

**PERFORMANCE TEST REPORT
FOR
AIR LEAKAGE AND DURABILITY
OF BARRIER PRODUCTS**

Rendered to:

TREMCO, INC.

SERIES/MODEL: EXOAIR 230 with ACM 4100 and TRESPA TS110 Rain Screen Panels

PRODUCT TYPE: Liquid Applied Air Barrier

Report No.: 91110.01-501-44

Test Date: 04/29/09

And: 04/30/09

Report Date: 05/20/09

Revision 1: 04/09/12

Test Record Retention End Date: 04/30/13

PERFORMANCE TEST REPORT
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Rendered to:

TREMCO, INCORPORATED
3735 Green Road
P.O. Box 1014
Beachwood, Ohio 44122

Report No.: 91110.01-501-44

Test Date: 04/29/09

And: 04/30/09

Report Date: 05/20/09

Test Record Retention End Date: 04/30/13

Project Summary: Architectural Testing, Inc. was contracted by Tremco, Inc. to conduct air leakage, water penetration resistance, and durability tests on a liquid applied air barrier product. The mock-ups tested were representative of target commercial installation methods. Testing was performed on two commercial walls, one control wall and one penetrated wall.

Reference Documents:

ASTM E 283-04, Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.

ASTM E 2357-05, Standard Test Method for Determining Air Leakage of Air Barrier Assemblies.

ASTM E 330-02, Test Method for Structural Performance of Exterior Windows, Curtain Walls and Doors by Uniform Static Air Pressure Difference.

ASTM E 331-00, Test Method for Water Penetration of Exterior Windows, Curtain Walls and Doors by Uniform Static Air Pressure Difference.

Test Protocol: A series of laboratory tests were performed to determine air leakage resistance, water penetration resistance, wind load performance, and durability of commercial air barriers with commercial installation techniques. The installations were tested for air leakage, water penetration resistance, and structural performance testing using ASTM E 283, ASTM E 2357, ASTM E 330, and ASTM E 331. The durability of the selected installations was evaluated and re-testing for air leakage was performed.

Test Specimen Description: Two commercial walls were constructed for this project. All walls measured 96" wide by 96" high.

Wall #1 Installation: The control wall was constructed of nominal 2" x 8" Spruce-Pine-Fir wood studs spaced 16" on center. The wall was sheathed with nominal 5/8" thick Georgia Pacific DensGlas Gold secured to the wood studs with #6 x 2" long drywall screws, located 2" from the corners and spaced 16" on center. A nominal 2" x 10" Spruce-Pine-Fir wood buck was secured around the perimeter. TREMCO ExoAir 230, a liquid applied air barrier, was applied to the exterior of the wall. A NOW Specialties, Inc. ACM 4100 rain screen panel system, consisting of eight metal panels protruding 2" from the air barrier surface was applied to the exterior using horizontal extruded aluminum angles. The aluminum angles were fastened through the air barrier system to the wood studs with #12 x 2" long self drilling screws, spaced approximately 16" on center. Each panel interlocked at the top and bottom with the aluminum angles, and was fastened at each top corner with one #10 x 3/4" long self drilling screw. The exterior perimeter of the wall was sealed to the wood buck with a silicone sealant.

Wall #2 Installation: The penetrated wall was constructed of nominal 2" x 8" Spruce-Pine-Fir wood studs spaced 16" on center. The wall was sheathed with nominal 5/8" thick Georgia Pacific DensGlas Gold secured to the wood studs with #6 x 2" long drywall screws, located 2" from the corners and spaced 16" on center. A nominal 2" x 10" Spruce-Pine-Fir wood buck was secured around the perimeter. The penetrations included a 24" by 48-1/2" wood blank window, a 4" by 4" HVAC duct, a 1-1/2" diameter plumbing pipe, and two electrical box penetrations, one square and one octagon per ASTM E 2357. TREMCO ExoAir 230, a liquid applied air barrier, was applied to the wall. The wood window blank was flashed and sealed at the perimeter with Tremco's "Proglaze ETA, Engineered Transition Assembly and Spectrem 1 silicone sealant". The perimeter of the duct, pipe sleeve and electrical boxes were all sealed with the ExoAir 230, to provide a continuous barrier. A NOW Specialties, Inc. TRESPA TS100 rain screen panel system, consisting of seven composite panels protruding 1-1/8" from the air barrier surface was applied using continuous vertical extruded aluminum brackets. The continuous brackets were fastened through the air barrier system to the wood studs using #12 x 2" long self drilling screws, spaced approximately 16" on center. Each composite panel was fastened to the aluminum brackets using #10 by 1" long truss head screws. The exterior perimeter of wall was sealed to the wood buck with a silicone sealant.

