CONSTRUCTION MATERIALS

TECHNOLOGIES

PERFORMANCE TEST REPORT

FOR

Southern Manufacturing
Division of Accord Industries
Internally Illuminated Street Name Sign

IN ACCORDANCE WITH

FLORIDA BUILDING CODE (HIGH VELOCITY HURRICANE ZONES)
TEST APPLICATION STANDARD (TAS) 100-95:

TEST PROCEDURE FOR WIND AND WIND DRIVEN RAIN RESISTANCE OF DISCONTINUOUS ROOF SYSTEMS

October 5, 2009

PRI Construction Materials Technologies, LLC. 6408 Badger Drive Tampa, FL 33610 Tel: 813-621-5777 Fax: 813-621-5840 e-mail materialstesting@pricmt.com WebSite: http://www.pricmt.com

PERFORMANCE TEST REPORT

FLORIDA BUILDING CODE (HVHZ) TAS 100-95

TEST PROCEDURE FOR WIND AND WIND DRIVEN RAIN RESISTANCE OF DISCONTINUOUS ROOF SYSTEMS

October 5, 2009

Client: Southern Manufacturing
4001 Forsyth Road
Winter Park, FL 32792

Test Date: September 24, 2009
PRI Report No.: SMA-002-02-01

1.1 Description of System Tested:

Street Name Sign

Supplier:	Southern Manufacturing
Product Name:	Internally Illuminated Street Name Sign
Product Description:	Lighted Sign 48 x 24

Mounting System

Supplier:	Southern Manufacturing
Product Name:	None

1.2 Method of Construction:

The objective of this testing was to determine if the street sign could withstand the sustained wind and water cycles used to test roofing systems within Dade County Florida and the State of Florida. The objective of this project was to test the sign, not the mounting system which was designed to center the sign being tested in the middle area of the exit to the wind tunnel. Southern Manufacturing designed the sign mounting system, mounted it on the back of a truck and positioned it in front of the wind tunnel exit. The front of the sign was approximately 5 feet in front of the exit to the wind tunnel and centered on the 4 foot height of the wind tunnel exit. The mounting permitted the sign to move in the direction of the wind stream.

1.3 Method of Conditioning

The sign was not conditioned before testing.

1.4 Absorptive Material Description

The absorptive material used for the simulated rainfall calibration was 46 gauge organic felt.

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1.5 Photographs of Front and Back of Sign Immediately Prior and Subsequent to Commencement and Termination of Testing.

FRONT OF IMMEDIATELY BEFORE COMMENCEMENT OF TEST

BACK OF SIGN IMMEDIATELY PRIOR TO COMMENCEMENT OF TEST

FRONT OF SIGN IMMEDIATELY AFTER TEST

BACK OF SIGN IMMEDIATELY AFTER TEST

1.6 Photographs of Top and Underside of Deck 30 Seconds Prior to Completion of Each Testing Interval.

FRONT OF SIGN 30 SECONDS PRIOR TO COMPLETION OF INTERVAL 1: 35 MPH

FRONT OF SIGN 30 SECONDS PRIOR TO COMPLETION OF INTERVAL 3: 70 MPH

FRONT OF SIGN 30 SECONDS PRIOR TO COMPLETION OF INTERVAL 5: 90 MPH

FRONT OF SIGN 30 SECONDS PRIOR TO COMPLETION OF INTERVAL 7: 110 MPH

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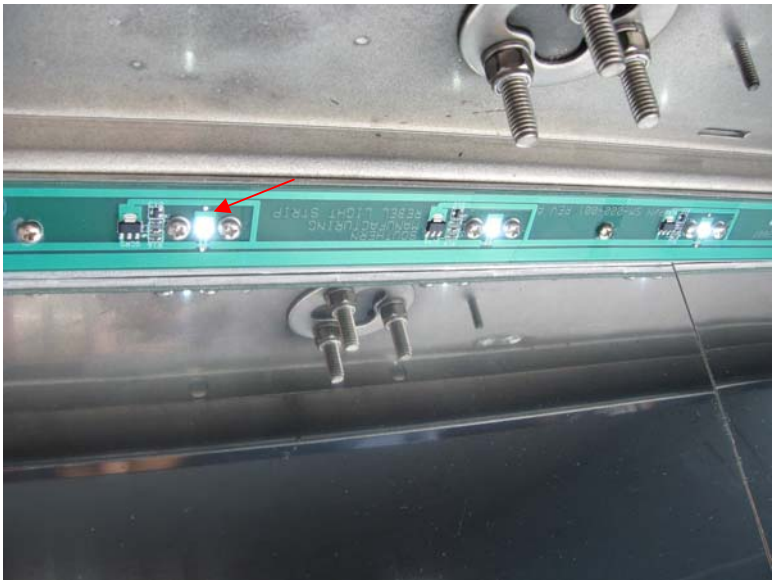
INTERIOR OF STREET SIGN AFTER COMPLETION OF TESTING

