

AAMA 508 TEST REPORT

Rendered to:

BAMCO INC.

SERIES/MODEL: ACM Wall Panel

PRODUCT TYPE: Pressure Equalized Rain Screen

This report contains in its entirety:

Cover Page: 1 page
Report Body: 6 pages
Graph: 1 page
Drawings: 4 pages

Report No.: 91677.01-109-44

Revision 2: 01/20/14

Test Dates: 05/27/09

Through: 03/02/10

Report Date: 03/26/10

Record Retention End Date: 03/02/14

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BAMCO INC.
30 Baekeland Avenue
Middlesex, New Jersey 08846

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Project Summary: Architectural Testing, Inc. was contracted by Bamco Inc. to perform testing in accordance with AAMA 508-07, *Voluntary Test Method and Specification for Pressure Equalized Rain Screen Wall Cladding Systems*. General construction details and test results are included herein. The sample was provided by the client.

Test Methods:

Air Infiltration: ASTM E 283-04, *Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen*. Testing was conducted at 1.57 psf positive static air pressure difference.

Cyclic Static Air Pressure Differential: ASTM E 1233-00, *Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Cyclic Static Air Pressure Differential*. Testing was conducted at 25.0 psf with 100 three-second cycles.

Static Pressure Water Resistance: ASTM E 331-00, *Standard Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference*. Testing was conducted at 6.24 psf positive static air pressure difference for a 15 minute duration. Water was applied to the mock-up at a minimum rate of 5 gal/ft²/hr.

Dynamic Pressure Water Resistance: AAMA 501.1-05, *Standard Test Method for Exterior Windows, Curtain Walls, and Doors for Water Penetration Using Dynamic Pressure*. Testing was conducted with a dynamic pressure equivalent of 6.24 psf for a 15 minute duration. Water was applied to the mock-up at a minimum rate of 5 gal/ft²/hr.

Test Specimen Description:

Series/Model: ACM Wall Panel

Product Type: Pressure Equalized Rain Screen

Overall Size: 96" wide by 96" high

Panel Sizes (4): 47-3/4" wide by 47-3/4" high

Rain Screen Construction: The wall was constructed of four aluminum ACM panels that measured 4 mm (0.160") thick. The panels utilized a 90° route and return bend on all sides. The panels utilized a 1-1/2" by 1" by 1/8" thick extruded aluminum tube reinforcement stiffener at the horizontal center. The extruded aluminum stiffeners were secured to the panels with silicone. The panels were secured to an extruded aluminum clip (Part #DX-5100) on all sides with a 1/8" diameter pop-rievet located 1/2" from each end of the top and bottom, and two pop-rievets located 1/2" and 5/16" from each end on the sides. The corners of the panels were keyed with a right-angle aluminum triangle bracket, measuring 3" wide by 3" high by 0.048" thick and was secured by #10 x 3/4" long self-tapping hex head screws, one per side, two per bracket.

The bottom panels were laid into an extruded aluminum mounting clip (Reference Drawing #SK-D-3E and Part #DX-5400) and secured at the head of the bottom panels with an extruded aluminum joint clip, (Reference Drawing #SK-D-2E and Part #DX-5200). The top panels were laid into the extruded aluminum joint of the panel below it, (Reference Drawing #1.02 Detail 04) and the extruded aluminum vertical joint clip, (Reference Drawing #SK-D-2E and Part #DX-5200) and were secured at the head with an extruded aluminum mounting clip, (Reference Drawing #SK-D-1E detail 2-D1E and Part #DX-5300). The jambs of both the top and bottom panels were secured to an extruded aluminum jamb clip (Reference Drawing #SK-D-1E detail 1-D1E and Part #DX-5300). The vertical and horizontal extruded clips at the joints were covered with a custom cut ACM panel that slid into the groove of the adjacent panel clips. The bottom aluminum clip was secured through the Lexan barrier to the steel stud wall with #10 x 1-1/2" long hex head self-tapping screws spaced 16" on center. The jamb and joint extruded aluminum clips were secured to a 16 gauge hat channel with #10 x 3/4" long hex head self-tapping screws, spaced 24" on center. The head mounting clip was secured to a 16 gauge steel "Z" shaped girt with 10 x 3/4" long pan head self-tapping screws spaced 16" on center. The girt was secured through the Lexan barrier to the steel stud wall with #10 x 1-1/2" long hex head self-tapping screws, spaced 16" on center. The hat channel a "Z" girt were secured to the wall with #10 x 1-1/2" long TEK 3 screws, spaced 16" on center into each steel stud. The bottom edge of each panel utilized 2-1/4" wide by 1/4" long weepslots located 11-5/8" from each end. The weepslots were covered with a fiberglass mesh which was secured to the interior of the panel with silicone.

