



**TESTING  
LISTING  
EVALUATION**

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**NEGATIVE WIND PRESSURE TEST ON EXTERIOR SHEATHING  
FOR MANUFACTURED HOUSING APPLICATIONS:  
DOUBLE 2X4 STUD GRADE SPF ON 16-IN. CENTERS SHEATHED ON THE EXTERIOR WITH  
3/8-IN. APA SPAN RATED 24/0 OSB AND  
CLIPSTONE LEDGESTONE BLACK RUNDER FLATS SIDING FOR  
96-IN. TALL EXTERIOR WALLS WIND ZONE III, CORNER**

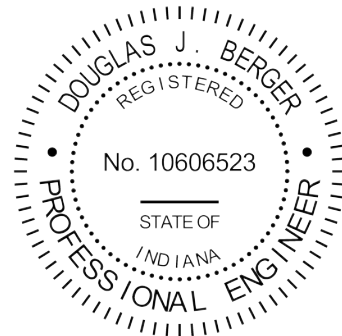
Prepared for:  
**Environmental StoneWorks  
7306 South Alton Way  
Suite B  
Centennial, CO 80112**

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Test Report: ESW071417-2  
Issued: November 9, 2017

Prepared By:  
Brad Wear  
Test Engineer

Reviewed By:  
Douglas Berger, P.E.  
Test Engineer



*Douglas J. Berger*  
11/9/17

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## 1. INTRODUCTION

Environmental StoneWorks retained NTA, Inc. to perform negative wind pressure load tests on wall assemblies constructed with their exterior siding. The purpose of this evaluation was to assess the suitability of sheathing wall assemblies for use in manufactured home construction when subjected to simulated negative wind pressure in accordance with Section 3280.401(b) of the *Federal Manufactured Home Construction and Safety Standards* (FMHCSS)<sup>1</sup>. General test parameters and pass/fail criteria, in accordance with the FMHCSS, are summarized in Table 1, below. All tests were conducted at the NTA, Inc. test facility located in Nappanee, Indiana.

**Table 1: Test Parameters**

| Parameter                | Value  |
|--------------------------|--|
| FMHCSS Wind Zone         | III  |
| Corner/Non-Corner        | Corner   |
| Design Pressure          | 48 psf   |
| Deflection Limit         | $L/180$  |
| Clear Height, $h$        | 96-in.   |
| Specimen Width, $w$      | 48-in.   |
| Uniform Load Application | Material: Polyethylene Sheeting<br>Thickness: 6 mil<br>Location: Between wall framing and exterior sheathing |

## 2. TEST PROGRAM

### 2.1. DEVIATIONS FROM TEST STANDARD

The testing detailed herein was performed with no modifications to the test standard.

### 2.2. DESCRIPTION OF TEST SPECIMENS

Three similar test assemblies were constructed from the sample siding material provided by the client. A diagram of the test assembly is provided in Figure 1. Additional photographs of materials and construction of specimens are provided in Figures 2 through 7.

NTA, Inc. randomly selected lumber for constructing specimens to represent average quality. NTA, Inc. provided commonly available construction materials and assembled each specimen to the client's specifications.

Representative material was sampled from inventory by Quality Control Consultants, LLC personnel on August 1, 2017 at the client's manufacturing facility located in North Branch, MN. As necessary, NTA, Inc. provided commonly available construction materials and assembled each specimen to the client's specifications.

**Table 2: Materials**

| Location           | Material  |
|--------------------|---|
| Studs              | Double 2x4 Stud Grade SPF at 16-in. oc  |
| Top Plate          | Single 1x4 Un-Graded SPF  |
| Bottom Plate       | Single 1x4 Un-Graded SPF  |
| Interior Sheathing | None  |
| Exterior Sheathing | 3/8-in. APA Span Rated 24/0, Exposure 1 OSB<br>(1) 96-in. x 48-in. Sheet Applied Vertically<br>Strength Axis Parallel to Length   |
| Exterior Siding    | ClipStone LedgeStone Black Runder Flats, 4-in. tall x 1-1/2-in. Thick x Lengths of 15-1/2, 13-1/2, 11-3/4, 10-1/2, or 7-3/4-in.<br>Model MN 160224<br>SKU CSM.11.010.30 |

