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CONSTRUCTION MATERIALS

TECHNOLOGIES

LABORATORY TEST REPORT

Report for: Drexel Metals, Inc.
1234 Gardiner Lane
Louisville, KY 40213

Attention: Jason Shumate

Product Name:	24 ga. DMC 150SS	Manufacturer:	Drexel Metals, Inc.
Project No.:	DMC-009-02-01	Source:	Drexel Metals, Inc.
Date Received:	March 11, 2013	Date Tested:	April 11, 2013

Purpose: Determine the performance of Drexel Metals, Inc.'s **24 ga. DMC 150SS** in accordance with **Florida Building Code Test Protocols for the High Velocity Hurricane Zone (HVHZ) Testing Application Standard (TAS) 100-95: Test Procedure for Wind and Wind Driven Rain Resistance of Discontinuous Roof Systems.**

Test Methods: Testing was completed as described in Florida Building Code Test Protocols for the High Velocity Hurricane Zone (HVHZ) Testing Application Standard (TAS) 100-95: *Test Procedure for Wind and Wind Driven Rain Resistance of Discontinuous Roof Systems.*

Sampling: **24 ga. DMC 150SS** panels were supplied by Drexel Metals, Inc. All other materials were provided by PRI Construction Materials Technologies LLC and purchased through local distribution.

Test Specimen: **Non-Structural Metal Roofing**

Roof Panel:

24 ga. DMC 150SS, preformed, standing seam metal roof panels; $F_y = \text{min. } 50 \text{ ksi}$; 16 in. installed coverage; 90 degree lock

22 ga. 6-1/4 in. x 1-5/8 in. galvanized steel DMC 150SS fixed clip installed with two (2) #10-13 x 1 in. PHW screws at 8 in. o.c. along the panel seam. Panel is mechanically locked with a 90 degree hem. See Appendix A for detailed drawing.

Valley/Eave/Rake:

Installation details are provided in Appendix A.

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PRI-CMT Accreditations: IAS TL-189; State of Florida TST5878; Miami-Dade 06-1116.02; CRRC

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Underlayment: ASTM D 226 Type II. Underlayment was installed with minimum 4" side-lap and 6" end-laps and fastened using 12 ga., 1-1/4" ring shank nails and 1-5/8" diameter tin caps spaced 6" o.c. along the laps and two staggered rows 12" o.c. in the field of the roll. Vertical laps at the valley were woven by extending the top ply a minimum of 12" past the valley center.

Deck: 15/32" APA plywood. Decking attached with 8d, 2-1/2" ring shank nails spaced 6" o.c. along perimeter and 12" o.c. at intermediate supports. Wood rafters were spaced 24 o.c.

Results:

Refer to Appendix A for details of equipment calibrations. Testing was performed at a 2":12" slope with an ambient temperature of 84°F.

Table 1. Testing Summary

Test Interval	Air Flow Velocity (mph)	Water Spray (in./hr)	Duration (min)	Result (Pass/Fail)	Requirement
1	35	8.8	15	Pass	No panel displacement or water infiltration
2	0	0.0	10	Pass	
3	70	8.8	15	Pass	
4	0	0.0	10	Pass	
5	90	8.8	15	Pass	
6	0	0.0	10	Pass	
7	110	8.8	5	Pass	
8	0	0	10	Pass	

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TOP OF DECK IMMEDIATELY BEFORE COMMENCEMENT OF TEST



UNDERSIDE OF DECK IMMEDIATELY PRIOR TO COMMENCEMENT OF TEST



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TOP OF DECK IMMEDIATELY AFTER TEST



