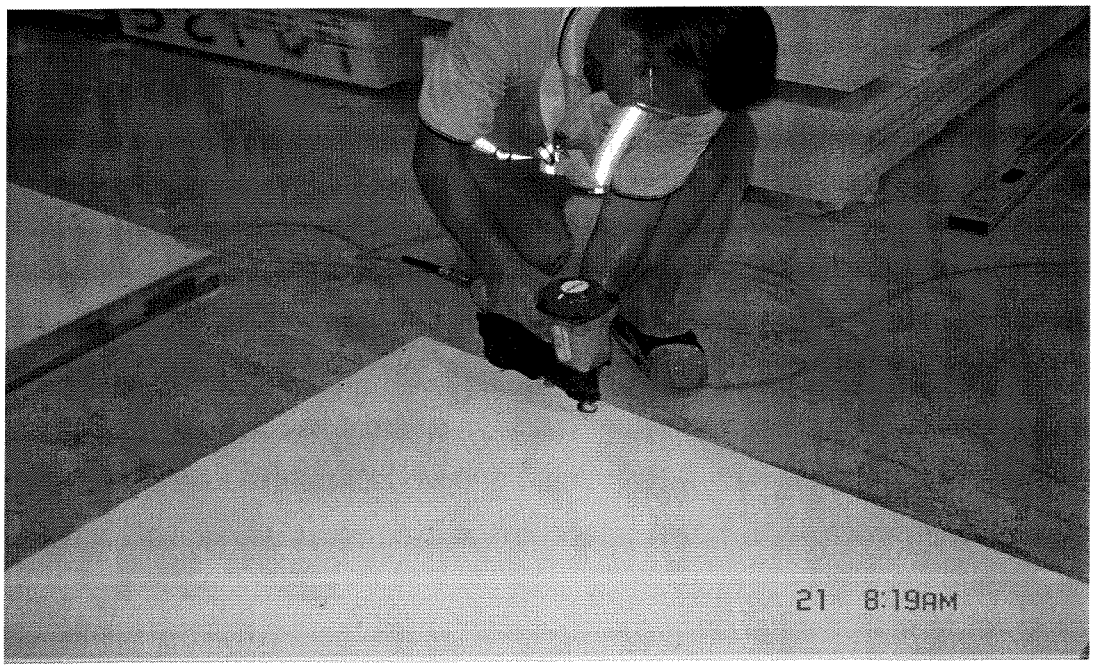
Test Specimen Details-studs 16" o.c.



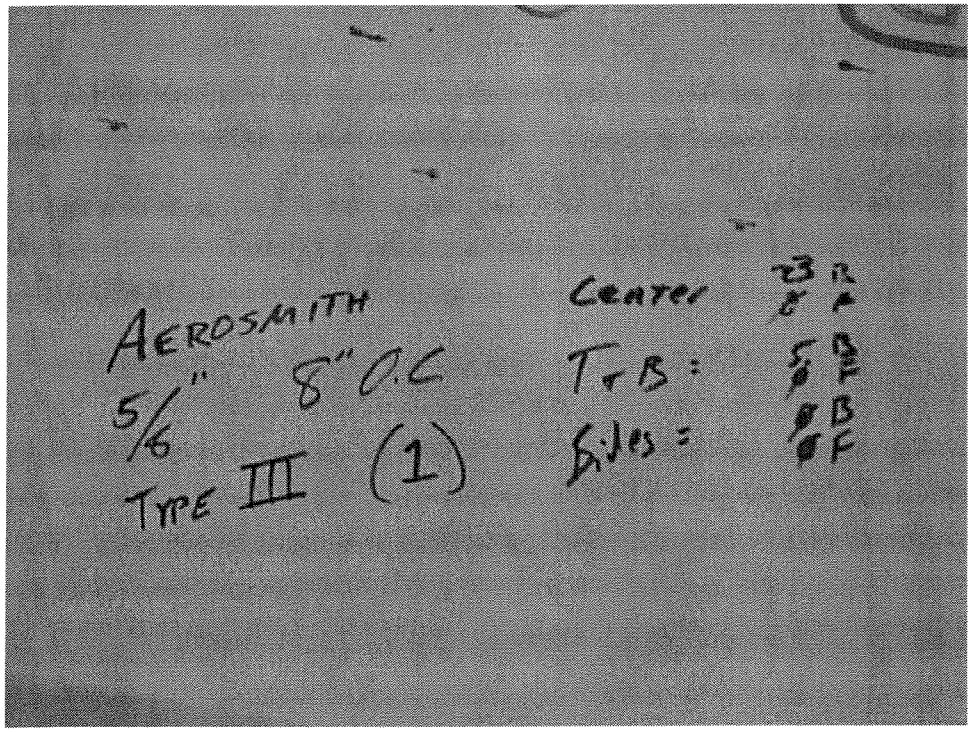
Test specimen details-studs 24" o.c.



