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**ATLNC # 1008.02-14**

Report Date: 11/25/14

Dade Certification # 13-0122.01  
FBC Organizational # TST 1555  
IAS Certification # TL-423

Test Dates: 10/08/14 – 10/09/14

**Test Requested By:**

Frank Krech  
Madison Industries Inc.  
Conyers, GA,  
Telephone 770-483-4401 Fax 770-785-7967

**Test Standard:**

ASTM E1592-05

**Test Conditions:** 70-75 degrees F

**Specimens A, B, C,** 8' purlin spacing

**Description of product tested:**

**Specimen A B, C** 20 gauge (.036") Metal Roof Panels over W8 x 13 purlins as shown in Madison Industries Drawing A-1.1

**Configuration:** Specimens Mounted in steel test chamber  
Specimens A, B, C (2 spans, 4 panels wide)

**Description of Units:**

**Panel Construction-** .036" steel roof panels 16" wide x 264" long with 3" interlocking standing seams per Drawing A-1.1

**Purlin Construction-** W8 x 13 I Beams

**Purlin Spacing-** 2 spans 96" OC with 36" overhang as shown in drawing.

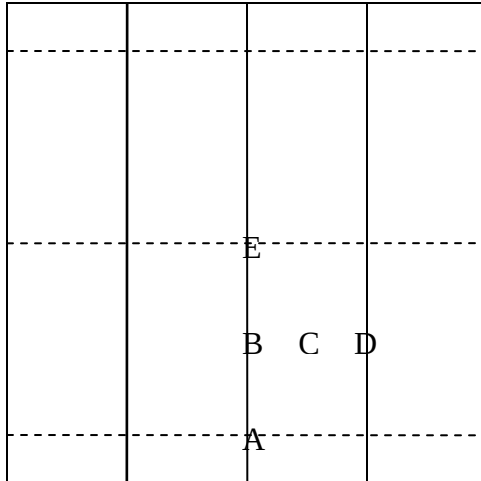
**Screws and Method of Attachment-**

**Purlins-** Panels were attached to the purlins with a 1/4" stainless steel bolt and a Deck Clip at each deck rib, alternating the position of the bolt and Deck Clip as shown in Drawing A-1.1

**Panel Standing Seams-** Overlaps were 16" OC and panels were joined with (1) # 14 x 3/4" Type AB fasteners at mid span per Drawing A-1.