**Table 3: Fastening Schedule**

| Connection                               | Fastener  | Quantity or Spacing  |
|--|---|--|
| Top Plate-to-Studs                       | 7/16-in. x 1-3/4-in. x 15 Ga.<br>Senco Staple #Q19BRB                     | 3  |
| Bottom Plate-to-Studs                    | 7/16-in. x 1-3/4-in. x 15 Ga.<br>Senco Staple #Q19BRB                     | 3  |
| Exterior Sheathing-to-Studs (Mechanical) | 7/16-in. x 1-1/2-in. x 16 Ga.<br>Senco Staple #N17BRB                     | 6/6 <sup>a</sup> (3/8-in. Edge Distances)<br>Staggered 3-in. at Double Studs See Figure 1  |
| Exterior Siding (Mechanical)             | #8 x 1-1/4-in. Buildex Teks Lath Screws, Part #21512,<br>#2 Phillips Head | Through hole in the top of each of the (2) metal hangers the back of each ClipStone piece, except the bottom row of stone which had a fastener in each of the (2) metal hangers above the stone and a fastener in each of the (2) hangers below the stone, fasteners were driven into exterior sheathing only (NOT into studs) |

<sup>a</sup> Given as edge / field spacing.

### 2.3. TEST PROCEDURE

The test procedure is based on ASTM E72<sup>2</sup>, Section 11; however, the loading stages were modified to correspond with those required in the ultimate load test procedures found in Section 3280.401(b) of the Federal Manufactured Home Construction and Safety Standards. Accordingly, the test setup consists of a vacuum chamber with an open side slightly larger than the test assembly, as shown in Figure 8. A vacuum pump and manometer connection provide a means to apply and monitor the applied pressure. The samples are placed with the exterior sheathing and siding facing into the vacuum chamber, thereby placing a negative force on the exterior sheathing. The polyethylene

sheeting is pleated to accommodate the specimen deflection and then sealed to the chamber.

Instrumentation consists of a water manometer and dial indicators. The water manometer has a resolution of 0.1 inches of water for pressures up to  $\pm 72.0$  inches of water. Dial indicators, with a resolution of 0.001 in., are positioned along selected studs to take deflection readings at mid-span and at the supports. For specimens with studs spaced at 16 in. centers, the center two studs are gauged, using a total of six dial gauges. For studs spaced at 24 in. centers, only the middle stud is gauged, using a total of three gauges. Figure 9 provides an example of a test setup.

For testing, each specimen is loaded monotonically at approximate  $\frac{1}{4}$  live load pressure increments. Upon reaching each loading stage, applied load is maintained for not less than 10 minutes prior to reading the dial indicators. Once the dial indicators have been read, the pressure is increased to the next loading stage. This procedure is followed through pressure corresponding to 1.25 times live load. After which, the dial gauges are removed and the pressure is increased to ultimate load. At ultimate load, the peak pressure and mode of failure are noted. Ultimate load is taken as the point where the specimen exhibits rupture, fracture, or excessive yielding. Any failure or observations at any point during the test are duly noted.

The applied pressure, in inches of water, is converted to pounds per square foot (psf) using the following conversion: 1 inch of water column = 5.2 psf.

### 3. TEST RESULTS

A total of three specimens were tested using the procedure outlined herein. The ultimate loads and service load deflections for each specimen are presented in Table 4, below. This table also provides average values, which are compared to the required pass/fail criteria

**Table 2: Test Results**

| <b>Specimen</b>                  | <b>Ultimate Pressure (psf)</b> | <b>Service Load Deflection (in.)</b> | <b>Failure Mode at Ultimate</b>  |
|----------------------------------|--------------------------------|--------------------------------------|--|
| 94662                            | 235                            | 0.322                                | <i>Left outer stud failure leading to bottom plate failure and exterior sheathing to framing fastener withdrawal</i> |
| 94663                            | 213                            | 0.349                                | <i>Top plate failure</i>   |
| 94664                            | 222                            | 0.361                                | <i>Bottom plate failure</i>  |
| Average                          | 223                            | 0.344                                | --   |
| Evaluation Criteria <sup>a</sup> | 145                            | 0.533                                | --   |
| <b>Overall Result</b>            | <i>Pass</i>                    | <i>Pass</i>                          | --   |

<sup>a</sup> As required by the FMHCSS<sup>1</sup>, which requires a factor of safety of 2.5 against failure and L/180 deflection limit under service level loads.


4. CONCLUSION

Environmental StoneWorks retained NTA, Inc. to perform testing on negative wind assemblies in accordance with procedures in Section 3280.401(b) of the *Federal Manufactured Home Construction and Safety Standards* (FMHCSS)<sup>1</sup>. Conclusions from this testing are provided in Table 5 below.