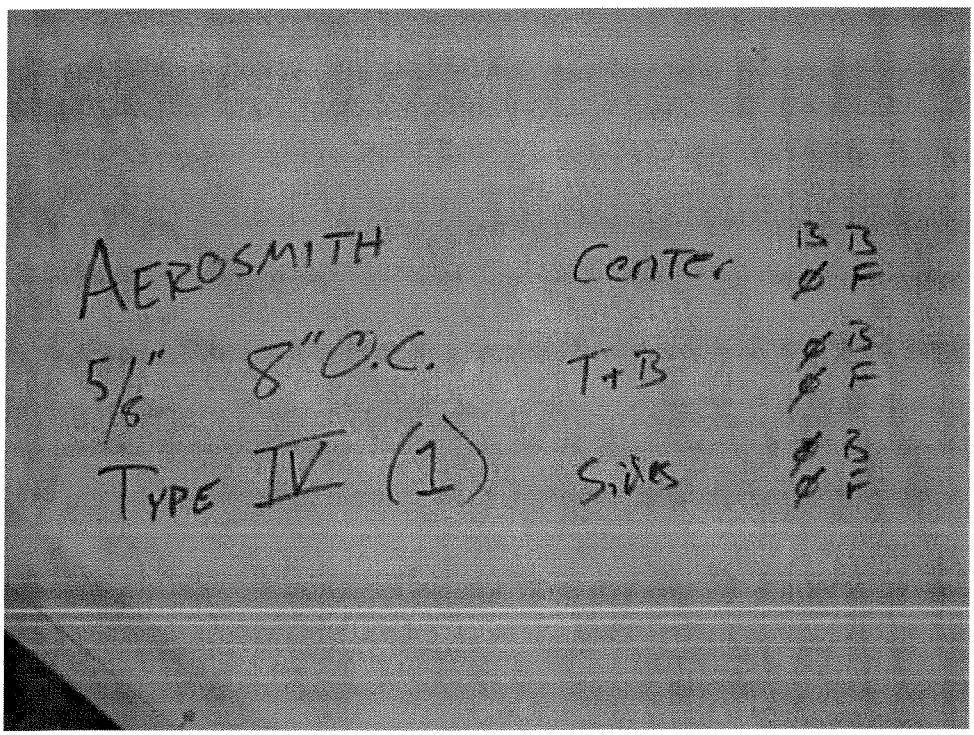
Aerosmith Versa Pin Model ST4100 Tool