Note: LEDs are functioning after test.



1.7 Wind stream, Simulated Rain Fall, and Flow Meter Calibration Data and Calculations. See Appendix A.

1.8 Detailed Observations.

TAS 100 DATA AND OBSERVATIONS
Southern Manufacturing
Internally Illuminated Street Name Sign

Air Temperature: 87°F

Interval	Test Condition	Result
1	Wind Speed: 35 mph Water Spray: On Duration: 15 min	Wind Speed: Sign mounting permitted sign movement in the wind stream of about 20°.
2	Wind Speed: 0 mph Water Spray: Off Duration: 10 min	Water Spray: Water infiltration was not detected.
3	Wind Speed: 70 mph Water Spray: On Duration: 15 min	Wind Speed: Sign mounting permitted sign movement in the wind stream of about 35°.
4	Wind Speed: 0 mph Water Spray: Off Duration: 10 min	Water Spray: Water infiltration was not detected.
5	Wind Speed: 90 mph Water Spray: On Duration: 15 min	Wind Speed: Sign mounting permitted sign movement in the wind stream of about 40°.
6	Wind Speed: 0 mph Water Spray: Off Duration: 10 min	Water Spray: Water infiltration was not detected.
7	Wind Speed: 110 mph Water Spray: On Duration: 5min	Wind Speed: Sign mounting permitted sign movement in the wind stream of about 45°.
8	Wind Speed: 0 mph Water Spray: Off Duration: 10min	Water Spray: Very minor water infiltration in the form of droplets which did not affect function of the sign. Sign Position: Sign returned to original position.

Summary Observations: Sign mounting permitted sign movement in the wind stream depending on wind velocity. At the conclusion of each wind cycle, the sign returned to the original position at start of the test. Very minor water infiltration, in the form of droplets, was detected after the 110 MPH wind cycle. Sign LEDs still functioned at the conclusion of the testing.

1.9 Volume of water, which infiltrated the sign.

None

1.10 Components which blow off or are damaged.

None. The street sign lighted as designed immediately after the completion of the test.

2.0 Result of Testing:

This LED sign was able to with stand sustained wind of up to 110 MPH and water during the wind cycle of 8.8 inches per hour without damage. Sign LEDs functioned at the conclusion of the test.

Signed: _____ **Signed:** _____

Donald Portfolio
President

Duc T. Nguyen
Florida Registered Professional Engineer
P.E. Number: 65034

Date: _____ **Date:** _____

APPENDIX A

FBC (HVHZ) TAS 100 - 95 CALIBRATION DATA

Detail for Report Section 1.7

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FBC (HVHZ) TAS 100 - 95 CALIBRATION PROCEDURES, DATA, AND CALCULATIONS

June 2, 2009

Windstream Calibration

Procedure: The windstream velocity calibration is conducted on a vertical plane grid measuring 8' wide by 4' high and grid dimensions of 2' by 2'. The plane is located in front of the wind tunnel exit. For each axial velocity setting, windstream pressures are measured using either a Dwyer Model 605-3 or 605-10 Magnehelic Differential Pressure Indicating Transmitter to a Dwyer Model 160-48 Pitot Tube. Velocity pressures for each grid square are observed as inches of water and converted to miles per hour according to the below relationship.

$$MPH = 12.4625\sqrt{P_V/_d}$$

where, P_V represents the velocity pressure in inH_2O and d represents the density of air in lbs/ft^3 adjusted for temperature, barometric pressure, and relative humidity.

The measured windstream velocity within each grid square shall be within ±10% of the required axial velocity for each wind speed.