UNDERSIDE OF DECK IMMEDIATELY AFTER TEST



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TOP OF DECK 30 SECONDS PRIOR TO COMPLETION OF INTERVAL 1: 35 MPH



UNDERSIDE OF DECK 30 SECONDS PRIOR TO COMPLETION OF INTERVAL 1: 35 MPH



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TOP OF DECK 30 SECONDS PRIOR TO COMPLETION OF INTERVAL 2: 0 MPH



UNDERSIDE OF DECK 30 SECONDS PRIOR TO COMPLETION OF INTERVAL 2: 0 MPH



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TOP OF DECK 30 SECONDS PRIOR TO COMPLETION OF INTERVAL 3: 70 MPH



UNDERSIDE OF DECK 30 SECONDS PRIOR TO COMPLETION OF INTERVAL 3: 70 MPH



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TOP OF DECK 30 SECONDS PRIOR TO COMPLETION OF INTERVAL 4: 0 MPH



UNDERSIDE OF DECK 30 SECONDS PRIOR TO COMPLETION OF INTERVAL 4: 0 MPH



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TOP OF DECK 30 SECONDS PRIOR TO COMPLETION OF INTERVAL 5: 90 MPH



UNDERSIDE OF DECK 30 SECONDS PRIOR TO COMPLETION OF INTERVAL 5: 90 MPH



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TOP OF DECK 30 SECONDS PRIOR TO COMPLETION OF INTERVAL 6: 0 MPH



UNDERSIDE OF DECK 30 SECONDS PRIOR TO COMPLETION OF INTERVAL 6: 0 MPH



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TOP OF DECK 30 SECONDS PRIOR TO COMPLETION OF INTERVAL 7: 110 MPH



UNDERSIDE OF DECK 30 SECONDS PRIOR TO COMPLETION OF INTERVAL 7: 110 MPH



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TOP OF DECK 30 SECONDS PRIOR TO COMPLETION OF INTERVAL 8: 0 MPH



UNDERSIDE OF DECK 30 SECONDS PRIOR TO COMPLETION OF INTERVAL 8: 0 MPH



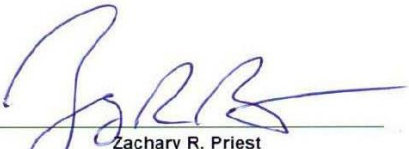
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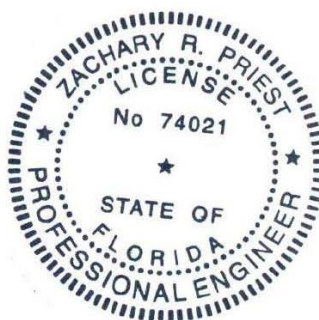
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Statement of Compliance:

The test specimen as described herein complies with all the requirements of the **Florida Building Code Test Protocols for the High Velocity Hurricane Zone (HVHZ) Testing Application Standard (TAS) 100-95: Test Procedure for Wind and Wind Driven Rain Resistance of Discontinuous Roof Systems.**

Signed: 
Zachary R. Priest
Florida Registered Professional Engineer
PE No.: 74021
Date: 4/24/2013



Report Issue History:

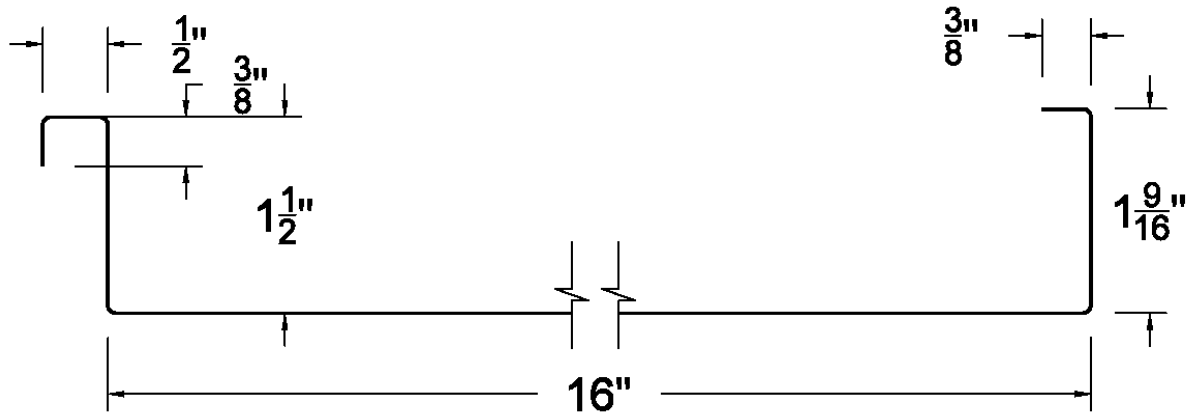
Issue #	Date	Pages	Revision Description (if applicable)
Original	4/24/2013	19	NA