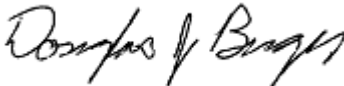
The data provided herein were obtained and assessed in accordance with FMHCSS test procedures and criteria and should not be used for other types of construction. For use in manufactured housing, these findings and results are subject to DAPIA review and approval.

**Table 3: Conclusion**

| Specimen  | Test Conditions         | Overall Result |
|---|-------------------------|----------------|
| Double 2x4 Stud Grade SPF on 16-in. centers with 3/8-in. APA Span Rated 24/0, Exposure 1 OSB exterior sheathing and Clipstone Ledgerstone Black Rundle Flats 1-1/2-in. thick x 4-in. tall stone siding for 96-in. tall exterior walls, fastened and constructed as detailed herein. | Wind Zone III<br>Corner | PASS           |

PREPARED BY:   
 \_\_\_\_\_  
 Brad Wear  
 Test Engineer

11-09-17  
 \_\_\_\_\_  
 Date

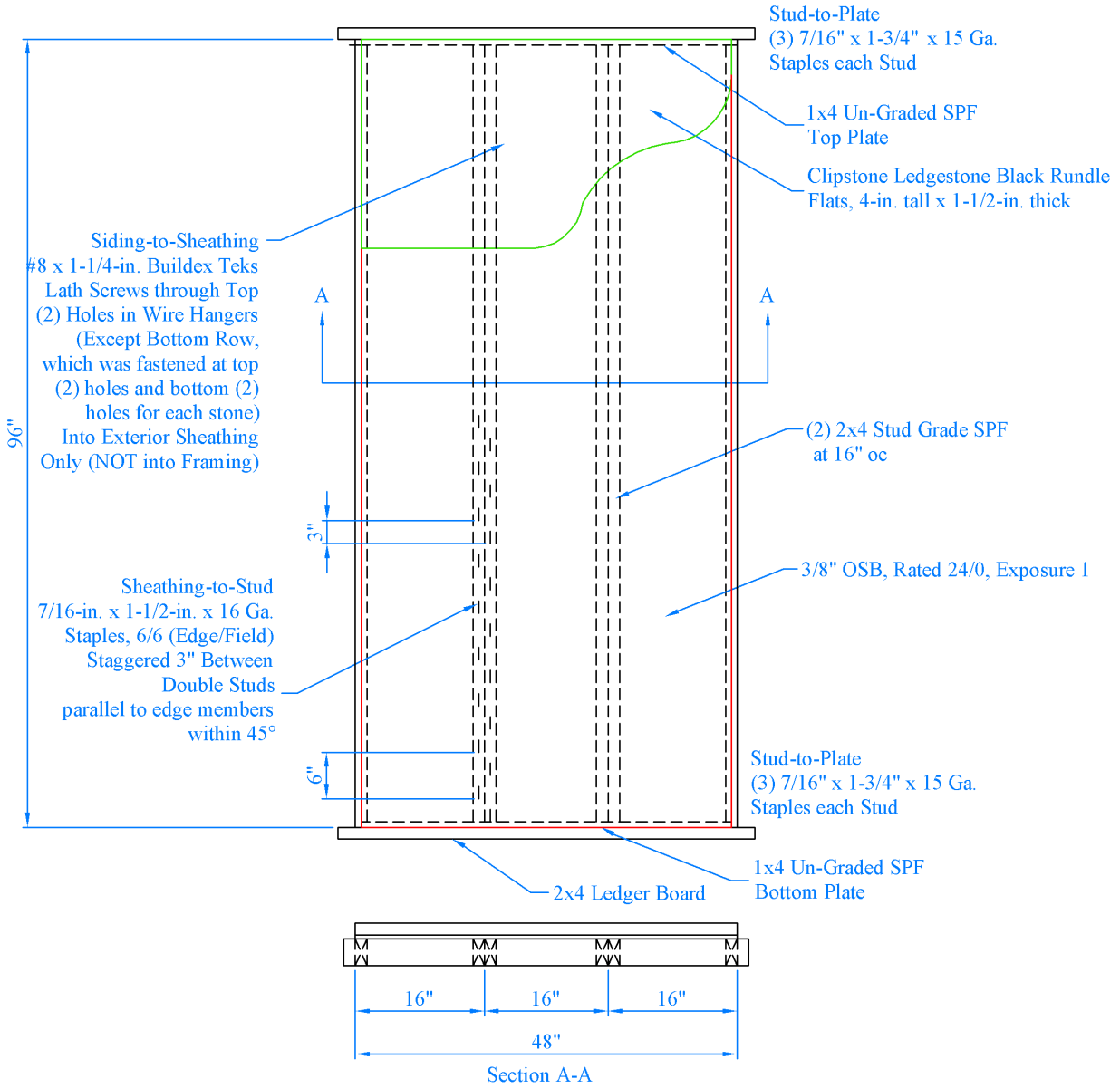
REVIEWED BY:   
 \_\_\_\_\_  
 Douglas Berger, P.E.  
 Test Engineer