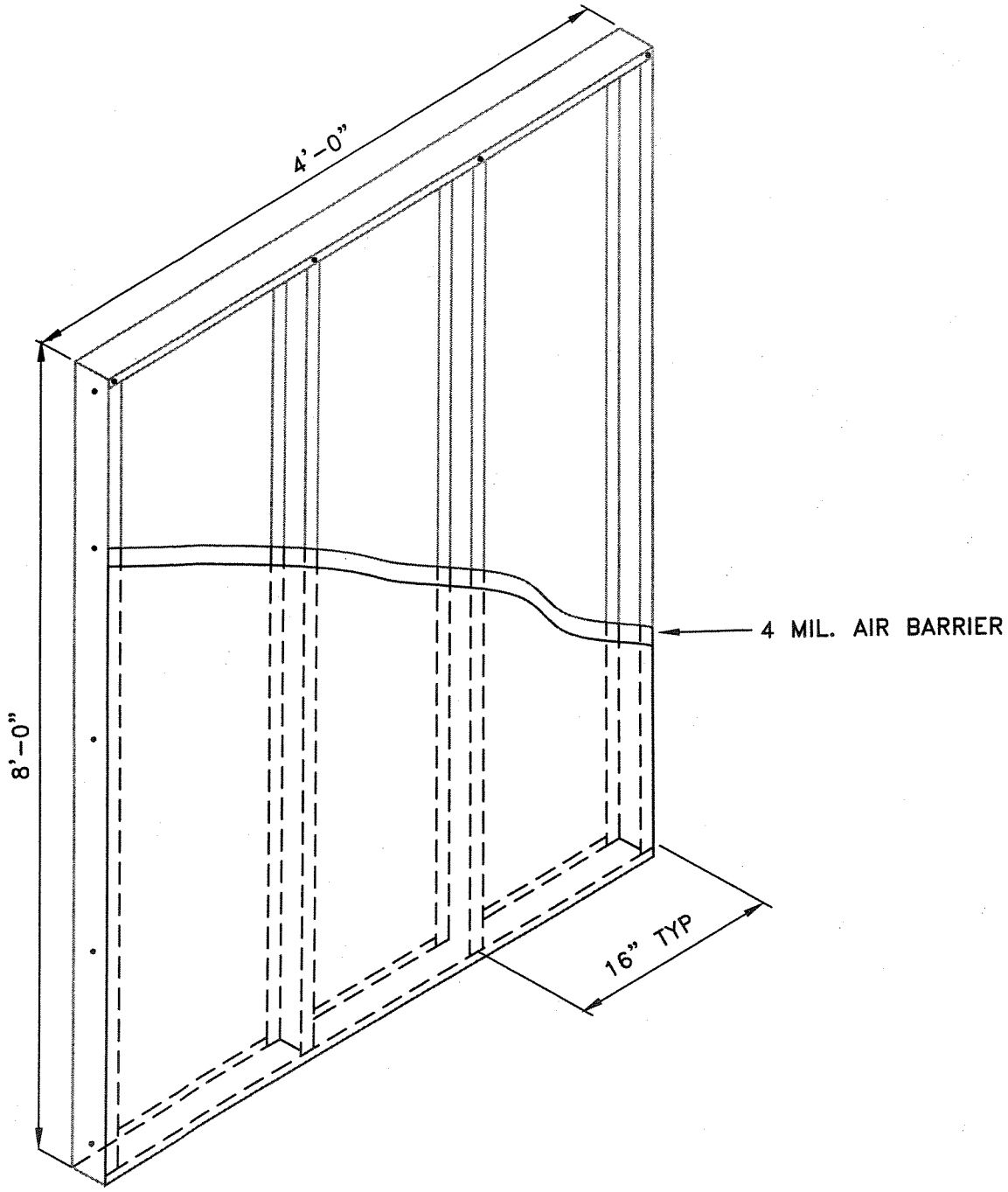
Aerosmith Versa Pin Model ST4100 Tool in use



