Intertek | Architectural Testing

TEST REPORT

Report No.: E6597.01-109-44

Rendered to:

HANOVER ARCHITECTURAL PRODUCTS
Hanover, Pennsylvania

PRODUCT TYPE: Ventloc Roof Paver System

Test Dates: 05/06/15
Through: 05/07/15
Revision 1: 08/16/16
Report Date: 11/04/15

130 Derry Court
York, PA 17406

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1.0 Report Issued To: Hanover Architectural Products
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Hanover, Pennsylvania 17331

2.0 Test Laboratory: Architectural Testing, Inc., an Intertek company ("Intertek-ATI")
130 Derry Court
York, Pennsylvania 17406-8405
717-764-7700

3.0 Project Summary:

3.1 Product Type: Ventloc Roof Paver System

3.2 Compliance Statement: Results obtained are tested values and were secured by using the designated test method(s). Test specimen description and results are reported herein.

3.3 Test Dates: 05/06/2015 - 05/07/2015

3.4 Test Record Retention End Date: All test records for this report will be retained until May 7, 2019.

3.5 Test Location: Intertek-ATI test facility in York, Pennsylvania.

3.6 Test Sample Source: The test specimen was provided by the client. Representative samples of the test specimen(s) will be retained by Intertek-ATI for a minimum of four years from the test completion date.

3.7 Drawing Reference: The test specimen drawings have been reviewed by Intertek-ATI and are representative of the test specimen(s) reported herein. Test specimen construction was verified by Intertek-ATI per the drawings on file with Intertek-ATI. Any deviations are documented herein or on the drawings.

4.0 Test Procedure

The Ventloc paver system was subjected to dynamic wind speeds. A wind speed of 40 mph was applied to the paver system and maintained for a duration of 30 seconds. The wind speed was increased in 10 mph increments until a maximum wind speed of 130 mph was achieved. Pressure transducers recorded pressure at four different locations while running the test. The pressure of the roof deck and the pressure of the pavers were measured at every location. Visual observations of the specimen were made at each wind speed to determine if the pavers were uplifting or had any signs of movement. The maximum uplift pressure recorded during testing has been reported for each test.

5.0 Test Specimen Description:

5.1 Product Sizes:

Test Specimen #1: Heavy Weight Paver

Overall Area: 9.3 m^2 (100 ft^2)	**Width**		**Length**	
	millimeters	**inches**	**millimeters**	**inches**
Overall size	3048	120	3048	120
Individual paver size (69)	305	12	445	17-1/2

Test Specimen #2: Standard Weight Paver

Overall Area: 9.3 m^2 (100 ft^2)	**Width**		**Length**	
	millimeters	**inches**	**millimeters**	**inches**
Overall size	3048	120	3048	120
Individual paver size (69)	305	12	445	17-1/2

The following descriptions apply to all specimens.

5.2 Test Deck Construction: The 10' 0" wide by 10' 0" long test frame was fabricated from 2x4 Spruce-Pine-Fir wood framing with studs spaced 16" on center. The frame utilized 1/2" thick plywood, secured using #6 x 1-5/8" drywall screws, 1" from each end and spaced 8" on center. The outside of the test frame utilized 2x6 Spruce-Pine-Fir wood wrap on three sides to set the deck up off ground. The test deck utilized 1-1/2" thick polyiso board insulation and loose lay 0.060" thick rubber roofing material.

5.3 Paver Construction: The pavers were constructed from concrete and had a thickness of 2".

5.0 Test Specimen Description: (Continued)

5.4 Paver System Assembly:

5.4.1 Test Assembly #1: The Ventloc paver system assembly was constructed with 2" thick concrete pavers loose laid (69 pavers total). A piece of "L" shaped flashing was set around edge of the pavers and wrapped over the test frame and secured with 1" screws, located 8" on center. Heavy weight pavers and standard weight pavers were tested in this paver system assembly.

5.4.2 Test Assembly #2: The Ventloc paver system assembly was constructed with 2" thick concrete pavers loose laid (69 pavers total). A plywood sheathed wall was utilized to simulate a 12" high parapet wall (measured from the top of the pavers) on three sides with the back left open. A piece of "L" shaped flashing was set on top of the paver and up on the parapet wall, secured with 1" screws located 8" on center. Heavy weight pavers and standard weight pavers were tested in this paver system assembly.

5.4.3 Test Assembly #3: The Ventloc paver system assembly was constructed with 2" thick concrete pavers loose laid (69 pavers total). A plywood sheathed wall was utilized to simulate a 24" high parapet wall (measured from the top of the pavers) on three sides with the back left open. A piece of "L" shaped flashing was set on top of the paver and up on the parapet wall, secured with 1" screws located 8" on center. Heavy weight pavers and standard weight pavers were tested in this paver system assembly.