11-09-17  
 \_\_\_\_\_  
 Date

## REFERENCES



1. Department of Housing and Urban Development (HUD). *Manufactured Home Construction and Safety Standards & Interpretive Bulletins to the Standards. 24 Code of Federal Regulations Part 3280*. Office of Assistant Secretary for Housing, Federal Housing Commissioner, Department of Housing and Urban Development.



**Figure 1: Specimen Diagram**

FIGURES



Figure 2: Clipstone Received



Figure 3: Close-Up View of a Box of ClipStone



FIGURES



Figure 4: Close-Up Views of ClipStone

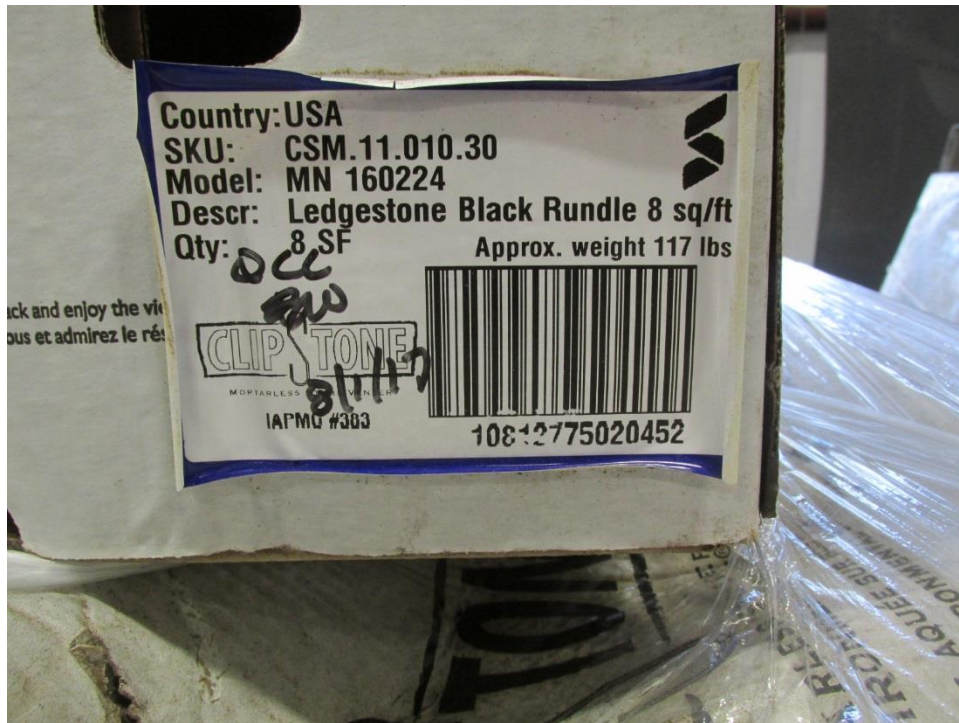


Figure 5: Information on a Box of ClipStone Received

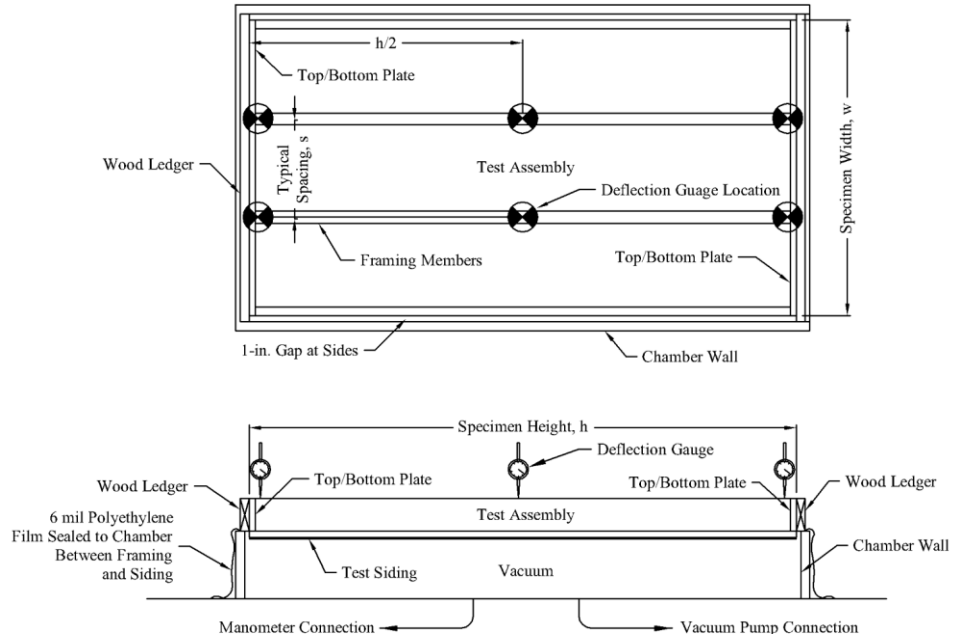


**Figure 6: Attaching ClipStone to a Specimen**



**Figure 7: A Fully Constructed Specimen**

**FIGURES**



**Figure 8: Test Setup**



**Figure 9: Test Setup**



Figure 10: Specimen #94662 after Ultimate



**Figure 11: Specimen #94663 after Ultimate**

**APPENDIX**



ESW071417-2, HUD 04-01WZIII (Vertical)(double studs) (FINAL)  
Out

NTA, Inc.

**SUMMARY DATA**

**HUD 04-01**

**Negative Wind Test for Wall Assemblies to be used in Manufactured Homes:**

**Specimen 1**

Client: Environmental StoneWorks  
Job Number: ESW071417-2  
Test Method: FMHCSS, Section 3280.401(b), Ultimate Load Test Procedure

Performed By: Keith Hassell  
Witnessed By: Bradley Wear

|  |                       |                  |                                 |
|--|-----------------------|------------------|---------------------------------|
| <b>General:</b>                          | <b>Apparatus:</b>     | <b>Asset No.</b> | <b>Ambient Test Conditions:</b> |
| Received: 8/17/2017                      | Length Measure: 01384 |                  | Ambient Temp.: 74.4 deg. F      |
| Fabrication Date: 9/28/2017              | Vacuum Table: 00023   |                  | Ambient R.H.: 39.7%             |
| Test Date: 9/28/2017                     | Manometer: 423, 337   |                  | Sensor Asset No.: 01355         |
| Test Location: NTA, Inc.<br>Nappanee, IN | Moisture Meter: 00830 |                  |                                 |
|  | Balance: 00468        |                  |                                 |

|   |                                     |
|---|-------------------------------------|
| <b>Specimen Description:</b>  | <b>Loading Conditions:</b>          |
| Specimen No.: 94662   | HUD Wind Zone: Zone III (Corner)    |
| Clear Span: 96-in.  | Design Pressure: 58 psf             |
| Width: 48-in.   | Deflection Limit (L/180): 0.533-in. |