**Purlin Attachment-** Each purlin was attached to the chamber.

Indicator Locations



### **STATIC AIR PRESSURE**

ASTM E1592 -05

#### **Specimen A**

Deflections in inches

#### **Deflection Locations**

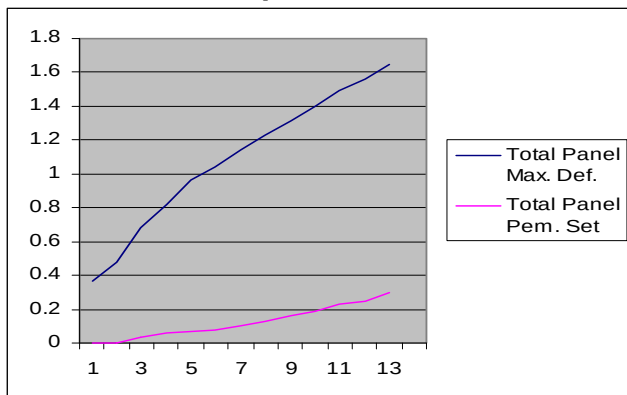
| <b>Pressure<br/>Increments<br/>psf<br/>Positive</b> | <b>Time<br/>(sec)</b> | <b>End<br/>Purlin<br/>Rib A</b> | <b>Mid-<br/>Span<br/>B</b> | <b>Mid-Span<br/>C</b> | <b>Mid-span<br/>D</b> | <b>Span End<br/>Purlin<br/>Rib E</b> | <b>Total panel<br/>deflection</b> |
|-----------------------------------------------------|-----------------------|---------------------------------|----------------------------|-----------------------|-----------------------|--------------------------------------|-----------------------------------|
| 30                                                  | 60                    | .01                             | .07                        | .37                   | .10                   | .01                                  | .37                               |
| 40                                                  | 60                    | .02                             | .11                        | .48                   | .18                   | .02                                  | .48                               |
| 60                                                  | 60                    | .02                             | .17                        | .68                   | .39                   | .04                                  | .68                               |
| 80                                                  | 60                    | .03                             | .24                        | .82                   | .64                   | .06                                  | .82                               |
| 90                                                  | 60                    | .04                             | .28                        | .96                   | .61                   | .13                                  | .96                               |
| 100                                                 | 60                    | .04                             | .31                        | 1.04                  | .75                   | .09                                  | 1.04                              |
| 110                                                 | 60                    | .05                             | .38                        | 1.14                  | .81                   | .12                                  | 1.14                              |
| 120                                                 | 60                    | .24                             | .42                        | 1.23                  | .93                   | .14                                  | 1.23                              |
| 130                                                 | 60                    | .06                             | .46                        | 1.31                  | 1.04                  | .13                                  | 1.31                              |
| 140                                                 | 60                    | .07                             | .50                        | 1.40                  | 1.20                  | .14                                  | 1.40                              |
| 150                                                 | 60                    | .08                             | .55                        | 1.49                  | 1.28                  | .16                                  | 1.49                              |
| 160                                                 | 60                    | .09                             | .60                        | 1.56                  | 1.33                  | .18                                  | 1.56                              |
| 170                                                 | 60                    | .10                             | .65                        | 1.65                  | 1.70                  | .20                                  | 1.65                              |

Note: At 120 psf indicator A slip off rib giving a false reading.

Perm Set in inches

| Deflection Locations                   |               |                                    |                   |               |               |                                |                         |
|----------------------------------------|---------------|------------------------------------|-------------------|---------------|---------------|--------------------------------|-------------------------|
| Pressure Increments<br>psf<br>Positive | Time<br>(sec) | End<br>Purlin<br>Between<br>Ribs A | Mid-<br>Span<br>B | Mid-Span<br>C | Mid-span<br>D | Span End<br>Purlin<br>Rib<br>E | Total panel<br>perm set |
| 30                                     | 60            | 0                                  | 0                 | 0             | 0             | 0                              | 0                       |
| 40                                     | 60            | .01                                | .01               | 0             | 0             | 0                              | 0                       |
| 60                                     | 60            | .01                                | .02               | .03           | .01           | 0                              | .03                     |
| 80                                     | 60            | .01                                | .03               | .06           | .03           | .01                            | .06                     |
| 90                                     | 60            | .02                                | .04               | .07           | .05           | .01                            | .07                     |
| 100                                    | 60            | .03                                | .05               | .08           | .06           | .02                            | .08                     |
| 110                                    | 60            | .03                                | .07               | .10           | .08           | .02                            | .10                     |
| 120                                    | 60            | .01                                | .08               | .13           | .10           | .03                            | .13                     |
| 130                                    | 60            | .01                                | .10               | .16           | .12           | .04                            | .16                     |
| 140                                    | 60            | .02                                | .12               | .19           | .15           | .05                            | .19                     |
| 150                                    | 60            | .02                                | .14               | .23           | .17           | .06                            | .23                     |
| 160                                    | 60            | .03                                | .16               | .25           | .20           | .07                            | .25                     |
| 170                                    | 60            | .04                                | .19               | .30           | .24           | .09                            | .30                     |

### Positive Side Graph



Note: After successfully testing at 170 psf at the request of the customer pressure was raised until failure occurred at 195 psf. Failure occurred at center purlin. Deck Clips bent and center rib bolt pulled through panel.