6.0 Test Results: The temperature during testing was 27°C (80°F). The results are tabulated as follows:

Test Assembly #1-1: No parapet with heavy weight pavers

Test 1: Wind generator aimed at the long side of the test specimen

Wind Speed	Duration	Observations
40 mph	30 seconds	No movement observed
50 mph	30 seconds	No movement observed
60 mph	30 seconds	No movement observed
70 mph	30 seconds	No movement observed
80 mph	30 seconds	No movement observed
90 mph	30 seconds	No movement observed
100 mph	30 seconds	No movement observed
110 mph	30 seconds	No movement observed
120 mph	30 seconds	No movement observed
130 mph	30 seconds	No movement observed

Maximum Roof Uplift Pressure: 1.71 psf
Maximum Paver Uplift Pressure: 3.49 psf

Test 2: Wind generator aimed at the short side of the test specimen

Wind Speed	Duration	Observations
40 mph	30 seconds	No movement observed
50 mph	30 seconds	No movement observed
60 mph	30 seconds	No movement observed
70 mph	30 seconds	No movement observed
80 mph	30 seconds	No movement observed
90 mph	30 seconds	No movement observed
100 mph	30 seconds	No movement observed
110 mph	30 seconds	No movement observed
120 mph	30 seconds	No movement observed
130 mph	30 seconds	No movement observed

Maximum Roof Uplift Pressure: 1.39 psf
Maximum Paver Uplift Pressure: 2.13 psf

6.0 Test Results: (Continued)

Test Assembly #1-2: No parapet with standard weight pavers

Test 1: Wind generator aimed at the long side of the test specimen

Wind Speed	Duration	Observations
40 mph	30 seconds	No movement observed
50 mph	30 seconds	No movement observed
60 mph	30 seconds	No movement observed
70 mph	30 seconds	No movement observed
80 mph	30 seconds	No movement observed
90 mph	30 seconds	No movement observed
100 mph	30 seconds	No movement observed
110 mph	30 seconds	No movement observed
120 mph	30 seconds	No movement observed
130 mph	30 seconds	No movement observed

Maximum Roof Uplift Pressure: 1.51 psf
Maximum Paver Uplift Pressure: 3.61 psf

Test 2: Wind generator aimed at the short side of the test specimen

Wind Speed	Duration	Observations
40 mph	30 seconds	No movement observed
50 mph	30 seconds	No movement observed
60 mph	30 seconds	No movement observed
70 mph	30 seconds	No movement observed
80 mph	30 seconds	No movement observed
90 mph	30 seconds	No movement observed
100 mph	30 seconds	No movement observed
110 mph	30 seconds	No movement observed
120 mph	30 seconds	No movement observed
130 mph	30 seconds	No movement observed

Maximum Roof Uplift Pressure: 2.35 psf
Maximum Paver Uplift Pressure: 2.75 psf

6.0 Test Results: (Continued)

Test Assembly #2-1: 12" parapet with heavy weight pavers

Test 1: Wind generator aimed at the long side of the test specimen

Wind Speed	Duration	Observations
40 mph	30 seconds	No movement observed
50 mph	30 seconds	No movement observed
60 mph	30 seconds	No movement observed
70 mph	30 seconds	No movement observed
80 mph	30 seconds	No movement observed
90 mph	30 seconds	No movement observed
100 mph	30 seconds	No movement observed
110 mph	30 seconds	No movement observed
120 mph	30 seconds	No movement observed
130 mph	30 seconds	No movement observed

Maximum Roof Uplift Pressure: 0.55 psf
Maximum Paver Uplift Pressure: 4.02 psf

Test 2: Wind generator aimed at the short side of the test specimen

Wind Speed	Duration	Observations
40 mph	30 seconds	No movement observed
50 mph	30 seconds	No movement observed
60 mph	30 seconds	No movement observed
70 mph	30 seconds	No movement observed
80 mph	30 seconds	No movement observed
90 mph	30 seconds	No movement observed
100 mph	30 seconds	No movement observed
110 mph	30 seconds	No movement observed
120 mph	30 seconds	No movement observed
130 mph	30 seconds	No movement observed

