



# ASTM C 1363

## Thermal Performance Test Report

**Test Number:** 2011-61

**Sponsor:** Bay Insulation Systems Inc.

Wall Filled Cavity- R-25/R-13 System with Thermal Block  
*Varco Pruden Vee Rib wall panels, 2 girts, rigid foam thermal spacer blocks,  
nominal R-13 unfaced fiberglass insulation, nominal R-25 faced fiberglass  
insulation, 8-1/2" girts*

**Test Date:** 9/27/2011

**Responsible Party:** Mark J. Henry

**Operator:** Larry Krueger

**Witness:** Mark Henry

### Summary of Results:

Thermal Transmittance, U:	0.202 W/m <sup>2</sup> K (0.036 Btu/ hr ft <sup>2</sup> F)
Overall Thermal Resistance, Ru:	5.0 m <sup>2</sup> K/W (28.1 hr ft <sup>2</sup> F/Btu)



## ASTM C 1363 Thermal Performance Test Report Summary

**Prepared For:**

Bay Insulation Systems Inc.  
 2929 Walker Drive  
 Green Bay, Wisconsin 54311

**Test Number:** 2011-61  
**Test Start Date:** 9/27/2011  
**Test End Date:** 9/30/2011  
**Report Date:** 10/12/2011

**Test Information:**

Wall Filled Cavity- R-25/R-13 System with Thermal Block  
*Varco Pruden Vee Rib wall panels, 2 girts, rigid foam thermal spacer blocks, nominal R-13 unfaced fiberglass insulation, nominal R-25 faced fiberglass insulation, 8-1/2" girts*

**Test Orientation / Heat Flow Direction:**

Vertical Wall / Inside to Outside

**Specimen Size:**

2.44 m x 3.05 m (8.00 ft x 10.00 ft)

**Test Procedure:** The Thermal Transmittance (U) and Thermal Resistance (Ru) were determined in general accordance with ASTM C 1363-05, *Standard Test Method for Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus.*

**ASTM Exceptions, if any:**

**Summary of Test Setup:**

Average Warm Side Ambient Temperature	37.82 deg C (100.07 deg F)
Average Cold Side Ambient Temperature	10.00 deg C (49.99 deg F)
Average Warm Side Air Velocity	0.31 m/s (61.44 fpm)
Average Cold Side Air Velocity	1.31 m/s (258.36 fpm)

**Summary of Results:**

Thermal Transmittance, U:	0.202 W/m <sup>2</sup> K (0.036 Btu/ hr ft <sup>2</sup> F)
Overall Thermal Resistance, Ru:	5.0 m <sup>2</sup> K/W (28.1 hr ft <sup>2</sup> F/Btu)

**Specimen Size:** 2.44 m x 3.05 m (8.00 ft x 10.00 ft)  
**Panel Type:** Varco Pruden Vee Rib wall panel  
**Insulation:** Fiberglass, 2-layers  
**Framing System:** Z-girt

**Specimen Construction:** The construction was supervised by Carl Lewis, Bay Insulation Systems Inc, and by Hal Robbins, Lamtec Corporation.

The girts were installed in the test frame. Two rows of 1" steel banding were attached to the inside of the test frame. Double stick tape was applied to the inside flange of the girts. One edge of the nominal R-25 insulation facing was adhered to the tape. Another layer of tape was adhered to the facing, and then the edge of the facing from the adjacent piece of insulation was adhered. At all four sides of the test frame the insulation facing were turned toward the exterior of the wall and were fastened to the test frame with small wood cleats. The turned up edge of the facing was taped to the sides of the test frame. Rigid foam thermal spacer blocks (3/4" x 3") were installed on the outside flange of the girts using double stick tape. The nominal R-16 insulation was draped over the girts and over the R-25 insulation. The wall panels were installed using typical field installation methods. Foam end closures were installed at each end of the panels. The perimeter of the panels and the side laps were taped to prevent air leakage.