**Specimen B**

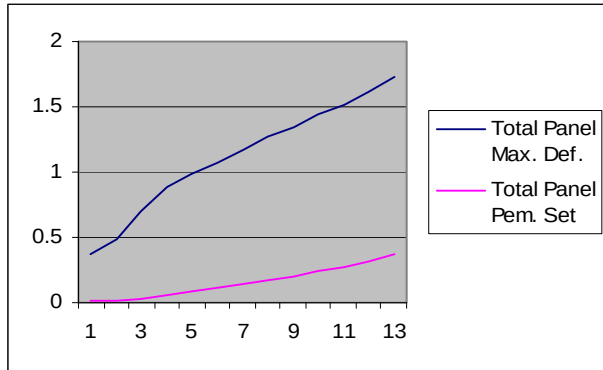
Deflections in inches

| <b>Deflection Locations</b>                     |                       |                                 |                            |                       |                       |                                      |                                   |
|-------------------------------------------------|-----------------------|---------------------------------|----------------------------|-----------------------|-----------------------|--------------------------------------|-----------------------------------|
| <b>Pressure Increments<br/>psf<br/>Positive</b> | <b>Time<br/>(sec)</b> | <b>End<br/>Purlin<br/>Rib A</b> | <b>Mid-<br/>Span<br/>B</b> | <b>Mid-Span<br/>C</b> | <b>Mid-span<br/>D</b> | <b>Span End<br/>Purlin<br/>Rib E</b> | <b>Total panel<br/>deflection</b> |
| 30                                              | 60                    | .01                             | .03                        | .37                   | .08                   | .01                                  | .37                               |
| 40                                              | 60                    | .02                             | .11                        | .48                   | .11                   | .02                                  | .48                               |
| 60                                              | 60                    | .03                             | .18                        | .70                   | .19                   | .04                                  | .70                               |
| 80                                              | 60                    | .05                             | .26                        | .89                   | .27                   | .07                                  | .89                               |
| 90                                              | 60                    | .05                             | .30                        | .99                   | .31                   | .08                                  | .99                               |
| 100                                             | 60                    | .05                             | .33                        | 1.07                  | .34                   | .09                                  | 1.07                              |
| 110                                             | 60                    | .06                             | .41                        | 1.17                  | .39                   | .11                                  | 1.17                              |
| 120                                             | 60                    | .07                             | .46                        | 1.27                  | .45                   | .12                                  | 1.27                              |
| 130                                             | 60                    | .07                             | .50                        | 1.35                  | .49                   | .14                                  | 1.35                              |
| 140                                             | 60                    | .08                             | .55                        | 1.44                  | .55                   | .16                                  | 1.44                              |
| 150                                             | 60                    | .09                             | .60                        | 1.52                  | .59                   | .17                                  | 1.52                              |
| 160                                             | 60                    | .10                             | .66                        | 1.61                  | .65                   | .19                                  | 1.61                              |
| 170                                             | 60                    | .11                             | .73                        | 1.73                  | .73                   | .22                                  | 1.73                              |

Perm Set in inches

| <b>Deflection Locations</b>                     |                       |                                     |                            |                       |                       |                                          |                                 |
|-------------------------------------------------|-----------------------|-------------------------------------|----------------------------|-----------------------|-----------------------|------------------------------------------|---------------------------------|
| <b>Pressure Increments<br/>psf<br/>Positive</b> | <b>Time<br/>(sec)</b> | <b>End<br/>Purlin<br/>Rib<br/>A</b> | <b>Mid-<br/>Span<br/>B</b> | <b>Mid-Span<br/>C</b> | <b>Mid-span<br/>D</b> | <b>Span End<br/>Purlin<br/>Rib<br/>E</b> | <b>Total panel<br/>perm set</b> |
| 30                                              | 60                    | 0                                   | 0                          | .01                   | 0                     | 0                                        | .01                             |
| 40                                              | 60                    | .01                                 | 0                          | .01                   | .01                   | 0                                        | .01                             |
| 60                                              | 60                    | .01                                 | .02                        | .03                   | .03                   | .01                                      | .03                             |
| 80                                              | 60                    | .03                                 | .04                        | .06                   | .04                   | .01                                      | .06                             |
| 90                                              | 60                    | .03                                 | .05                        | .09                   | .05                   | .02                                      | .09                             |
| 100                                             | 60                    | .02                                 | .06                        | .11                   | .08                   | .03                                      | .11                             |
| 110                                             | 60                    | .02                                 | .09                        | .14                   | .11                   | .03                                      | .14                             |
| 120                                             | 60                    | .03                                 | .11                        | .17                   | .15                   | .05                                      | .17                             |
| 130                                             | 60                    | .03                                 | .13                        | .20                   | .17                   | .06                                      | .20                             |
| 140                                             | 60                    | .04                                 | .15                        | .24                   | .19                   | .07                                      | .24                             |
| 150                                             | 60                    | .04                                 | .17                        | .27                   | .22                   | .08                                      | .27                             |
| 160                                             | 60                    | .04                                 | .20                        | .32                   | .24                   | .09                                      | .32                             |
| 170                                             | 60                    | .05                                 | .24                        | .37                   | .28                   | .11                                      | .37                             |