Test Specimen Description:

Test Set-Up: An 8' wide by 8' high steel stud wall was constructed with 16 gauge steel studs. The steel studs were spaced 16" on center inside a 2x10 wood buck. The stud wall was covered with a 1/4" thick sheet of clear Lexan, sealed and secured to the exterior of the steel studded wall to simulate an air/water barrier. The wall panel system was then installed onto the clear Lexan in a manner consistent with normal construction procedures for the system. The clear Lexan was calibrated to a pre-determined air leakage rate by drilling 1/8" diameter holes on the backside in a uniform pattern, making sure to create an even pressure drop and leakage rate across the wall and in each quadrant. The exterior of the test unit was sealed to the wood buck with silicone.

Test Results: The following results have been recorded:

<u>Title of Test - Test Method</u>	<u>Results</u>	<u>Allowed</u>
Air Infiltration per ASTM E 283 1.57 psf (25 mph)	0.12 cfm/ft ²	0.11 cfm/ft ² min. 0.13 cfm/ft ² max.

Observations: *The calibrated leakage was achieved with sixty 1/8" diameter holes drilled through the Lexan.*

Pressure Cycling per ASTM E 1233 100 cycles from 5.0 psf to 25.0 psf	<0.01 sec.* 4.41 psf PASS	0.08 sec. 12.9 psf (50% of Max. Pressure)
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Observations: *Pressure tap was attached through the air barrier at center point between first and second studs.*

Water Penetration per ASTM E 331 6.24 psf	1 in ² PASS	3.2 ft ²
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Observations: *A small amount of water droplets, measuring 1" by 1" was observed on the Lexan. There was no uncontrolled streaming of water on Lexan.*

Water Penetration per AAMA 501.1 6.24 psf	1 in ² PASS	3.2 ft ²
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Observations: *A small amount of water droplets measuring 1" by 1" was observed on the Lexan. There was no uncontrolled streaming of water on Lexan.*

*See Pressure Cycling graph in Appendix A.

Test Equipment:

- Computerized control panel to run positive pressures, cyclic pressures, and measure air leakage rates.
- Structural test chamber to mount the test wall, as to evaluate the performance of the wall panel system for static and cyclic pressures, as well as water penetration. The wall was situated such that the interior side of the Lexan test wall was accessible to observe air and water leakage.
- Dynamic wind generator to create a wind pressure to test the wall panel system for dynamic water penetration.
- Computerized data management equipment to read, log, and graph differential pressures.

Test Witnesses: The following representatives witnessed all or part of the testing:

<u>Name</u>	<u>Company</u>
Thomas Lawlor	Architectural Testing, Inc.
Jeremy R. Bender	Architectural Testing, Inc.
Jeramie D Grabosch	Architectural Testing, Inc.
Emily C. Riley	Architectural Testing, Inc.
Ken R. Stough	Architectural Testing, Inc.
Michael D. Stremmel, P.E.	Architectural Testing, Inc.
Russell W. Clark	Architectural Testing, Inc.

Architectural Testing 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 Architectural Testing, Inc. for the entire test record retention period.

Results obtained are tested values and were secured by using the designated test 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 the specimen(s) tested. This report may not be reproduced, except in full, without the written approval of Architectural Testing, Inc.

For ARCHITECTURAL TESTING, INC.

Timothy J. McGill
Project Engineer

Joseph A. Reed, P.E.
Director - Engineering

RWC:dem/cmd

Attachments (pages): This report is complete only when all attachments listed are included.

