Architectural Testing

PERFORMANCE TEST REPORT

Rendered to:

SPRAY POLYURETHANE FOAM ALLIANCE

PROJECT: Racking Load Tests

Report No.:	**67937.01-120-32**
Test Dates:	**02/06/07**
And:	**02/07/07**
Report Date:	**02/12/07**
Report Retention Date:	**02/07/11**

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Architectural Testing

PERFORMANCE TEST REPORT

Rendered to:

SPRAY POLYURETHANE FOAM ALLIANCE
4400 Fair Lakes Court
Suite 105
Fairfax, Virginia 22033

Report No.:	67937.01-120-32
Test Dates:	02/06/07
And:	02/07/07
Report Date:	02/12/07
Report Retention Date:	02/07/11

Type: Sheathed Stud Walls

Project Summary: Architectural Testing, Inc. (ATI) was contracted by Spray Polyurethane Foam Alliance to conduct performance tests on a series of stud walls with various sheathing and insulation materials.

Test Method: ASTM E 72-05 *Standard Test Methods of Conducting Strength Tests of Panels for Building Construction*, Section 14, *Racking Load - Evaluation of Sheathing Materials on a Standard Wood Frame.*

Wall Panel Description: Each panel frame measured 97-1/2" by 97-1/2" and consisted of 2x4 studs placed 16" on center. The sill plate consisted of a single 2x4 and the head employed a double 2x4 top plate. The frames were fastened together with 16d nails. The interior side of each wall was sheathed with 1/2" drywall fastened with 1-1/4" drywall screws placed 16" on center. Each wall utilized different exterior sheathing and insulating materials as follows:

Panel #1: The exterior of Panel #1 was sheathed with 1/2" OSB fastened with 2" roofing nails with a 1" diameter plastic washer spaced 16" on center. No insulating material was utilized in Panel #1.

Panel #2: The exterior of Panel #2 was sheathed with 1/2" Polyisocyanurate board with 2" roofing nails with a 1" diameter plastic washer spaced 16" on center. No insulating material was utilized in Panel #2.

Panel #3: The exterior of Panel #3 was sheathed with 1/2" Polyisocyanurate board with 2" roofing nails with a 1" diameter plastic washer spaced 16" on center. The inside of the exterior sheathing was sprayed with 1-1/2" thick #2 density spray foam insulation.

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Wall Panel Description (Continued):

Panel #4: The exterior of Panel #4 was sheathed with 1/2" Polyisocyanurate board with 2" roofing nails with a 1" diameter plastic washer spaced 16" on center. The inside of the exterior sheathing was sprayed with 3" thick #2 density spray foam insulation.

Test Specimen Installation: The panels were centered under the head of the test rig. The sill plate of the panel was fastened to the fixture base with four (4) 1/2" hex head bolts. The bolts were centered on the width of the wall and between studs. A 5" wide by 96" long channel was placed over the top of the wall with the flanges facing up. Three holes were drilled in the channel such that three 1/2" hex head bolts could fasten the channel to the head of the wall panels. See Photo No. 1 for general test set-up.

Test Procedure: The specimen was instrumented as required by the standard. Loads were applied by a hydraulic actuator at the top corner of the fixture and measured with an electronic load cell between the actuator and the specimen. The specimen was loaded and unloaded to 790 lb, 1,570 lb, and 2,360 lb. Deflections and permanent sets were recorded at each load increment. The specimen was then progressively loaded to failure. The ultimate load and failure mode was recorded.