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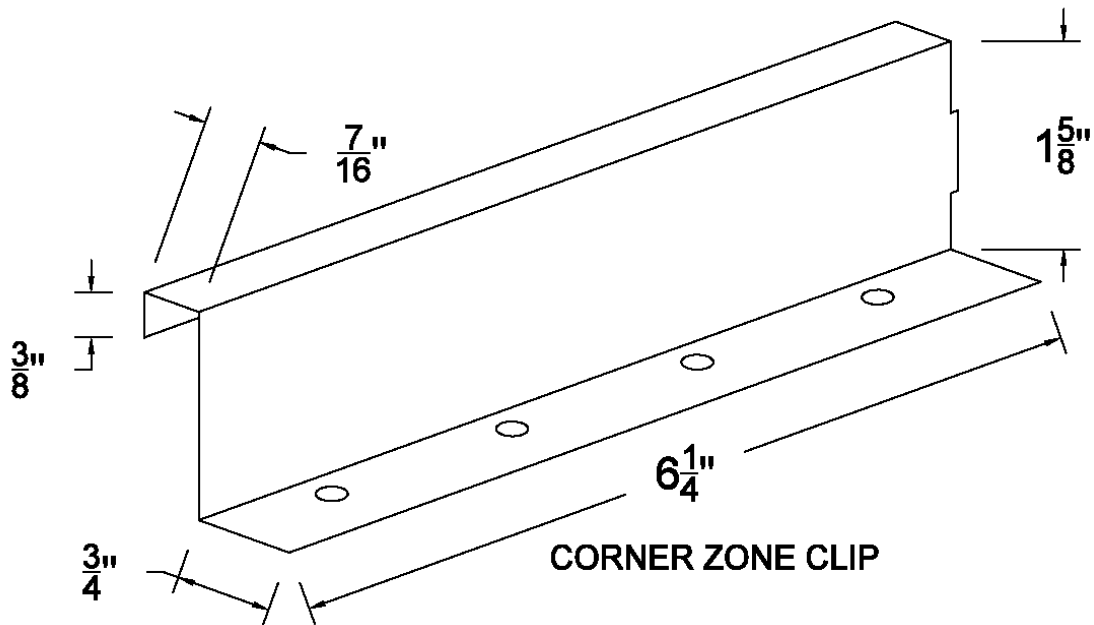
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Panel Profile