Appendix-A: Graph (1)

Appendix-B: Drawings (4)

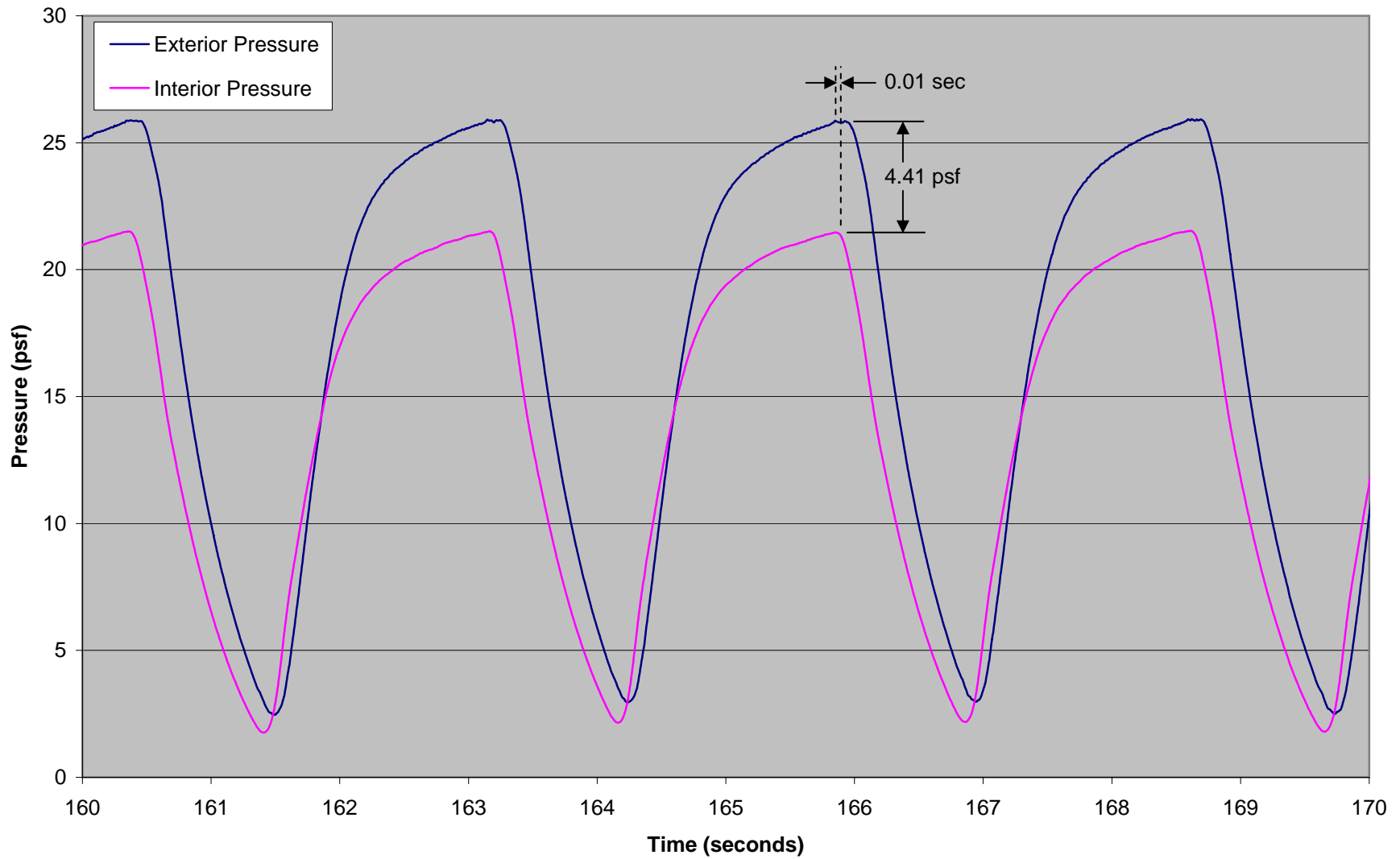
Revision Log

<u>Rev. #</u>	<u>Date</u>	<u>Page(s)</u>	<u>Revision(s)</u>
0	03/26/10	N/A	Original report issue
1	03/30/10	Cover page and Summary page	Corrected Expiration Date to 03/02/14
2	01/20/14	Cover page and Summary page	Changed Expiration Date to Record Retention End Date