Test Results: The test results are recorded in the following tables:

Wall #1 - Commercial Control Wall

Title of Test	Pressure	Test Results	
		Air Infiltration	Air Exfiltration
Air Infiltration/Exfiltration (Phase I)	25 Pa (0.52 psf)	<0.01 cfm/ft ²	<0.01 cfm/ft ²
	50 Pa (1.05 psf)	<0.01 cfm/ft ²	<0.01 cfm/ft ²
	75 Pa (1.56 psf)	<0.01 cfm/ft ²	<0.01 cfm/ft ²
	100 Pa (2.10 psf)	<0.01 cfm/ft ²	<0.01 cfm/ft ²
	150 Pa (3.14 psf)	<0.01 cfm/ft ²	<0.01 cfm/ft ²
	250 Pa (5.23 psf)	<0.01 cfm/ft ²	<0.01 cfm/ft ²
	300 Pa (6.27 psf)	<0.01 cfm/ft ²	<0.01 cfm/ft ²

Title of Test	Pressure	Test Results
Water Penetration Resistance	718 Pa (15.0 psf)	No Penetration

Title of Test	Pressure	Test Results
Deformation (10 second load)	±100 Pa (±2.09 psf)	No damage
	±200 Pa (±4.18 psf)	No damage
	±300 Pa (±6.27 psf)	No damage
	±400 Pa (±8.36 psf)	No damage
	±500 Pa (±10.45 psf)	No damage
Deformation (60 minute load)	±600 Pa (±12.54 psf)	No damage
Cyclic Loading (1000 cycles)	±800 Pa (±16.72 psf)	No damage
Gust Loading (3 second load)	±1200 Pa (±25.08 psf)	No damage

Title of Test	Pressure	Test Results	
		Air Infiltration	Air Exfiltration
Air Infiltration/Exfiltration (Phase II)	25 Pa (0.52 psf)	<0.01 cfm/ft ²	<0.01 cfm/ft ²
	50 Pa (1.05 psf)	<0.01 cfm/ft ²	<0.01 cfm/ft ²
	75 Pa (1.56 psf)	<0.01 cfm/ft ²	<0.01 cfm/ft ²
	100 Pa (2.10 psf)	<0.01 cfm/ft ²	<0.01 cfm/ft ²
	150 Pa (3.14 psf)	<0.01 cfm/ft ²	<0.01 cfm/ft ²
	250 Pa (5.23 psf)	<0.01 cfm/ft ²	<0.01 cfm/ft ²
	300 Pa (6.27 psf)	<0.01 cfm/ft ²	<0.01 cfm/ft ²

Title of Test	Pressure	Test Results (Inch)						
		#1	#2	#3	#4	#5	#6	#7
Wind Pressure Loading (10 second load)	+1440 Pa (+30.09 psf)	0.02	0.07	0.09	0.09	0.09	0.09	0.07
	-1440 Pa (-30.09 psf)	0.03	0.07	0.08	0.08	0.09	0.09	0.07

Test Results: (Continued)

Wall #2 - Commercial Penetration Wall

Title of Test	Pressure	Test Results	
		Air Infiltration	Air Exfiltration
Air Infiltration/Exfiltration (Phase I)	25 Pa (0.52 psf)	<0.01 cfm/ft ²	<0.01 cfm/ft ²
	50 Pa (1.05 psf)	<0.01 cfm/ft ²	<0.01 cfm/ft ²
	75 Pa (1.56 psf)	<0.01 cfm/ft ²	0.01 cfm/ft ²
	100 Pa (2.10 psf)	<0.01 cfm/ft ²	0.01 cfm/ft ²
	150 Pa (3.14 psf)	<0.01 cfm/ft ²	0.01 cfm/ft ²
	250 Pa (5.23 psf)	<0.01 cfm/ft ²	0.02 cfm/ft ²
	300 Pa (6.27 psf)	<0.01 cfm/ft ²	0.02 cfm/ft ²