**Specimen Conditioning:** The assembly was built at the BlueScope Buildings Research Center and remained there until it was tested. The insulation was unrolled and was in environmental conditions for at least 12 hours before being enclosed in the test assembly. The insulation was "fluffed" in a manner similar to the NAHB procedure for quality testing of faced insulation, in order to promote the recovery of the insulation thickness. The average measured thickness of the R-13 insulation was 3.9 inches, and of the R-25 insulation was 6.6 inches.

**Materials Used:**

Material Name	Description
Wall Panel	Varco Pruden Buildings Vee Rib wall panel, 26 gauge, Painted Cool Cotton White finish
Thermal Spacer Block	Extruded polystyrene foam spacer block Nominal thermal resistance: R-5 per inch
R-13 Insulation	Nominal R-13 unfaced fiberglass blanket insulation Measured thermal resistance: 12.31 hr ft <sup>2</sup> F/Btu
R-25 Insulation	Nominal R-25 faced fiberglass blanket insulation Measured thermal resistance: 23.2 hr ft <sup>2</sup> F/Btu

**Sources for Materials Used:** BlueScope Buildings North America supplied the girts. Varco Pruden Buildings supplied the wall panels and fasteners. Bay Insulation Systems Inc. supplied the insulation. The original manufacturer of the R-13 fiberglass and of the R-25 fiberglass was the Owens Corning. Bay Insulation System Inc. supplied the thermal spacer blocks. The original manufacturer of the extruded polystyrene was the Dow Chemical Company.

## Measured Test Data

### Test Times

Test Start Time	9/27/2011 3:55 PM
Test End Time	9/30/2011 8:27 AM
Time Required to Reach Steady State	91.8 Hours
Steady State Start Time	9/29/2011 5:02 PM
Steady State End Time	9/30/2011 12:56 AM

### Test Information

Metered Area	10.48 m <sup>2</sup> (112.75 ft <sup>2</sup> )
Specimen Area	7.43 m <sup>2</sup> (80.00 ft <sup>2</sup> )
Average Warm Side Ambient Temperature	37.82 deg C (100.07 deg F)
Average Cold Side Ambient Temperature	10.00 deg C (49.99 deg F)

### Input

**65.69 watts (224.14 Btu/hr)**

Warm Side Heaters	60.18 watts (205.33 Btu/hr)
Warm Side Fans	4.24 watts (14.47 Btu/hr)
Warm Side AVT & RH Sensor Power <sup>6</sup>	1.27 watts (4.34 Btu/hr)

### Loss

**23.95 watts (81.71 Btu/hr)**

Surround Panel Loss	19.85 watts (67.73 Btu/hr)
Specimen Flanking Loss	4.11 watts (14.02 Btu/hr)
Meter Wall and Flanking Loss	-0.01 watts (-0.05 Btu/hr)
Thermopile Voltage ( <i>E</i> )	-0.234 mV
Thermopile Null ( <i>E<sub>0</sub></i> )	-0.2418 mV
Thermopile Slope ( <i>m</i> )	-1.8296

### Total Heat Flow Through Test Specimen

**41.74 watts (142.43 Btu/hr)**

### Calculated Thermal Properties

Specimen Thermal Transmittance (U)	0.202 W/m <sup>2</sup> K (0.036 Btu/ hr ft <sup>2</sup> F)
Specimen Overall Thermal Resistance (R <sub>u</sub> )	5.0 m <sup>2</sup> K/W (28.1 hr ft <sup>2</sup> F/Btu)

The estimated uncertainty of the results is ± 7.3 %



Measurements were taken to determine the depth of the insulation. They were taken on the inside, from a reference line behind the test frame to the insulation facing. The reference line was 7-7/16" from the edge of the test frame. The inside of the panel rib of the wall panel was flush with the outside of the tests frame. The test frame is 11-5/8" deep. So the measurement subtracted from 19-1/6" is the depth of the insulation from the panel rib. The measurements were taken at 6" increment across the width of the specimen. The measurements were taken when the assembly was vertical. Vertical locations are measured from the centerline of the inside flange of the girt.