***Note**: Test results are summarized in the following tables. Charts are presented in Appendix A and photographs are presented in Appendix C.*

Test Dates: 02/06/07 and 02/07/07
Technician: D. Spangler

Wall Shear Test Results:

Specimen	At 790 lb			At 1,570 lb			At 2,360 lb		
	Defl. (in)	Set (in)	Set (%)	Defl. (in)	Set (in)	Set (%)	Defl. (in)	Set (in)	Set (%)
1	0.23	0.17	74	0.62	0.39	63	1.73	1.14	66
2	0.44	0.28	64	N/A	N/A	N/A	N/A	N/A	N/A
3	0.13	0.03	23	0.39	0.05	13	N/A	N/A	N/A
4	0.08	0.03	38	0.28	0.08	29	N/A	N/A	N/A

Session 3 - Wall Shear Tests: (Continued)

Specimen	Ultimate Load (lb)	Comments	Photo No.
1	2,908	At 2,908 lbs. the panel would no longer hold a load. The nails through the sill plate began to pull out of the vertical studs.	2
2	1,109	At 1,109 lbs. the panel would no longer hold a load. The drywall had cracked and the screws had pulled through. The nails through the sill plate were beginning to disengage from the vertical studs.	3
3	2,259	At 2,259 lbs. the panel would no longer hold a load. The nails through the sill plate were bent and disengaging from the vertical studs.	4
4	2,152	At 2,152 lbs. the panel would no longer hold a load. The nails through the sill plate were bent and disengaging from the vertical studs.	5
See Chart No. 1 though 4 in Appendix A.			

For ARCHITECTURAL TESTING, INC.

Dwayne A. Spangler

Digitally Signed by: Dwayne A. Spangler

Dwayne A. Spangler
Project Engineer

Digitally Signed by: Joseph W. Wise

Joseph W. Wise.
Director – Project/Curtain Wall Testing

DAS:jld

Attachments (pages):
Appendix-A: Charts (4)
Appendix-B: Sketch (1)
Appendix-C: Photographs (3)

Revision Log

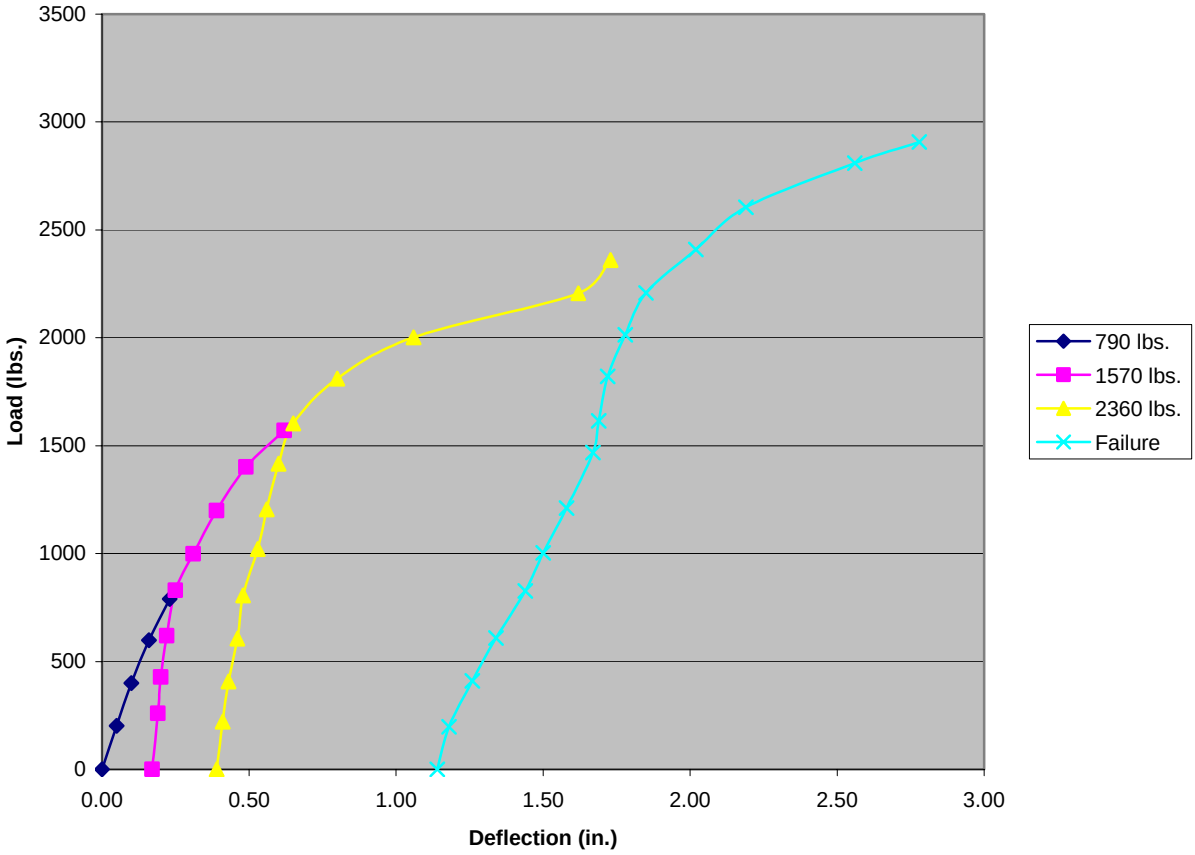
Rev. #	Date	Page(s)	Revision(s)
0	02/13/07	N/A	Original report issue.