| Dead Weight: 13.23 psf  | Test Orientation: Vertical          |
| Framing: (4) 2 x 4 Stud SPF 16-in. oc   |                                     |
| Ext. Sheathing: 3/8-in x 48-in x 96-in ARBEC, Teco Mill 187 OSB Applied Vertically (Strength axis is parallel to length.) |                                     |
| 16ga x 7/16 x 1 1/2-in. 6/6-in. oc edge/field   |                                     |
| Ext. Siding: Clipstone LedgeStone Black Rundle 1 1/2-in. Stone  |                                     |
| #8 x 1 1/4-in. Buildex Teks Lath Screws, Part #21512, #2 Phillips Head 2 per stone through sheathing only                 |                                     |
| Int. Sheathing: none  |                                     |

Wood MC: 11.6% - 14.1%

**Specimen 1 Ultimate Load Test Deflection Data**

| Load Stages    | Applied Pressure (psf) | Left Stud Deflection (in.) |          |                | Right Stud Deflection (in.) |          |                |
|----------------|------------------------|----------------------------|----------|----------------|-----------------------------|----------|----------------|
|                |                        | Top Support                | Mid Span | Bottom Support | Top Support                 | Mid Span | Bottom Support |
|                |                        | 01784                      | 01941    | 00655          | 01785                       | 01682    | 00657          |
| <b>0 (REF)</b> | 0.0                    | 0.000                      | 0.000    | 0.000          | 0.000                       | 0.000    | 0.000          |
| <b>1/4LL</b>   | 14.6                   | 0.036                      | 0.102    | 0.020          | 0.033                       | 0.098    | 0.020          |
| <b>1/2LL</b>   | 29.1                   | 0.059                      | 0.194    | 0.041          | 0.054                       | 0.189    | 0.041          |
| <b>3/4LL</b>   | 43.7                   | 0.082                      | 0.307    | 0.062          | 0.076                       | 0.303    | 0.064          |
| <b>LL</b>      | 58.2                   | 0.103                      | 0.414    | 0.080          | 0.096                       | 0.411    | 0.084          |
| <b>5/4LL</b>   | 72.8                   | 0.128                      | 0.531    | 0.102          | 0.120                       | 0.532    | 0.106          |
| <b>5/2LL</b>   | 144.6                  | --                         | --       | --             | --                          | --       | --             |