Clip Detail

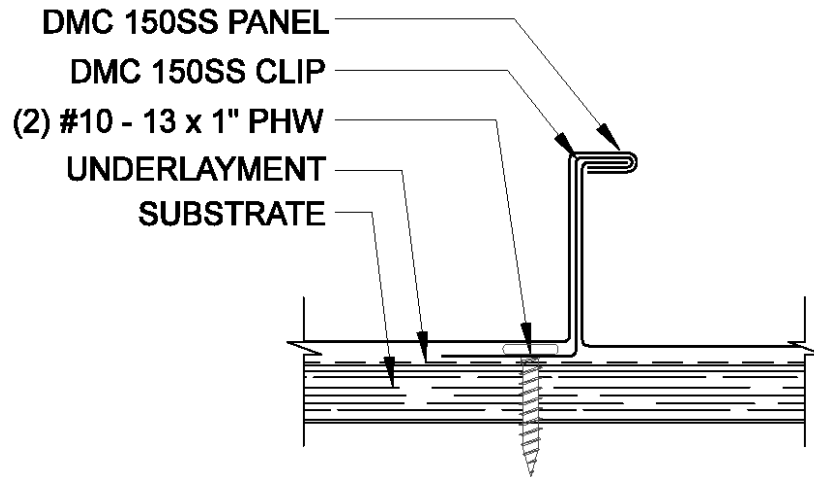


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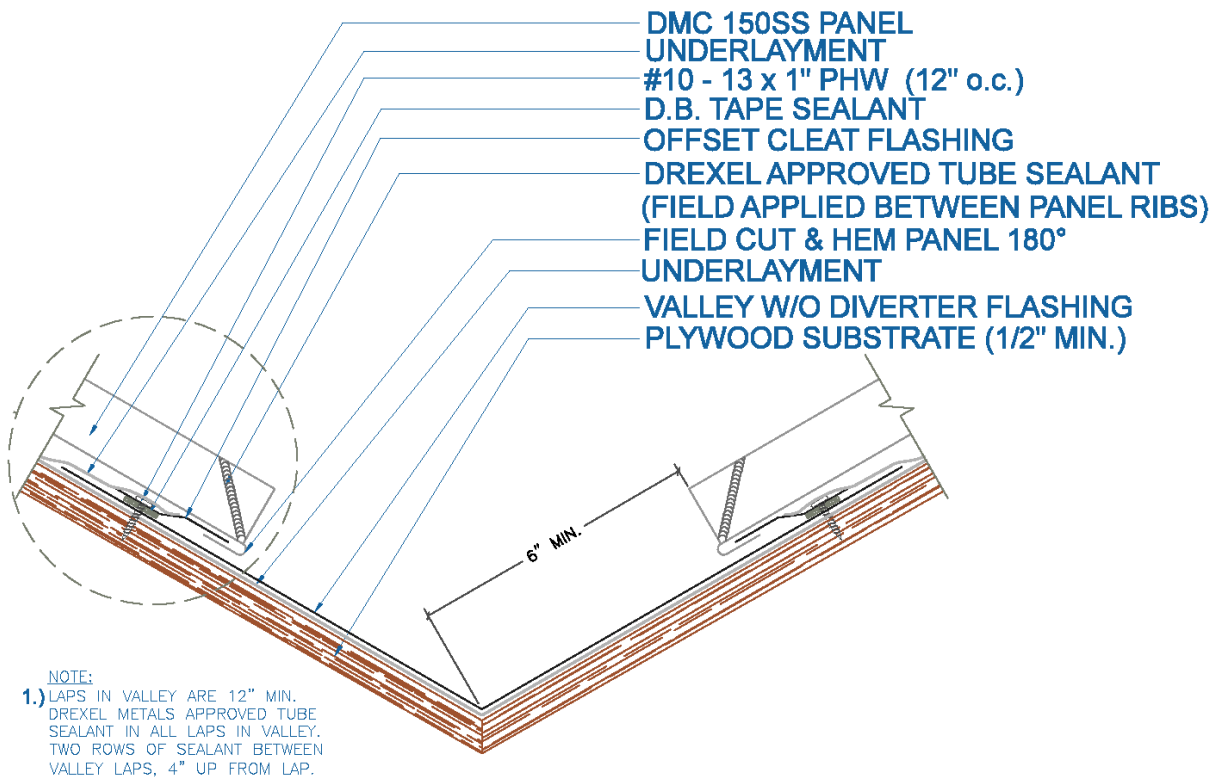
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Seam Installation – Clips at 8 in. o.c.