Data and Calculations: Data from the most recent calibration indicate that the wind generator provides a suitably constant wind profile for the TAS 100-95 test procedure. Windstream velocity calibration data is provided in the table that follows on the next page.

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Windstream Velocity Calibration

Date of Calibration Procedure: **06/03/09** Next Due: **December-09**

Ambient Temperature:	77.0	°F
Barometric Pressure:	30.05	in Hg
Relative Humidity:	83	%

RPM	Grid Position	Velocity Pressure (in H_2O)	Windstream Velocity (mph)	Grid Position	Velocity Pressure (in H_2O)	Windstream Velocity (mph)	Grid Position	Velocity Pressure (in H_2O)	Windstream Velocity (mph)	Grid Position	Velocity Pressure (in H_2O)	Windstream Velocity (mph)
1500	1	0.70	38.5	2	0.60	35.6	3	0.60	35.6	4	0.70	38.5
	5	0.60	35.6	6	0.70	38.5	7	0.60	35.6	8	0.70	38.5
Target:	35 mph	Calibration: Each Grid Square shall be within ± 10% of 35 mph (31.5 - 38.5 mph)								Pass/Fail:		***Pass***
2600	1	2.4	71.2	2	2.2	68.2	3	2.2	68.2	4	2.4	71.2
	5	2.2	68.2	6	2.1	66.6	7	2.2	68.2	8	2.4	71.2
Target:	70 mph	Calibration: Each Grid Square shall be within ± 10% of 70 mph (63 - 77 mph)								Pass/Fail:		***Pass***
3500	1	3.9	90.8	2	3.8	89.6	3	3.7	88.4	4	3.9	90.8
	5	3.8	89.6	6	3.6	87.2	7	3.7	88.4	8	3.9	90.8
Target:	90 mph	Calibration: Each Grid Square shall be within ± 10% of 90 mph (81 - 99 mph)								Pass/Fail:		***Pass***
4200	1	5.6	109	2	5.6	109	3	5.5	108	4	5.8	111
	5	5.6	109	6	5.5	108	7	5.7	110	8	5.8	111
Target:	110 mph	Calibration: Each Grid Square shall be within ± 10% of 110 mph (99 - 121 mph)								Pass/Fail:		***Pass***

Simulated Rainfall and Flow Meter Calibration

Procedure: Water is supplied to the windstream via mounted sprinkle-pipes. Calibration is conducted in essentially two steps. First, the flow meter readings, in gal/min, are recorded, summed, and input into the following equation:

$$\left[\frac{\left(\frac{gallons}{minute}\right)\times\left(\frac{60\ minutes}{1\ hour}\right)\times\left(\frac{231\ inches^3}{1\ gallon}\right)}{11{,}520\ inches^2}\right]=\left(x\,\frac{inches}{hour}\right)$$

The quantity x determined above shall be within ± 5% of the desired rainfall simulation of 8.8 inches/hour.

Second, the quantity of water captured in one (1) minute is weighed, converted to volume, and input into the below equation:

$$\left[\frac{\left(\frac{inches^3}{11{,}520\ inches^2}\right)}{1\ minute} \times \left(\frac{60\ minutes}{1\ hour}\right)\right] = \left(y\ \frac{inches}{hour}\right)$$

The flow meter determination x shall be within ± 5% of the quantity y determined above.

Data and Calculations: Data from the most recent calibration indicate that an appropriate volume of water is applied during the TAS 100-95 test procedure. Simulated rainfall and flow meter calibration data is provided in the below table.

Simulated Rainfall and Flow Meter Calibration

Date of Calibration Procedure: **06/03/09** Next Due: **December-09**

X	Water Supply (gal/min)	Simulated Rainfall (in/hr)
Flow Meter #1	3.6	4.3
Flow Meter #2	3.6	4.3
Total	7.2	8.7
Simulated Rainfall		**8.7**
Target		8.8
Within ± 5% Tolerance		***Pass***

Y	Weight (lbs)	Volume (in^3)	Simulated Rainfall (in/hr)
Flow Meter #1	30.2	835.9	4.4
Flow Meter #2	30.5	844.2	4.4
Total	60.7	1680.2	8.8
Simulated Rainfall			**8.8**
Target			8.7
Within ± 5% Tolerance			***Pass***

Water Distribution Check

Procedure: The water distribution of simulated rain fall over the test frame was determined by placing a thick absorptive material on the deck sheathing, determining the amount of water absorbed during a set time interval, and verifying the water distribution profile within given tolerances. The procedure outlined in TAS 100-95 and was followed. The deck was set to a 2in:12in slope. The thick absorptive material used was 46 gauge organic felt. Wind driven rain was applied for approximately six (6) minutes. Each individual 2' x 2' wetted square was weighed using an Ohaus Model I-10 Scale.