Note: If testing was performed in a horizontal orientation the cladding weight was included in the 5/2LL stage above and the ultimate load below.

**Net LL Deflection: 0.322-in. at 58 psf**

**Ultimate Uniform Load: 235 psf**

**Failure Mode:** *Left outer stud failure, leading to bottom plate failure, followed by sheathing to framing fastener withdraw*

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**APPENDIX**



ESW071417-2, HUD 04-01WZIII (Vertical)(double studs) (FINAL)  
Out

NTA, Inc.

**Negative Wind Test for Wall Assemblies to be used in Manufactured Homes:  
Specimen 2**

Client: Environmental StoneWorks  
Job Number: ESW071417-2  
Test Method: *FMHCSS, Section 3280.401(b), Ultimate Load Test Procedure*

Performed By: Keith Hassell  
Witnessed By: Caleb Hunsberger

|                             |                       |                  |                                 |
|-----------------------------|-----------------------|------------------|---------------------------------|
| <b>General:</b>             | <b>Apparatus:</b>     | <b>Asset No.</b> | <b>Ambient Test Conditions:</b> |
| Received: 8/17/2017         | Length Measure: 01384 |                  | Ambient Temp.: 73.2 deg. F      |
| Fabrication Date: 9/28/2017 | Vacuum Table: 00023   |                  | Ambient R.H.: 50.4%             |
| Test Date: 10/11/2017       | Manometer: 423, 337   |                  | Sensor Asset No.: 01355         |
| Test Location: NTA, Inc.    | Moisture Meter: 00830 |                  |                                 |
| Nappanee, IN                | Balance: 00468        |                  |                                 |

|   |                                     |
|---|-------------------------------------|
| <b>Specimen Description:</b>  | <b>Loading Conditions:</b>          |
| Specimen No.: 94663   | HUD Wind Zone: Zone III (Corner)    |
| Clear Span: 96-in.  | Design Pressure: 58 psf             |
| Width: 48-in.   | Deflection Limit (L/180): 0.533-in. |
| Dead Weight: 12.84 psf  | Test Orientation: Vertical          |
| Framing: (4) 2 x 4 Stud SPF 16-in. oc   |                                     |
| Ext. Sheathing: 3/8-in x 48-in x 96-in ARBEC, Teco Mill 187 OSB Applied Vertically (Strength axis is parallel to length.) |                                     |
| 16ga x 7/16 x 1 1/2-in. 6/6-in. oc edge/field   |                                     |
| Ext. Siding: Clipstone Ledgestone Black Rundle 1 1/2-in. Stone  |                                     |
| #8 x 1 1/4-in. Buildex Tek's Lath Screws, Part #21512, #2 Phillips Head 2 per stone through sheathing only                |                                     |
| Int. Sheathing: none  |                                     |

Wood MC: 12.1% - 15.4%

**Specimen 2 Ultimate Load Test Deflection Data**

| Load Stages    | Applied Pressure (psf) | Left Stud Deflection (in.) |          |                | Right Stud Deflection (in.) |          |                |
|----------------|------------------------|----------------------------|----------|----------------|-----------------------------|----------|----------------|
|                |                        | Top Support                | Mid Span | Bottom Support | Top Support                 | Mid Span | Bottom Support |
|                |                        | 01784                      | 01941    | 00655          | 01785                       | 01942    | 00657          |
| <b>0 (REF)</b> | 0.0                    | 0.000                      | 0.000    | 0.000          | 0.000                       | 0.000    | 0.000          |
| <b>1/4LL</b>   | 14.8                   | 0.023                      | 0.113    | 0.031          | 0.031                       | 0.114    | 0.035          |
| <b>1/2LL</b>   | 29.1                   | 0.048                      | 0.210    | 0.039          | 0.055                       | 0.209    | 0.048          |
| <b>3/4LL</b>   | 43.7                   | 0.073                      | 0.326    | 0.057          | 0.078                       | 0.322    | 0.067          |
| <b>LL</b>      | 58.2                   | 0.099                      | 0.445    | 0.077          | 0.099                       | 0.434    | 0.087          |
| <b>5/4LL</b>   | 72.8                   | 0.125                      | 0.567    | 0.095          | 0.121                       | 0.565    | 0.105          |
| <b>5/2LL</b>   | 144.6                  | --                         | --       | --             | --                          | --       | --             |

Note: If testing was performed in a horizontal orientation the cladding weight was included in the 5/2LL stage above and the ultimate load below.