## Positive Side Graph



Note: No damage noted at 170 psf.

## Specimen C

Deflections in inches

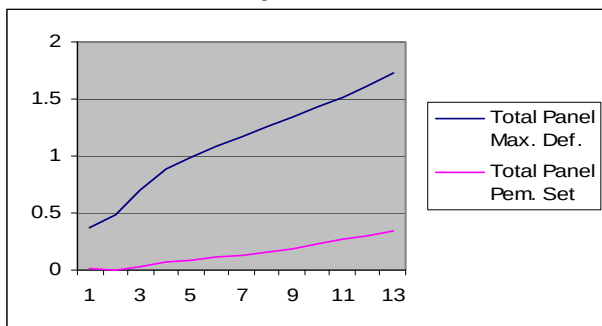
| Deflection Locations                   |               |                        |                   |               |               |                             |                           |
|----------------------------------------|---------------|------------------------|-------------------|---------------|---------------|-----------------------------|---------------------------|
| Pressure Increments<br>psf<br>Positive | Time<br>(sec) | End<br>Purlin<br>Rib A | Mid-<br>Span<br>B | Mid-Span<br>C | Mid-span<br>D | Span End<br>Purlin<br>Rib E | Total panel<br>deflection |
| 30                                     | 60            | .01                    | .07               | .37           | .07           | .02                         | .37                       |
| 40                                     | 60            | .01                    | .10               | .49           | .10           | .03                         | .49                       |
| 60                                     | 60            | .02                    | .16               | .70           | .16           | .05                         | .70                       |
| 80                                     | 60            | .03                    | .23               | .89           | .22           | .074                        | .89                       |
| 90                                     | 60            | .04                    | .26               | .98           | .25           | .09                         | .98                       |
| 100                                    | 60            | .05                    | .30               | 1.08          | .28           | .10                         | 1.08                      |
| 110                                    | 60            | .06                    | .34               | 1.17          | .32           | .12                         | 1.17                      |
| 120                                    | 60            | .08                    | .39               | 1.26          | .36           | .14                         | 1.26                      |
| 130                                    | 60            | .09                    | .43               | 1.34          | .40           | .15                         | 1.34                      |
| 140                                    | 60            | .10                    | .47               | 1.43          | .44           | .17                         | 1.43                      |
| 150                                    | 60            | .12                    | .52               | 1.52          | .49           | .19                         | 1.52                      |
| 160                                    | 60            | .13                    | .56               | 1.61          | .53           | .22                         | 1.61                      |
| 170                                    | 60            | ---                    | .64               | 1.73          | .59           | .25                         | 1.73                      |