Appendix A

Graph

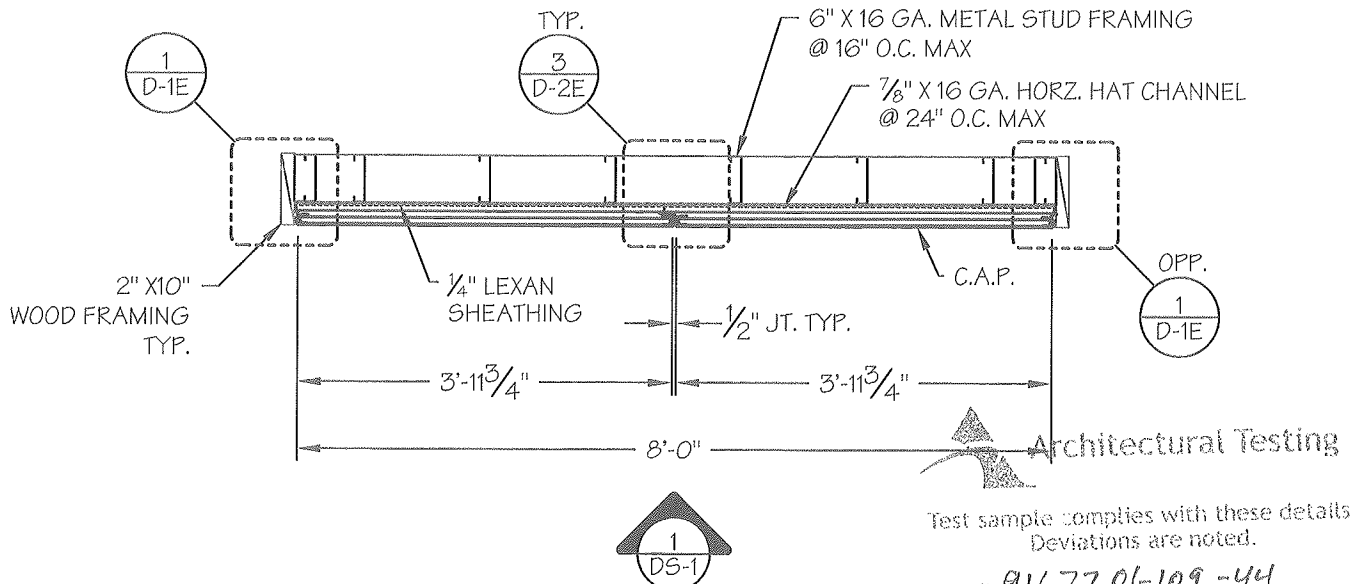