Title of Test	Pressure	Test Results
Deformation (10 second load)	±100 Pa (±2.09 psf)	No damage
	±200 Pa (±4.18 psf)	No damage
	±300 Pa (±6.27 psf)	No damage
	±400 Pa (±8.36 psf)	No damage
	±500 Pa (±10.45 psf)	No damage
Deformation (60 minute load)	±600 Pa (±12.54 psf)	No damage
Cyclic Loading(1000 cycles)	±800 Pa (±16.72 psf)	No damage
Gust Loading(3 second load)	±1200 Pa (±25.08 psf)	No damage

Title of Test	Pressure	Test Results	
		Air Infiltration	Air Exfiltration
Air Infiltration/Exfiltration (Phase II)	25 Pa (0.52 psf)	<0.01 cfm/ft ²	<0.01 cfm/ft ²
	50 Pa (1.05 psf)	<0.01 cfm/ft ²	0.01 cfm/ft ²
	75 Pa (1.56 psf)	<0.01 cfm/ft ²	0.01 cfm/ft ²
	100 Pa (2.10 psf)	<0.01 cfm/ft ²	0.01 cfm/ft ²
	150 Pa (3.14 psf)	<0.01 cfm/ft ²	0.01 cfm/ft ²
	250 Pa (5.23 psf)	<0.01 cfm/ft ²	0.02 cfm/ft ²
	300 Pa (6.27 psf)	<0.01 cfm/ft ²	0.02 cfm/ft ²

Title of Test	Pressure	Test Results (Inch)						
		#1	#2	#3	#4	#5	#6	#7
Wind Pressure Loading (10 second load)	+1440 Pa (+30.09 psf)	0.15	0.16	0.19	0.08	0.14	0.19	0.13
	-1440 Pa (-30.09 psf)	0.18	0.22	0.23	0.11	0.17	0.23	0.13

General Note: All testing was performed in accordance with the referenced standards.

Tape and film were not used to seal against air leakage during structural testing.

Drawing Reference: The test specimen drawings have been reviewed by Architectural Testing and are representative of the test specimen reported herein.

List of Official Observers:

<u>Name</u>	<u>Company</u>
Kyle Miller	Tremco, Inc.
Scottie Stinson	Tremco, Inc.
Michael Soeder	Tremco, Inc.
Michael Kohler	Tremco, Inc.
Daniel Ozuna	Now Specialties
Alex Debo	Now Specialties
Alex Debo Jr.	Now Specialties
Lynn George	Architectural Testing, Inc.
Corey Eisenhuth	Architectural Testing, Inc.

Detailed drawings, data sheets, representative samples of test specimens, a copy of this report, or other pertinent project documentation will be retained by Architectural Testing, Inc. for a period of four years from the original test date. At the end of this retention period, such materials shall be discarded without notice and the service life of this report will expire.

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:

Joseph E. Allison
Senior Technician

Lynn George
Director – Regional Operations

JEA:sld

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

Appendix-A: Test Equipment (1)

Appendix-B: Photographs (6)

Revision Log

<u>Rev. #</u>	<u>Date</u>	<u>Page(s)</u>	<u>Revision(s)</u>
0	05/20/09	N/A	Original report issue
1	04/09/12	Cover Page, Page 1	Corrected - Expiration date: 04/30/12 to Test Record Retention End Date: 04/30/13

Appendix A

Test Equipment

Instrument	Manufacturer	Asset #
Control Panel	ATI	004968
Water Spray Rack	ATI	004989
Linear Transducer	Celesco	005196
Linear Transducer	Celesco	005198
Linear Transducer	Celesco	005200
Linear Transducer	Celesco	005201
Linear Transducer	Celesco	62163
Linear Transducer	Celesco	62164
Linear Transducer	Celesco	62164

Appendix B

Photographs



Photo No. 1
ExoAir 230 Control Wall



Photo No. 2
ExoAir 230 Control Wall with aluminum angles



Photo No. 3
ExoAir 230 Control Wall with ACM 4100 Panels



Photo No. 4
ExoAir 230 Perforated Wall



Photo No. 5
ExoAir 230 Perforated Wall with Aluminum Brackets



Photo No. 6
ExoAir 230 Perforated Wall with TRESPA TS110 Panel System