APPENDIX A

Charts

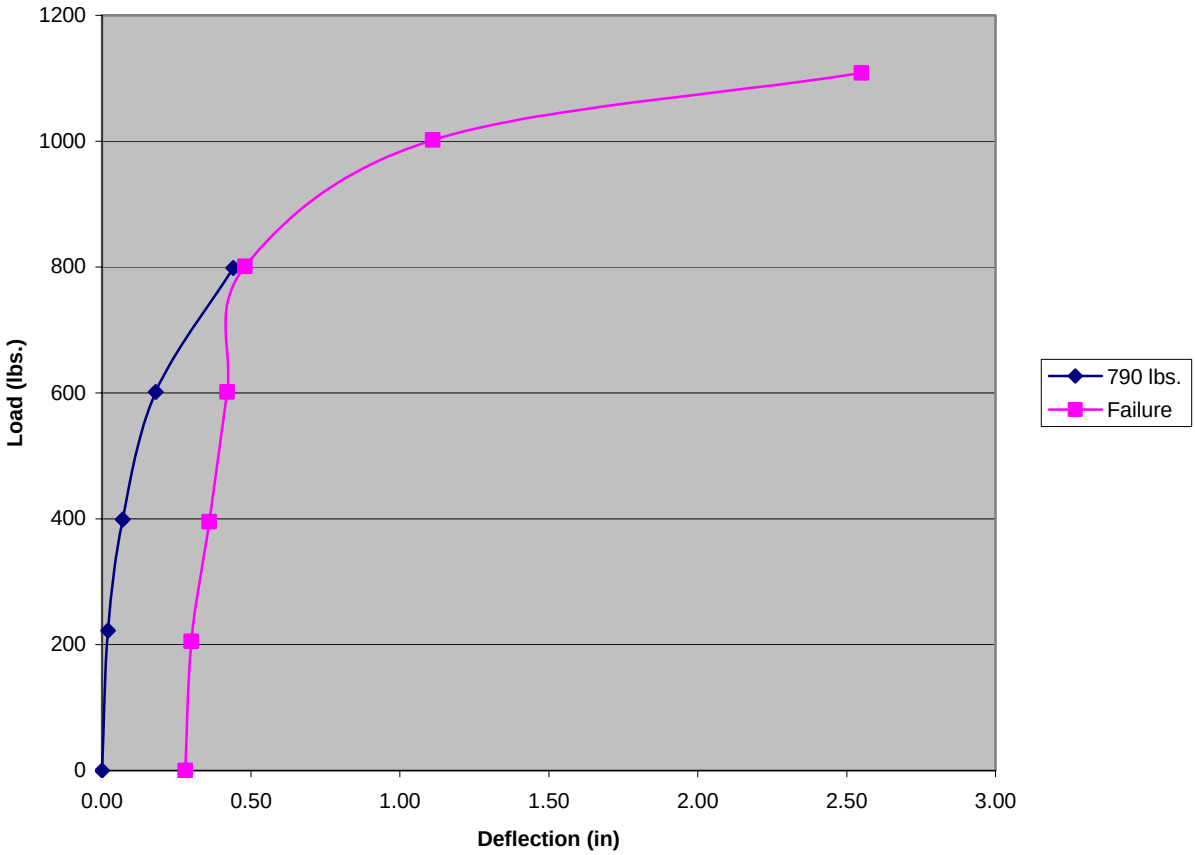
Architectural Testing

Sample #1



Architectural Testing