**Net LL Deflection: 0.349-in. at 58 psf**  
**Ultimate Uniform Load: 213 psf**  
**Failure Mode: Failure of the top plate.**

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**APPENDIX**



ESW071417-2, HUD 04-01WZIII (Vertical)(double studs) (FINAL)  
Out

NTA, Inc.

**Negative Wind Test for Wall Assemblies to be used in Manufactured Homes:  
Specimen 3**

Client: Environmental StoneWorks  
Job Number: ESW071417-2  
Test Method: *FMHCSS, Section 3280.401(b), Ultimate Load Test Procedure*

Performed By: Keith Hassell  
Witnessed By: Bradley Wear

|                             |                   |                  |                                 |
|-----------------------------|-------------------|------------------|---------------------------------|
| <b>General:</b>             | <b>Apparatus:</b> | <b>Asset No.</b> | <b>Ambient Test Conditions:</b> |
| Received: 8/17/2017         | Length Measure:   | 01384            | Ambient Temp.: 72.6 deg. F      |
| Fabrication Date: 9/28/2017 | Vacuum Table:     | 00023            | Ambient R.H.: 50.8%             |
| Test Date: 10/11/2017       | Manometer:        | 423, 337         | Sensor Asset No.: 01355         |
| Test Location: NTA, Inc.    | Moisture Meter:   | 00830            |                                 |
| Nappanee, IN                | Balance:          | 00468            |                                 |

|   |                                     |
|---|-------------------------------------|
| <b>Specimen Description:</b>  | <b>Loading Conditions:</b>          |
| Specimen No.: 94664   | HUD Wind Zone: Zone III (Corner)    |
| Clear Span: 96-in.  | Design Pressure: 58 psf             |
| Width: 48-in.   | Deflection Limit (L/180): 0.533-in. |
| Dead Weight: 12.79 psf  | Test Orientation: Vertical          |
| Framing: (4) 2 x 4 Stud SPF 16-in. oc   |                                     |
| Ext. Sheathing: 3/8-in x 48-in x 96-in ARBEC, Teco Mill 187 OSB Applied Vertically (Strength axis is parallel to length.) |                                     |
| 16ga x 7/16 x 1 1/2-in. 6/6-in. oc edge/field   |                                     |
| Ext. Siding: Clipstone Ledgestone Black Rundle 1 1/2-in. Stone  |                                     |
| #8 x 1 1/4-in. Buildex Tek's Lath Screws, Part #21512, #2 Phillips Head 2 per stone through sheathing only                |                                     |
| Int. Sheathing: none  |                                     |

Wood MC: 9.4% - 14.7%

**Specimen 3 Ultimate Load Test Deflection Data**

| Load Stages    | Applied Pressure (psf) | Left Stud Deflection (in.) |          |                | Right Stud Deflection (in.) |          |                |
|----------------|------------------------|----------------------------|----------|----------------|-----------------------------|----------|----------------|
|                |                        | Top Support                | Mid Span | Bottom Support | Top Support                 | Mid Span | Bottom Support |
|                |                        | 01784                      | 01941    | 00655          | 01785                       | 01942    | 00657          |
| <b>0 (REF)</b> | 0.0                    | 0.000                      | 0.000    | 0.000          | 0.000                       | 0.000    | 0.000          |
| <b>1/4LL</b>   | 14.4                   | 0.034                      | 0.127    | 0.026          | 0.030                       | 0.119    | 0.016          |
| <b>1/2LL</b>   | 29.1                   | 0.050                      | 0.228    | 0.044          | 0.046                       | 0.203    | 0.043          |
| <b>3/4LL</b>   | 43.7                   | 0.072                      | 0.356    | 0.065          | 0.069                       | 0.305    | 0.065          |
| <b>LL</b>      | 58.2                   | 0.099                      | 0.491    | 0.086          | 0.097                       | 0.416    | 0.088          |
| <b>5/4LL</b>   | 72.8                   | 0.123                      | 0.619    | 0.106          | 0.121                       | 0.520    | 0.109          |
| <b>5/2LL</b>   | 144.6                  | --                         | --       | --             | --                          | --       | --             |

Note: If testing was performed in a horizontal orientation the cladding weight was included in the 5/2LL stage above and the ultimate load below.