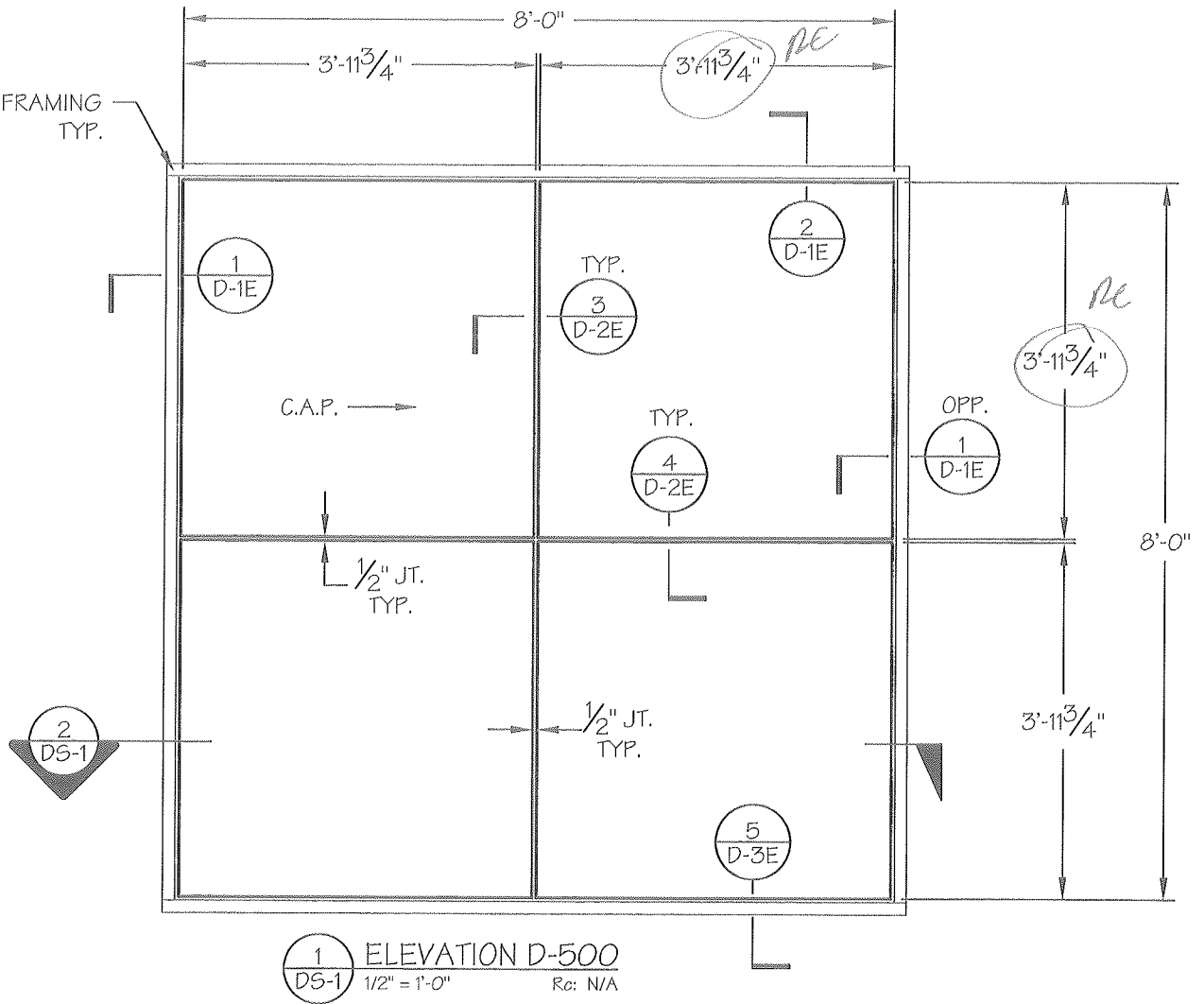
AAMA 508 Pressure Cycling per ASTM E1233