Maximum Roof Uplift Pressure: 1.08 psf
Maximum Paver Uplift Pressure: 20.88 psf

6.0 Test Results: (Continued)

Test Assembly #2-2: 12" parapet with standard weight pavers

Test 1: Wind generator aimed at the long side of the test specimen

Wind Speed	Duration	Observations
40 mph	30 seconds	No movement observed
50 mph	30 seconds	No movement observed
60 mph	30 seconds	No movement observed
70 mph	30 seconds	No movement observed
80 mph	30 seconds	No movement observed
90 mph	30 seconds	No movement observed
100 mph	30 seconds	No movement observed
110 mph	30 seconds	No movement observed
120 mph	30 seconds	No movement observed
130 mph	30 seconds	No movement observed

Maximum Roof Uplift Pressure: 0.57 psf
Maximum Paver Uplift Pressure: 3.44 psf

Test 2: Wind generator aimed at the short side of the test specimen

Wind Speed	Duration	Observations
40 mph	30 seconds	No movement observed
50 mph	30 seconds	No movement observed
60 mph	30 seconds	No movement observed
70 mph	30 seconds	No movement observed
80 mph	30 seconds	No movement observed
90 mph	30 seconds	No movement observed
100 mph	30 seconds	No movement observed
110 mph	30 seconds	No movement observed
120 mph	30 seconds	No movement observed
130 mph	30 seconds	No movement observed

Maximum Roof Uplift Pressure: 6.15 psf
Maximum Paver Uplift Pressure: 23.78 psf

6.0 Test Results: (Continued)

Test Assembly #3-1: 24" parapet with heavy weight pavers

Test 1: Wind generator aimed at the long side of the test specimen

Wind Speed	Duration	Observations
40 mph	30 seconds	No movement observed
50 mph	30 seconds	No movement observed
60 mph	30 seconds	No movement observed
70 mph	30 seconds	No movement observed
80 mph	30 seconds	No movement observed
90 mph	30 seconds	No movement observed
100 mph	30 seconds	No movement observed
110 mph	30 seconds	No movement observed
120 mph	30 seconds	No movement observed
130 mph	30 seconds	No movement observed

Maximum Roof Uplift Pressure: 0.80 psf
Maximum Paver Uplift Pressure: 8.26 psf

Test 2: Wind generator aimed at the short side of the test specimen

Wind Speed	Duration	Observations
40 mph	30 seconds	No movement observed
50 mph	30 seconds	No movement observed
60 mph	30 seconds	No movement observed
70 mph	30 seconds	No movement observed
80 mph	30 seconds	No movement observed
90 mph	30 seconds	No movement observed
100 mph	30 seconds	No movement observed
110 mph	30 seconds	No movement observed
120 mph	30 seconds	No movement observed
130 mph	30 seconds	No movement observed

Maximum Roof Uplift Pressure: 4.74 psf
Maximum Paver Uplift Pressure: 4.29 psf

6.0 Test Results: (Continued)

Test Assembly #3-2: 24" parapet with standard weight pavers

Test 1: Wind generator aimed at the long side of the test specimen

Wind Speed	Duration	Observations
40 mph	30 seconds	No movement observed
50 mph	30 seconds	No movement observed
60 mph	30 seconds	No movement observed
70 mph	30 seconds	No movement observed
80 mph	30 seconds	No movement observed
90 mph	30 seconds	No movement observed
100 mph	30 seconds	No movement observed
110 mph	30 seconds	No movement observed
120 mph	30 seconds	No movement observed
130 mph	30 seconds	No movement observed

Maximum Roof Uplift Pressure: 4.87 psf
Maximum Paver Uplift Pressure: 6.69 psf

Test 2: Wind generator aimed at the short side of the test specimen

Wind Speed	Duration	Observations
40 mph	30 seconds	No movement observed
50 mph	30 seconds	No movement observed
60 mph	30 seconds	No movement observed
70 mph	30 seconds	No movement observed
80 mph	30 seconds	No movement observed
90 mph	30 seconds	No movement observed
100 mph	30 seconds	No movement observed
110 mph	30 seconds	No movement observed
120 mph	30 seconds	No movement observed
130 mph	30 seconds	No movement observed

Maximum Roof Uplift Pressure: 5.62 psf
Maximum Paver Uplift Pressure: 6.83 psf

Intertek-ATI 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 Intertek-ATI for the entire test record retention period.

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For ARCHITECTURAL TESTING, INC.:

Digitally Signed by: Eric Brennan

Eric M Brennan
Project Manager

Digitally Signed by: Timothy J. McGill

Timothy J. McGill
Manager – Product Testing

JRB:asm

Attachments (pages): This report is complete only when all attachments listed are included.
Appendix-A: Drawing(s) Complete drawings packet on file with Intertek-ATI.