Valley Installation

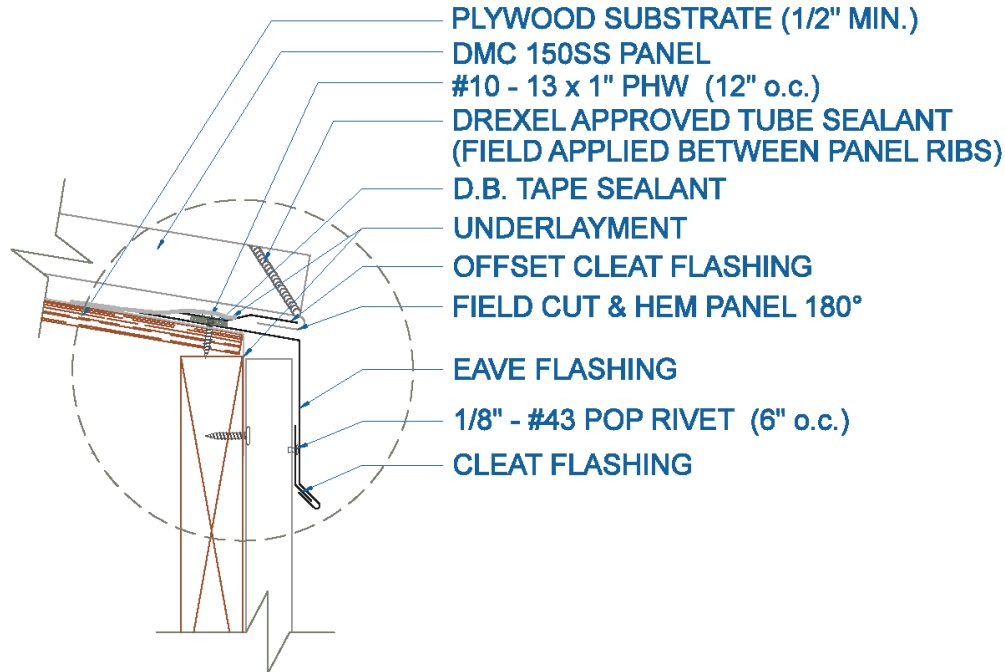


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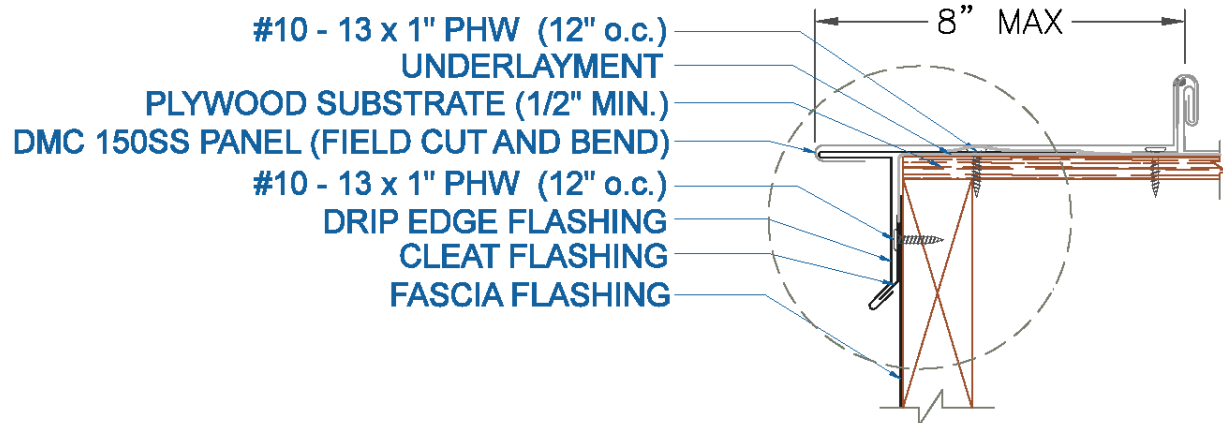
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Eave Installation



Gable Installation



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

January 17, 2012

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 inH₂O and d represents the density of air in lbs/ft³ 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.