Location		0.5'	1.0'	1.5'	2.0'	2.5'	3.0'	3.5'	4.0'	4.5'	5.0'	5.5'	6.0'	6.5'	7.0'	7.5'
15" above upper girt	Meas.	9.31	9.19	9.88	8.94	8.31	8.13	7.69	7.56	7.63	7.69	8.13	8.69	9.88	9.38	9.75
	Depth	9.75	9.88	9.19	10.13	10.75	10.94	11.38	11.50	11.44	11.38	10.94	10.38	9.19	9.69	9.31
15" below upper girt	Meas.	9.19	9.06	9.25	7.38	7.94	7.81	7.75	7.69	7.69	7.94	8.00	8.50	10.38	9.00	9.19
	Depth	9.88	10.00	9.81	11.69	11.13	11.25	11.31	11.38	11.38	11.13	11.06	10.56	8.69	10.06	9.88
45" below upper girt	Meas.	9.56	9.44	9.25	8.63	8.06	7.56	7.56	7.38	7.50	7.75	8.06	8.69	9.44	9.13	9.69
	Depth	9.50	9.63	9.81	10.44	11.00	11.50	11.50	11.69	11.56	11.31	11.00	10.38	9.63	9.94	9.38
15" above test frame	Meas.	9.69	9.50	10.13	9.06	8.69	8.50	8.38	8.25	8.44	8.50	8.88	9.19	9.88	9.50	9.75
	Depth	9.38	9.56	8.94	10.00	10.38	10.56	10.69	10.81	10.63	10.56	10.19	9.88	9.19	9.56	9.31



Specimen Surface Temperatures.

		<b>Avg.</b>	<b>Avg.</b>			<b>Avg.</b>	<b>Avg.</b>
		<b>Deg C</b>	<b>Deg F</b>			<b>Deg C</b>	<b>Deg F</b>
Climate	#11	10.61	51.10	Meter	#49	37.46	99.43
Climate	#12	10.80	51.44	Meter	#50	37.30	99.14
Climate	#13	11.36	52.45	Meter	#51	37.40	99.33
Climate	#14	10.80	51.44	Meter	#52	36.94	98.50
Climate	#15	10.92	51.65	Meter	#53	36.90	98.42
Climate	#16	10.26	50.47	Meter	#54	36.85	98.33
Climate	#17	10.52	50.94	Meter	#55	36.92	98.46
Climate	#18	10.73	51.31	Meter	#56	36.78	98.21
Climate	#19	11.40	52.52	Meter	#57	37.13	98.83
Climate	#20	10.35	50.63	Meter	#58	37.24	99.03
Climate	#21	10.36	50.64	Meter	#59	37.26	99.08
Climate	#22	10.39	50.70	Meter	#60	37.22	99.00
Climate	#23	10.65	51.17	Meter	#61	36.90	98.42
Climate	#24	10.47	50.84	Meter	#62	36.97	98.54
Climate	#25	11.42	52.55	Meter	#63	36.43	97.58
Climate	#26	10.44	50.80	Meter	#64	36.54	97.77
Climate	#27	10.46	50.82	Meter	#65	36.04	96.86
Climate	#28	10.26	50.47	Meter	#66	36.29	97.32
Climate	#29	10.24	50.44	Meter	#67	36.28	97.31
Climate	#30	10.08	50.15	Meter	#68	36.93	98.48

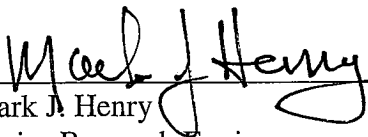


**Accreditations:**

Test Specification	Description	Accredited By
ASTM C 1363-05	Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus	International Accreditation Service, Inc.