Perm Set in inches

| <b>Deflection Locations</b>                     |                       |                                     |                            |                       |                       |                                          |                                 |
|-------------------------------------------------|-----------------------|-------------------------------------|----------------------------|-----------------------|-----------------------|------------------------------------------|---------------------------------|
| <b>Pressure Increments<br/>psf<br/>Positive</b> | <b>Time<br/>(sec)</b> | <b>End<br/>Purlin<br/>Rib<br/>A</b> | <b>Mid-<br/>Span<br/>B</b> | <b>Mid-Span<br/>C</b> | <b>Mid-span<br/>D</b> | <b>Span End<br/>Purlin<br/>Rib<br/>E</b> | <b>Total panel<br/>perm set</b> |
| 30                                              | 60                    | 0                                   | 0                          | .01                   | .01                   | 0                                        | .01                             |
| 40                                              | 60                    | 0                                   | .01                        | 0                     | .01                   | .01                                      | 0                               |
| 60                                              | 60                    | 0                                   | .10                        | .03                   | .02                   | .01                                      | .03                             |
| 80                                              | 60                    | 0                                   | .03                        | .07                   | .02                   | .02                                      | .07                             |
| 90                                              | 60                    | 0                                   | .04                        | .09                   | .04                   | .02                                      | .09                             |
| 100                                             | 60                    | .01                                 | .05                        | .11                   | .05                   | .03                                      | .11                             |
| 110                                             | 60                    | .02                                 | .07                        | .13                   | .07                   | .04                                      | .13                             |
| 120                                             | 60                    | .03                                 | .08                        | .16                   | .09                   | .05                                      | .16                             |
| 130                                             | 60                    | .04                                 | .09                        | .19                   | .11                   | .06                                      | .19                             |
| 140                                             | 60                    | .04                                 | .11                        | .23                   | .13                   | .08                                      | .23                             |
| 150                                             | 60                    | .05                                 | .13                        | .27                   | .15                   | .10                                      | .27                             |
| 160                                             | 60                    | .06                                 | .15                        | .30                   | .17                   | .12                                      | .30                             |
| 170                                             | 60                    | ---                                 | .19                        | .35                   | .21                   | .14                                      | .35                             |

Note: Indicator A slipped off of rib at 170 psf no reading on max deflection taken. Specimen failed at 180 psf at 30 seconds into test. Failed occurred at center purlin. Deck Clips bent and center rib bolt pulled through panel.

### Positive Side Graph



**Tensile Test**  
**ASTM E8**

**Test Results**

| Specimen | Dimensions<br>(inches) | Area<br>(sq. inches) | Peak<br>Force<br>(lbs) | Yield<br>Stress<br>(psi) | Ultimate<br>Stress<br>(psi) | Elongation<br>(%) |
|----------|------------------------|----------------------|------------------------|--------------------------|-----------------------------|-------------------|
| A        | .502 x .032            | .016                 | 1308                   | 63,496                   | 81,206                      | 21                |
| B        | .502 x .032            | .016                 | 1290                   | 63,378                   | 80,260                      | 23                |
| C        | .502 x .032            | .016                 | 1298                   | 62,749                   | 80,646                      | 23                |

Note: 2 mil polyethylene film was used for the tests, it is the opinion of the undersigned that it had no influence on the results of the test.

Observers-

Keith Owen / ATL  
Keith Owen Jr, Samuel Poplin / ATL  
Frank Krech, Larry Bauman / Madison Industries  
David W. Johnson, P.E.

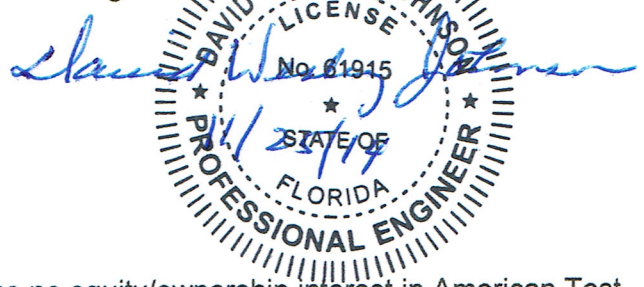
Keith Owen, Lab Director  
American Test Lab, Inc.

*Keith Owen*  
11/25/14

All Tests Witnessed and Certified by:

David Johnson P. E.  
1656 Calvert Rd.  
Brevard, NC 28712  
Florida P.E. # 61915

Engineer Seal and Signature



Certificate of Independence: The witnessing engineer has no equity/ownership interest in American Test Lab of North Carolina, Madison Industries or their parts vendors. Witnessing engineer is in complete compliance of Florida Statute 9B-72, Section 72.110.

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