Appendix B

Drawings

2" X 10" WOOD FRAMING
TYP.



8'-0" X 8'-0" PAGE 1 OF 1
DRY SYSTEM TEST D-500

2 FLOOR PLAN D-500
D5-1 1/2" = 1'-0" Re: N/A

STIFFENER SPACING TO BE DETERMINED

BAMCO inc.

PHONE: (732) 302-0889
FAX : (732) 302-9456

Project Name/Address: SYSTEM TEST 2009

General Contractor: PRESSURE EQUALIZED TEST D-500 DRY SYSTEM

Drawing No.

SK-

30 Backland Avenue, Middlesex, NJ 08846

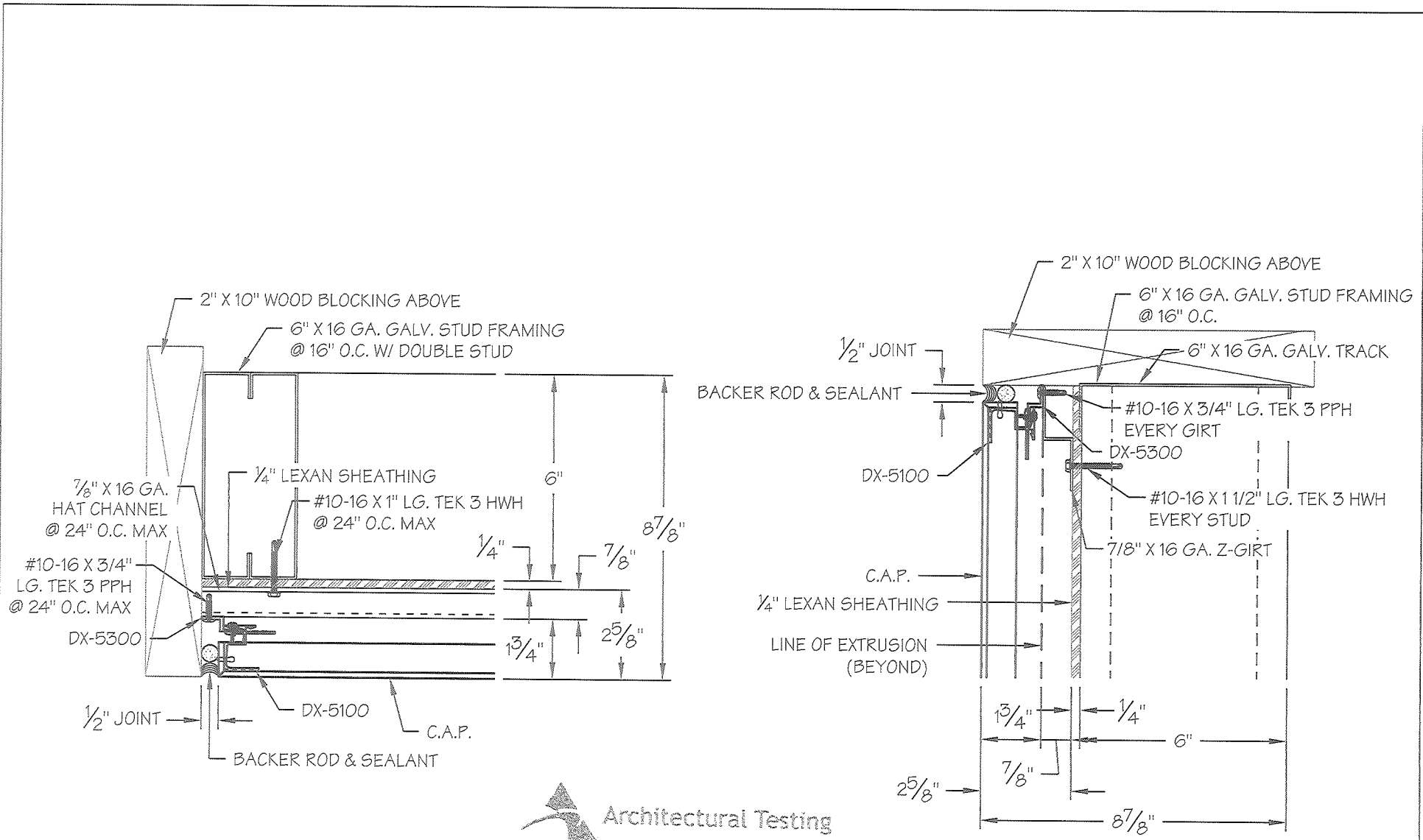
BAMCO Project No:

Drawn By: PMG

Date: 04/27/09

Scale: 1/2" = 1'-0"

DS-1



Test sample complies with these details.
 Deviations are noted.