The simulated rainfall calculated for each 2' x 2' wetted square shall be within either

±15% (at 35mph) or ±10% (at 70mph) of every other wetted square.

Data and Calculations: Data from the most recent calibration indicate that the wind generator and water supply system provides a suitably constant water distribution profile for the TAS 100-95 test procedure. Water distribution check data is provided in the table below.

Water Distribution Check

Date of Calibration Procedure: **06/02/09** Next Due: **December-09**

Ambient Temperature:	92.0	°F
Barometric Pressure:	30.04	in Hg
Relative Humidity:	41	%

Windstream Velocity: 35 mph
Water Supply: 7.2 gal/min
Elasped Time: 6 min

Grid Position	Dry Felt (g)	Wetted Felt (g)	Simulated Rainfall (g)	Grid Position	Dry Felt (g)	Wetted Felt (g)	Simulated Rainfall (g)	Grid Position	Dry Felt (g)	Wetted Felt (g)	Simulated Rainfall (g)	Grid Position	Dry Felt (g)	Wetted Felt (g)	Simulated Rainfall (g)
20	200.5	669.0	468.5	15	194.0	668.0	474.0	10	198.5	667.0	468.5	5	186.5	638.0	451.5
19	200.0	680.0	480.0	14	199.5	692.0	492.5	9	197.0	670.0	473.0	4	191.0	624.0	433.0
18	197.0	669.0	472.0	13	199.5	696.0	496.5	8	193.0	658.0	465.0	3	186.5	573.0	386.5
17	199.5	646.0	446.5	12	201.0	672.0	471.0	7	187.5	636.0	448.5	2	189.0	620.0	431.0
16	201.5	669.0	467.5	11	198.0	684.0	486.0	6	183.5	603.0	419.5	1	189.0	611.5	422.5

Target: No one particular square sample shall exhibit a rainfall simulation greater than or less than 25% of the average of all square samples.

Average: 457.68 ⇒ Low Tolerance: 343.26
⇒ High Tolerance: 572.09 Pass/Fail: ***Pass***

Windstream Velocity: 70 mph
Water Supply: 7.2 gal/min
Elasped Time: 6 min

Grid Position	Dry Felt (g)	Wetted Felt (g)	Simulated Rainfall (g)	Grid Position	Dry Felt (g)	Wetted Felt (g)	Simulated Rainfall (g)	Grid Position	Dry Felt (g)	Wetted Felt (g)	Simulated Rainfall (g)	Grid Position	Dry Felt (g)	Wetted Felt (g)	Simulated Rainfall (g)
20	213.4	624.0	410.6	15	210.2	576.0	365.8	10	207.2	592.0	384.8	5	205.6	618.0	412.4
19	213.4	652.0	438.6	14	210.2	584.0	373.8	9	207.2	591.0	383.8	4	205.6	613.0	407.4
18	213.4	666.0	452.6	13	210.2	612.0	401.8	8	207.2	616.0	408.8	3	205.6	615.0	409.4
17	213.4	656.0	442.6	12	210.2	621.0	410.8	7	207.2	625.0	417.8	2	205.6	618.0	412.4
16	213.4	658.0	444.6	11	210.2	647.0	436.8	6	207.2	619.0	411.8	1	205.6	632.0	426.4

Target: No one particular square sample shall exhibit a rainfall simulation greater than or less than 25% of the average of all square samples.

Average: 412.65 ⇒ Low Tolerance: 309.49
⇒ High Tolerance: 515.81 Pass/Fail: ***Pass***

FBC (HVHZ) TAS 100 - 95 CALIBRATION PROCEDURES, DATA, AND CALCULATIONS

Signed: _____ **Signed:** _____

Donald C. Portfolio
President

Duc T. Nguyen
Florida Registered Professional Engineer
P.E. Number: 65034

Date: _____ **Date:** _____

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