**Latest Apparatus Calibration Date:** August 2011

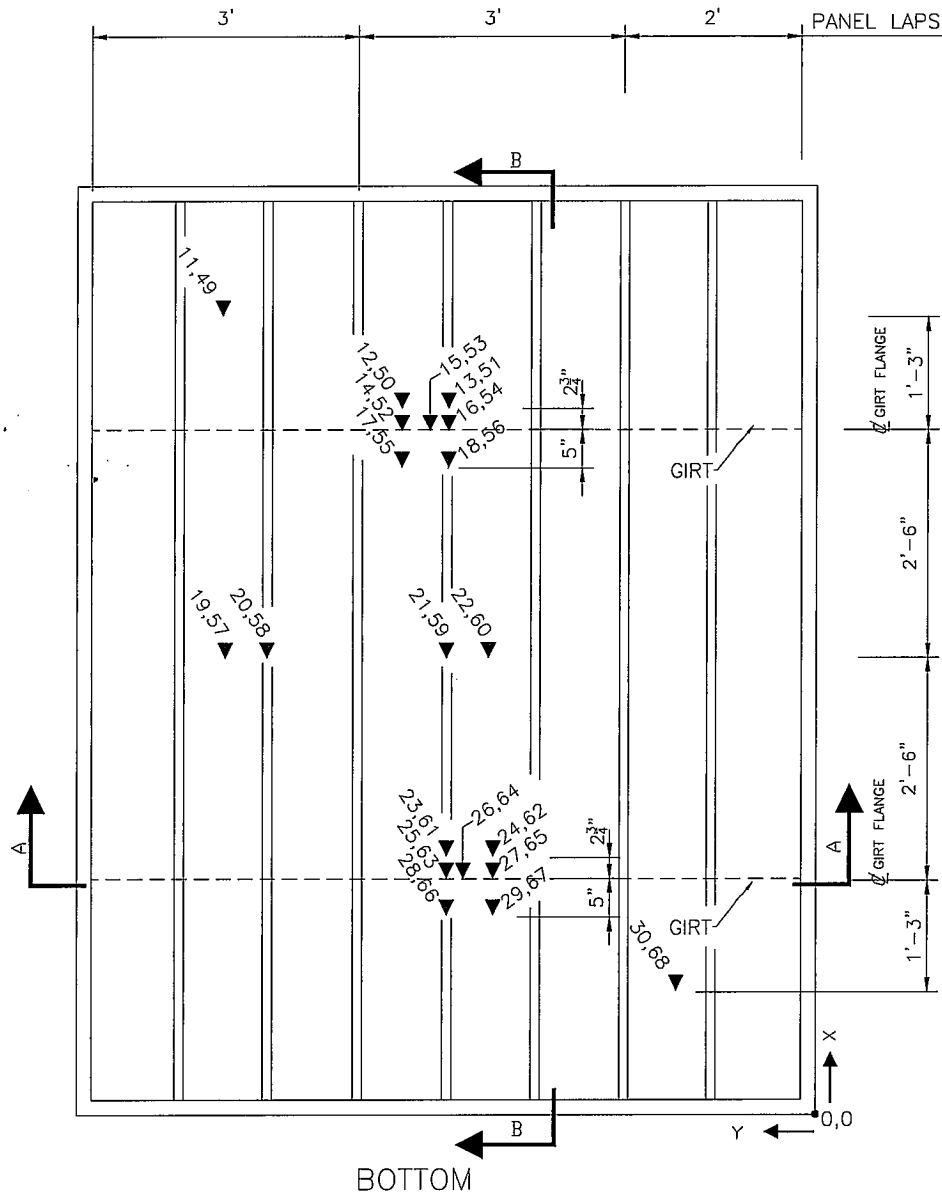
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 Mark J. Henry  
 Senior Research Engineer