Report# 91677.01-109-44
 Date 3/9/10 Tech R Clark

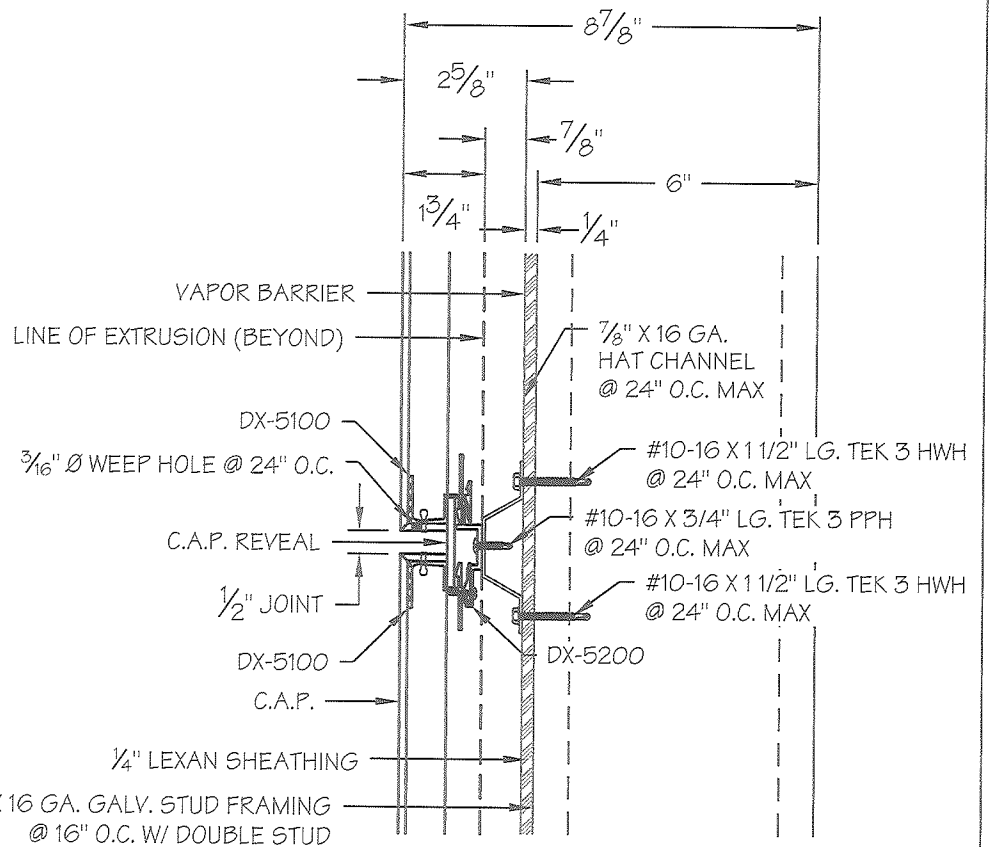
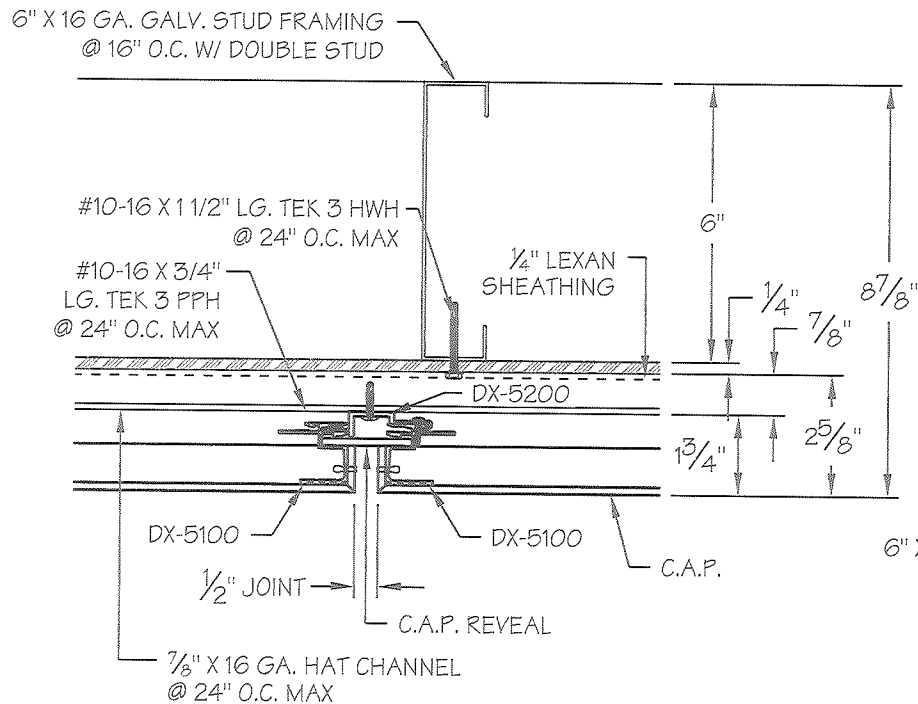
1 VERTICAL TERMINATION
 D-1E 3" = 1'-0" Re: N/A

2 HORIZONTAL TERMINATION
 D-1E 3" = 1'-0" Re: N/A

DETAILS - TERM.

BAMCO inc.
 PHONE: (732) 302-0889
 FAX: (732) 302-9486
 30 Backland Avenue, Middlesex, NJ 08846

Project Name/Address: SYSTEM TEST 2009		Drawing No.	
General Contractor: DRY SYSTEM DETAILS		SK-	
BAMCO Project No:	Drawn By: PMG	Date: 04/27/09	Scale: 3" = 1'-0"
			D-1E



3 VERTICAL JOINT D-500
D-2E 3" = 1'-0" Re: N/A



Architectural Testing

Test sample complies with these details.
Deviations are noted.