Sample #2



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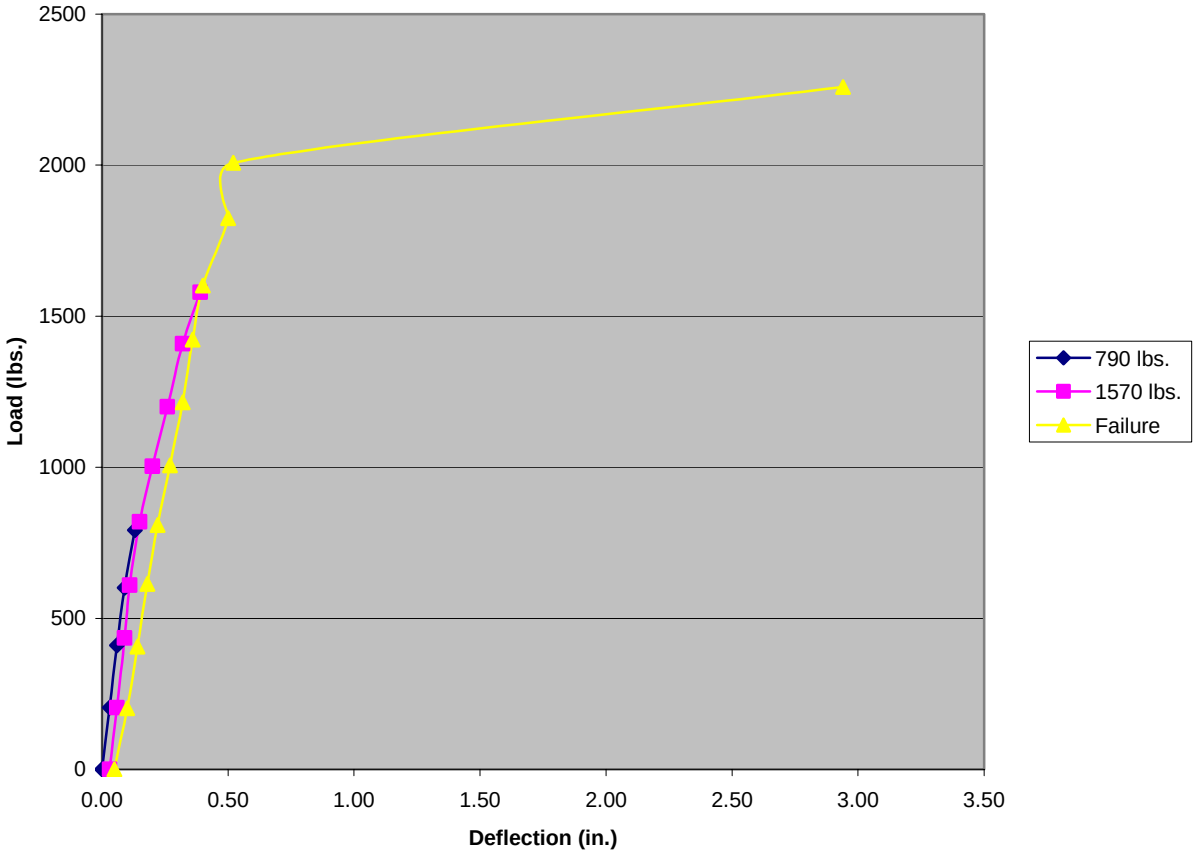
Sample #3