Windstream Velocity Calibration												
Date of Calibration Procedure: 01/17/12						Next Due: 07/17/12						
Ambient Temperature:		74.0	°F									
Barometric Pressure:		30.22	in Hg									
Relative Humidity:		48	%									
RPM	Grid Position	Velocity Pressure (in H ₂ O)	Windstream Velocity (mph)	Grid Position	Velocity Pressure (in H ₂ O)	Windstream Velocity (mph)	Grid Position	Velocity Pressure (in H ₂ O)	Windstream Velocity (mph)	Grid Position	Velocity Pressure (in H ₂ O)	Windstream Velocity (mph)
1500	1	0.60	35.3	2	0.60	35.3	3	0.60	35.3	4	0.60	35.3
	5	0.60	35.3	6	0.50	32.3	7	0.60	35.3	8	0.60	35.3
Target: 35 mph		Calibration: Each Grid Square shall be within ± 10% of 35 mph (31.5 - 38.5 mph)								Pass/Fail:		Pass
2600	1	2.0	64.5	2	2.0	64.5	3	2.2	67.7	4	2.2	67.7
	5	2.2	67.7	6	2.2	67.7	7	2.2	67.7	8	2.3	69.2
Target: 70 mph		Calibration: Each Grid Square shall be within ± 10% of 70 mph (63 - 77 mph)								Pass/Fail:		Pass
3500	1	4.0	91.2	2	3.9	90.1	3	3.9	90.1	4	4.0	91.2
	5	3.8	88.9	6	4.0	91.2	7	4.0	91.2	8	4.1	92.4
Target: 90 mph		Calibration: Each Grid Square shall be within ± 10% of 90 mph (81 - 99 mph)								Pass/Fail:		Pass
4200	1	5.8	110	2	5.7	109	3	5.8	110	4	6.0	112
	5	5.7	109	6	5.7	109	7	5.9	111	8	6.1	113
Target: 110 mph		Calibration: Each Grid Square shall be within ± 10% of 110 mph (99 - 121 mph)								Pass/Fail:		Pass

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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:

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

The quantity x determined above shall be within $\pm 5\%$ 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:

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

The flow meter determination x shall be within $\pm 5\%$ 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: 01/17/12			Next Due: 07/17/12		
X	Water Supply (gal/min)	Simulated Rainfall (in/hr)	Y	Weight (lbs)	Volume (in ³)
Flow Meter #1	3.6	4.3	Flow Meter #1	29.1	805.5
Flow Meter #2	3.6	4.3	Flow Meter #2	29.3	811.0
Total	7.2	8.7	Total	58.4	1616.5
Simulated Rainfall		8.7	Simulated Rainfall		8.4
Target		8.8	Target		8.7
Within $\pm 5\%$ Tolerance		0.7	Within $\pm 5\%$ Tolerance		Pass

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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 $\pm 15\%$ (at 35mph) or $\pm 10\%$ (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:		01/17/12				Next Due:		07/17/12									
Ambient Temperature:		74.0		°F		Barometric Pressure:		30.22		in Hg		Relative Humidity:		48		%	
Windstream Velocity:		35				mph											
Water Supply:		7.2				gal/min											
Elapsed 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	190	680	490	15	190	685	495	10	190	690	500	5	185	675	490		
19	185	690	505	14	190	710	520	9	180	700	520	4	190	680	490		
18	190	675	485	13	185	700	515	8	190	685	495	3	190	705	515		
17	190	675	485	12	185	695	510	7	190	700	510	2	185	695	510		
16	190	700	510	11	190	675	485	6	190	705	515	1	185	690	505		
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:		502.5		⇒		Low Tolerance:		376.88		4.0000		Pass/Fail:		Pass			
				⇒		High Tolerance:		628.13									
Windstream Velocity:		70				mph											
Water Supply:		7.2				gal/min											
Elapsed 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	187	680	493	15	183	690	507	10	184	680	496	5	184	695	511		
19	187	680	493	14	183	685	502	9	184	685	501	4	184	700	516		
18	187	710	523	13	183	700	517	8	184	695	511	3	184	705	521		
17	187	705	518	12	183	685	502	7	184	690	506	2	184	685	501		
16	187	690	503	11	183	700	517	6	184	705	521	1	184	680	496		
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:		507.75		⇒		Low Tolerance:		380.81		634.69		Pass/Fail:		Pass			
				⇒		High Tolerance:											

END OF REPORT

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