Failure details in one Specimen



Failure details in another Specimen



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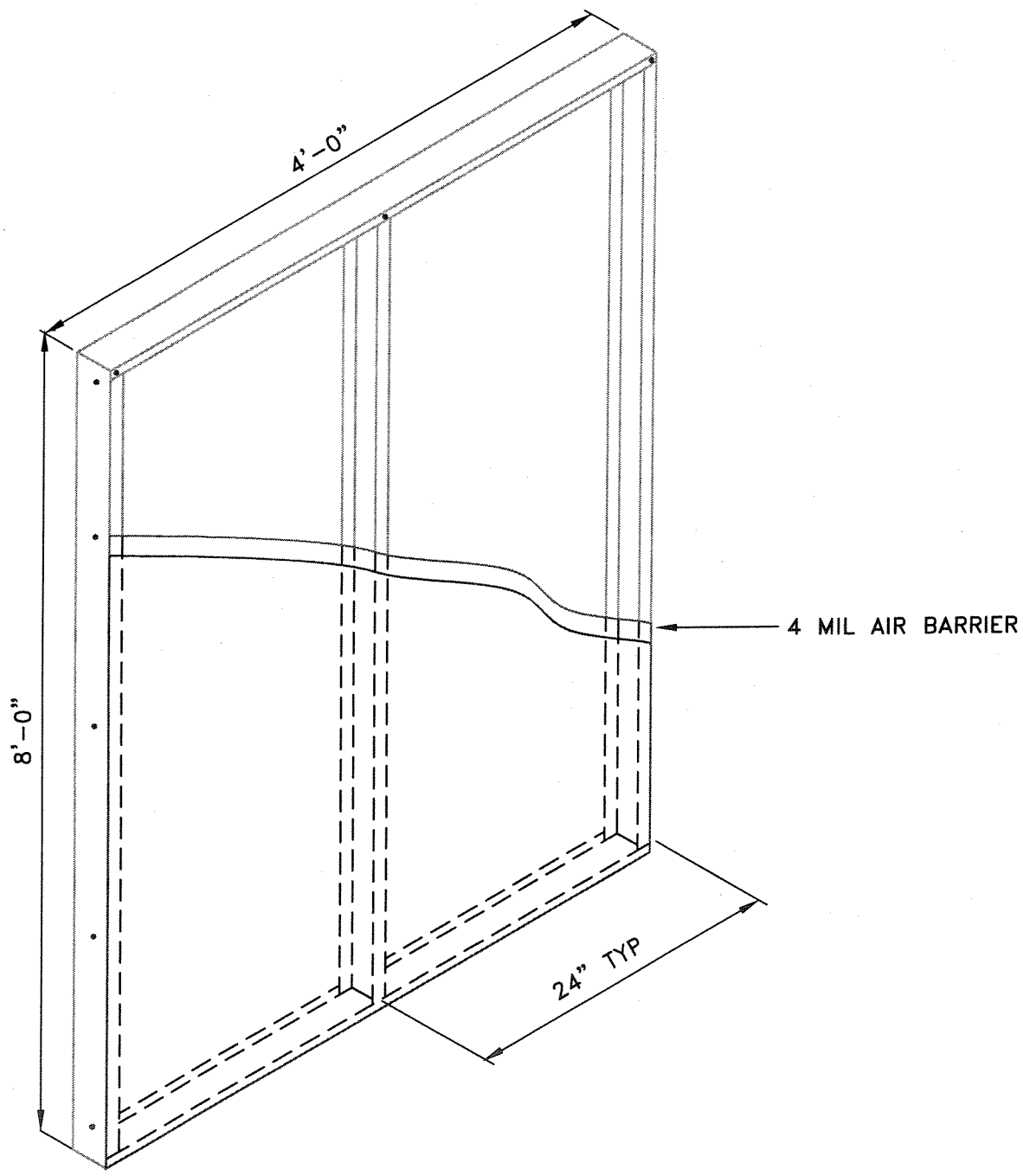