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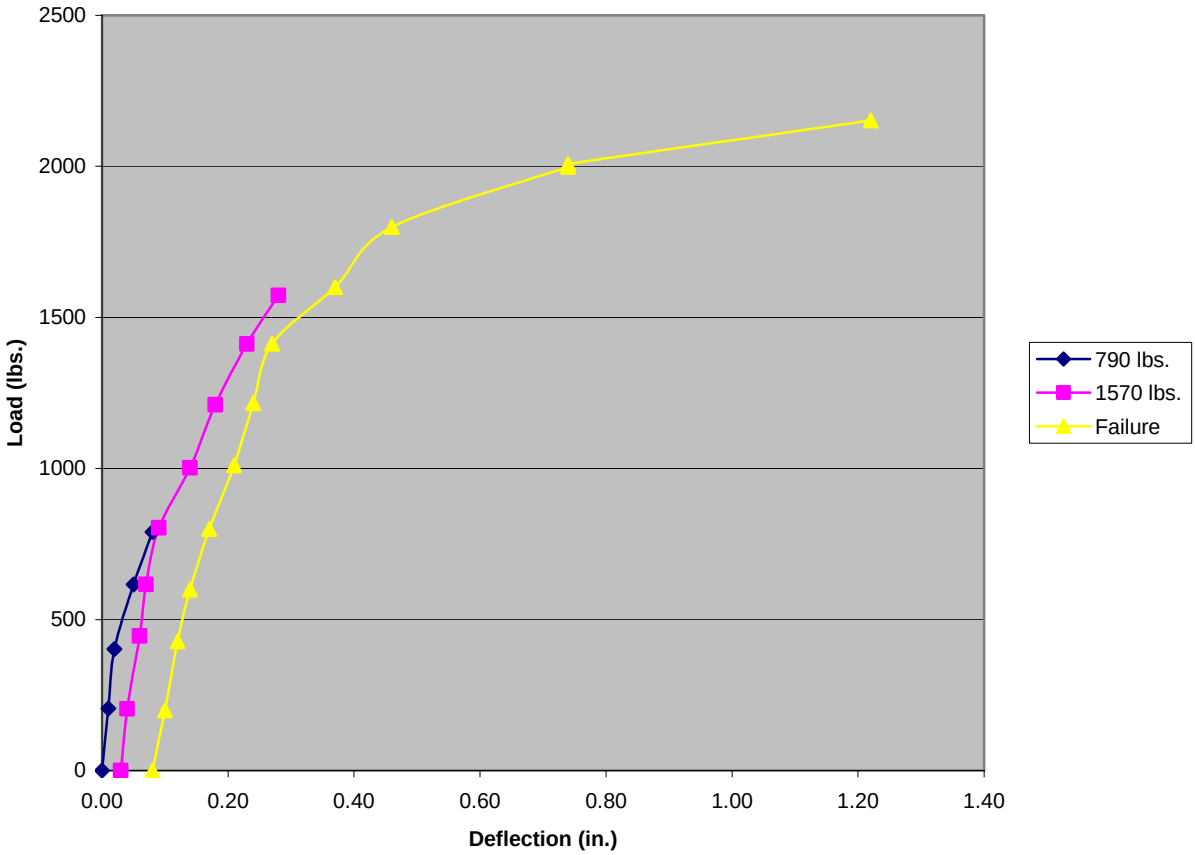
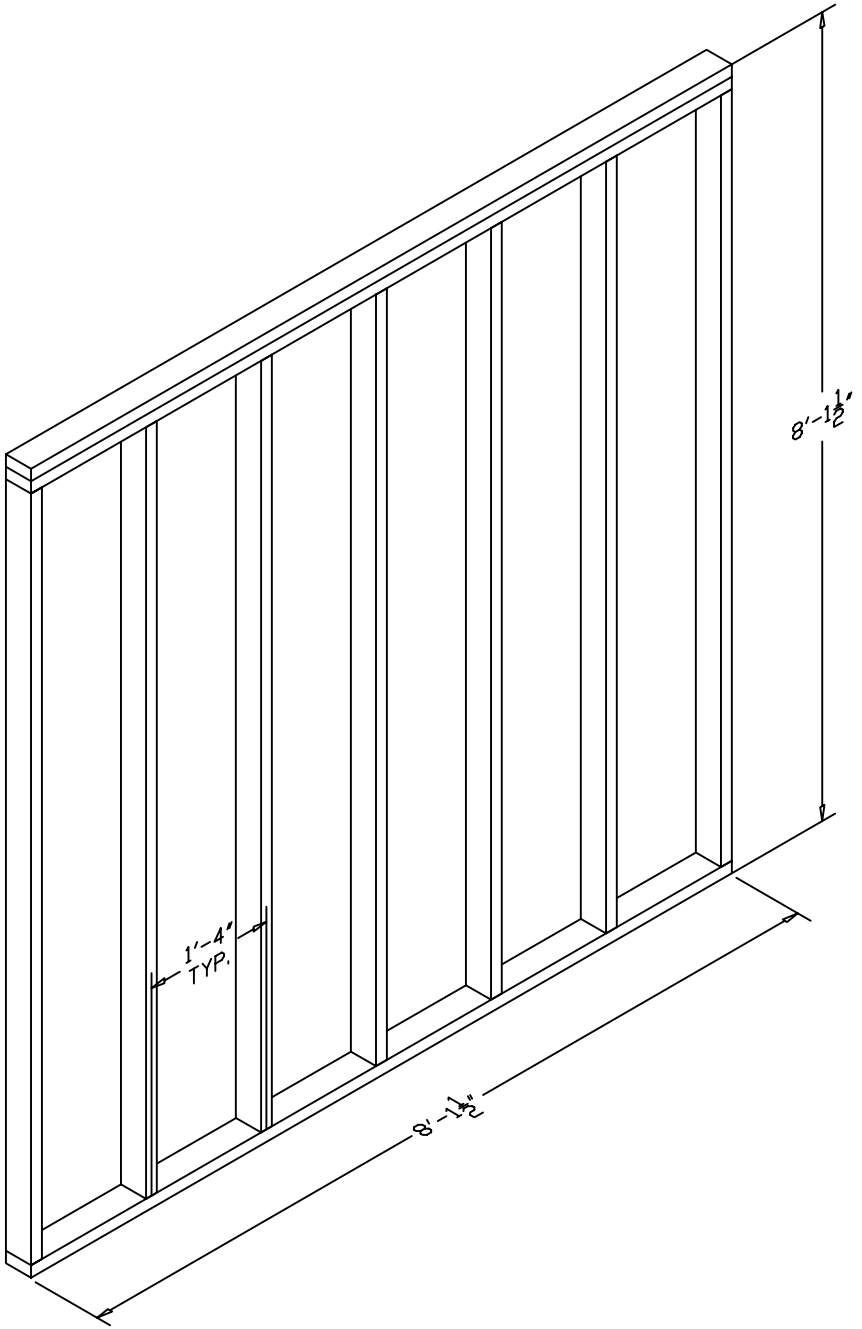
Sample #4



APPENDIX B

Sketch

REV	DATE	DESCRIPTION	BY



PROJECT NO. 6793.01 120-32	PROJECT NAME: ASTM E 72 TESTING CLIENT: SPRAY POLYURETHANE FOAM ALLIANCE	Architectural Testing	DRAWING: TYPICAL WALL PANEL FRAME	DWG. BY: das DATE: 2/8/07	SHEET 1 OF 1

APPENDIX C

Photographs

Photo No. 1
General Test Set-up

Photo No. 2
Sample #1 Stud Disengagement

Photo No. 3
Sample #2 Stud Disengagement and Drywall Cracking

Photo No. 4
Sample #3 Stud Disengagement

Photo No. 5
Sample #4 Stud Disengagement