**Net LL Deflection: 0.361-in. at 58 psf**  
**Ultimate Uniform Load: 222 psf**  
**Failure Mode: Failure of the bottom plate.**

This summary contains only data arrived at after employing the specific test procedures listed herein. This summary data might not include all reporting requirements of the test standard. The data herein does not constitute a recommendation for, endorsement of, or certification of the product or material tested. NTA, Inc. makes no warranty, expressed or implied, except that the test has been performed, and data prepared, based upon the specimen furnished by the client. Extrapolation of data, from the test data provided herein, to the batch or lot from which the specimens were obtained may not correlate and should be interpreted with extreme caution. NTA, Inc. assumes no responsibility for variations in quality, composition, appearance, performance, or other features of similar materials produced by the client, other persons, or under conditions over which NTA, Inc. has no control. NTA Inc. has issued this data summary for the exclusive use of the client to whom it is addressed. Any use or duplication of this summary shall not be made without their consent. This summary shall only be reproduced in its entirety.



**APPENDIX**



ESW071417-2, HUD 04-01WZIII (Vertical)(double studs) (FINAL)  
Out

NTA, Inc.

**Negative Wind Test for Wall Assemblies to be used in Manufactured Homes:  
Results Summary**

Client: Environmental StoneWorks  
Job Number: ESW071417-2  
Test Method: *FMHCSS, Section 3280.401(b), Ultimate Load Test Procedure*

Performed By: Keith Hassell  
Witnessed By: Bradley Wear

**Specimen Description:**

Clear Span: 96-in.  
Width: 48-in.

**Loading Conditions:**

HUD Wind Zone: Zone III (Corner)  
Design Pressure: 58 psf  
Deflection Limit (L/180): 0.533-in.

Framing: (4) 2 x 4 Stud SPF 16-in. oc  
Ext. Sheathing: *3/8-in x 48-in x 96-in ARBEC, Teco Mill 187 OSB Applied Vertically (Strength axis is parallel to length.)*  
*16ga x 7/16 x 1 1/2-in. 6/6-in. oc edge/field*  
Ext. Siding: *Clipstone Ledgestone Black Rundle 1 1/2-in. Stone*  
*#8 x 1 1/4-in. Buildex Tek's Lath Screws, Part #21512, #2 Phillips Head 2 per stone through sheathing only*  
Int. Sheathing: *none*

Wood MC: 9.4% - 15.4%

Construction Description: Double 2x4 studs at 16 in. oc with 3/8-in x 48-in x 96-in OSB, Exposure 1, Rated 24/0 exterior sheathing applied vertically, fastened at 6/6 (staggered at double studs) with a 3/8-in Edge distance using 7/16-in x 1-1/2-in x 16 gauge staple, Clipstone Ledgestone Black Runder Flats, fastened with Buildex Tek's Lath Screws, into exterior sheathing only (NOT into studs) for Wind Zone III-Corner. Product samples by Quality Control Consultants, LLC who was contracted by Enviromental Stoneworks, LLC to witness (3) pallets (38 boxes, 304 sq. ft.) of Clipstone Ledgeworks Black Rundle Flats, for HUD testing. Sampled on 8/1/17, samples taken randomly from inventory and are individual pieces witnessed by Brett Wrigley.

Test Variable: Negative Wind Test, Wind Zone III-Corner

Procedures Modification: None

**Overall Test Results**

| Specimen | Specimen No. | Ultimate Pressure (psf) | Service Deflection (in.) |
|----------|--------------|-------------------------|--------------------------|
| 1        | 94662        | 235                     | 0.322                    |
| 2        | 94663        | 213                     | 0.349                    |
| 3        | 94664        | 222                     | 0.361                    |

**Average Ultimate Pressure<sup>b</sup>: 223 psf, Pass (58 psf x 2.5 - Specimen Dead Load = Min. Ultimate Pressure)**

**Average Mid-Span Deflection<sup>a</sup>: 0.344-in., Pass (L/180 = 0.533-in.)**

amid-span deflection less the average of the support deflections.

<sup>b</sup>If the orientation of specimen during testing is horizontal, the specimen dead load may be subtracted from the design pressure to obtain the required minimum ultimate pressure.

Note: Each individual specimen must pass the criteria above in order for the whole test to be considered passing.

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