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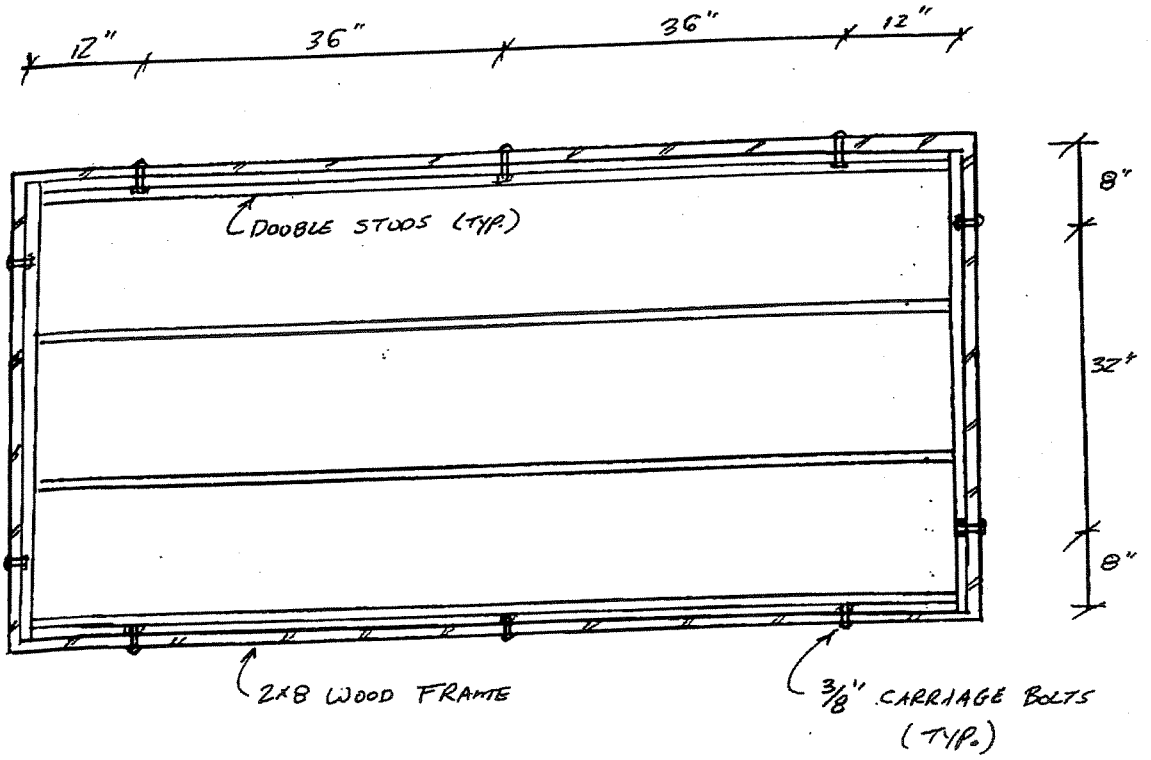
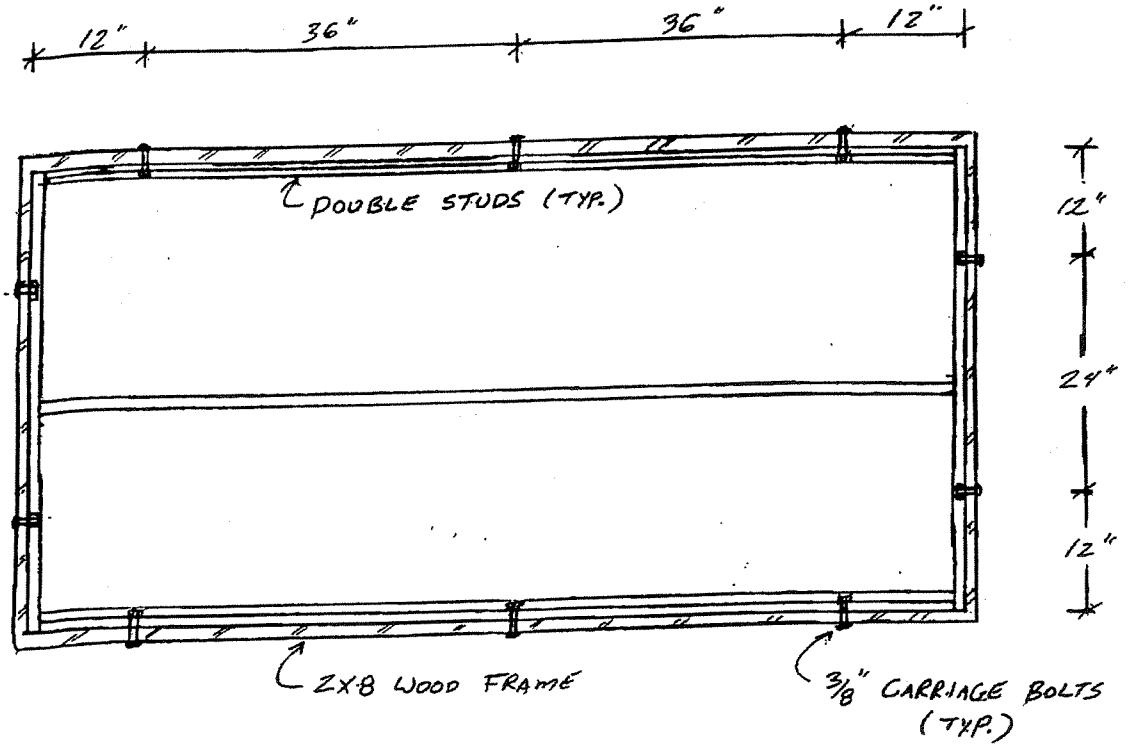
TEST FRAME CONNECTION DETAIL



4'x8' PANEL WITH STUDS @ 16" O.C.

NOTE: ALL DIMENSIONS ARE APPROXIMATE (± 4 INCHES)

TEST FRAME CONNECTION DETAIL



4'X8' PANEL WITH
STUD @ 24" O.C.

NOTE: ALL DIMENSIONS ARE APPROXIMATE (±4 INCHES)