Report# 91677.01-109-44
Date 3/9/10 Tech R Clark

4 HORIZONTAL JOINT D-500
D-2E 3" = 1'-0" Re: N/A

DETAILS - CAULK

BAMCO inc.

PHONE: (732) 302-0889
FAX: (732) 302-9456

Project Name/Address: SYSTEM TEST 2009
General Contractor: DRY SYSTEM DETAILS

Drawing No.

SK-
D-2E

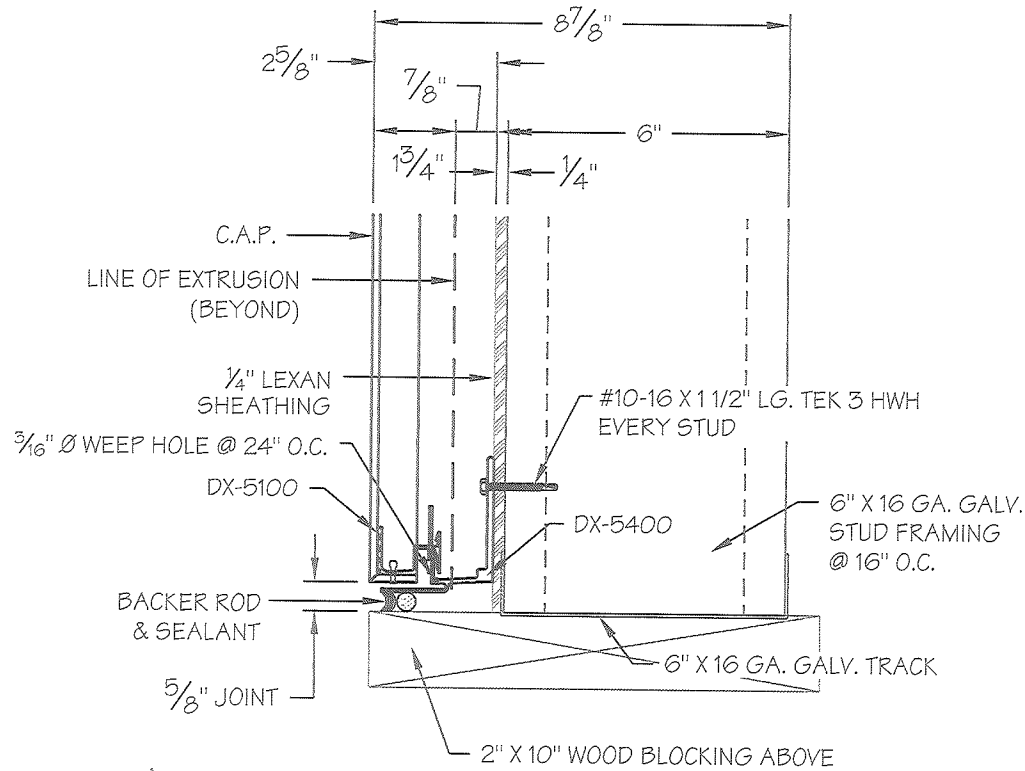
30 Backland Avenue, Middlesex, NJ 08846

BAMCO Project No:

Drawn By: PMG

Date: 04/27/09

Scale: 3" = 1'-0"



Architectural Testing

Test sample complies with these details.
Deviations are noted.

Report# 91677.01-109-44
Date 3/9/10 Tech RClark

5 HORIZONTAL BASE TERMINATION
D-3E 3" = 1'-0" Re: N/A

DETAILS - BASE TERM.

BAMCO inc.

30 Baekeland Avenue, Middlesex, NJ 08846

PHONE: (732) 302-0889
FAX: (732) 302-9456

Project Name/Address: SYSTEM TEST 2009

General Contractor: DRY SYSTEM DETAILS

BAMCO Project No:

Drawn By: PMG

Date: 04/27/09

Scale: 3" = 1'-0"

Drawing No.

SK-

D-3E