### Revision Log

Rev #	Date	Page(s)	Revision(s)
Original	10/12/2011	All	

DRAWING A – ELEVATION  
 WALL FILLED CAVITY R-25/R-13 SYSTEM THERMAL BLOCK



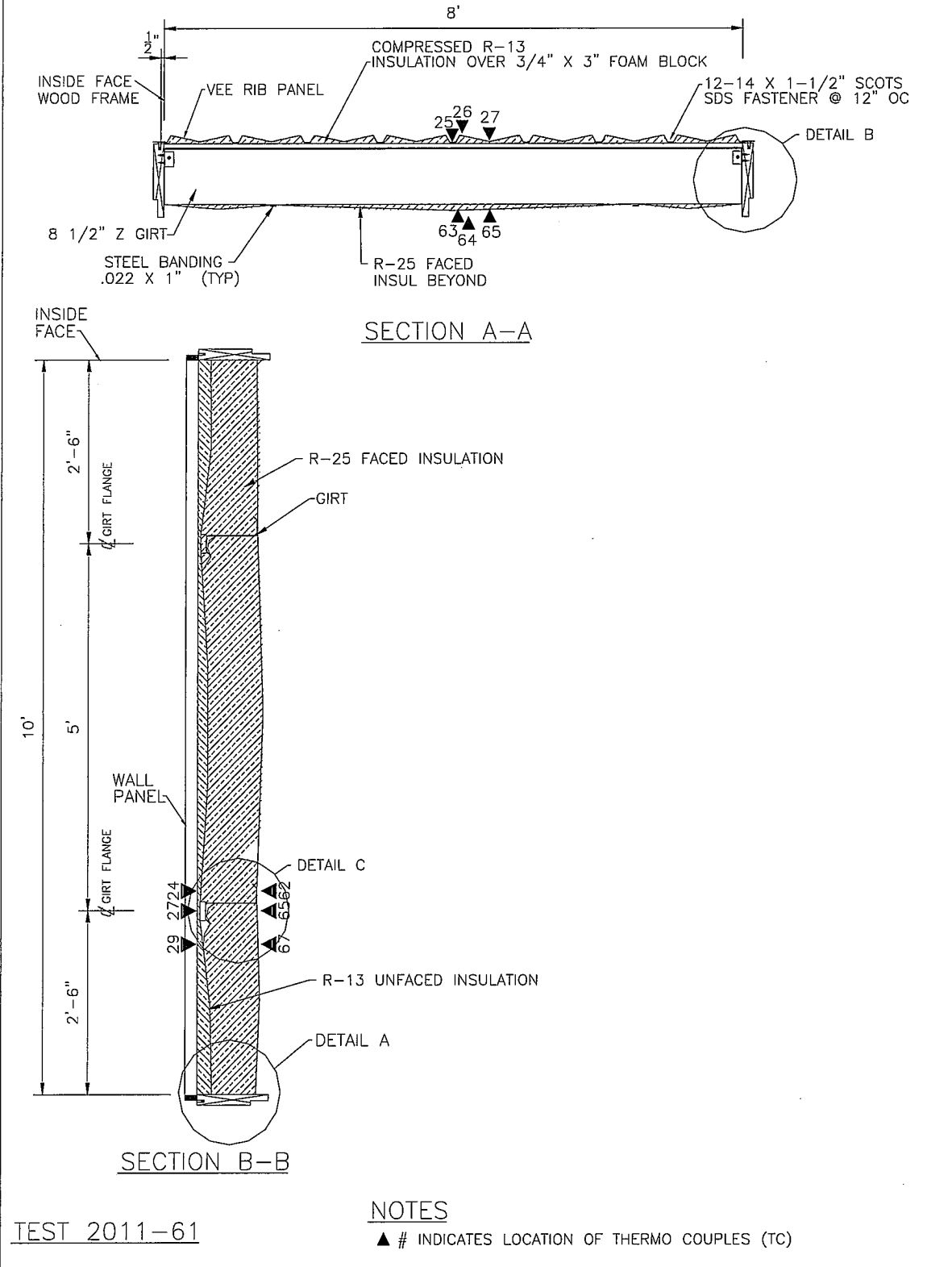
NOTES

- (TC) 11 THRU 30 ARE ON THE CLIMATE SURFACE
- (TC) 49 THRU 68 ARE ON THE METER SIDE
- ▼## INDICATES LOCATION OF THERMO COUPLES (TC)

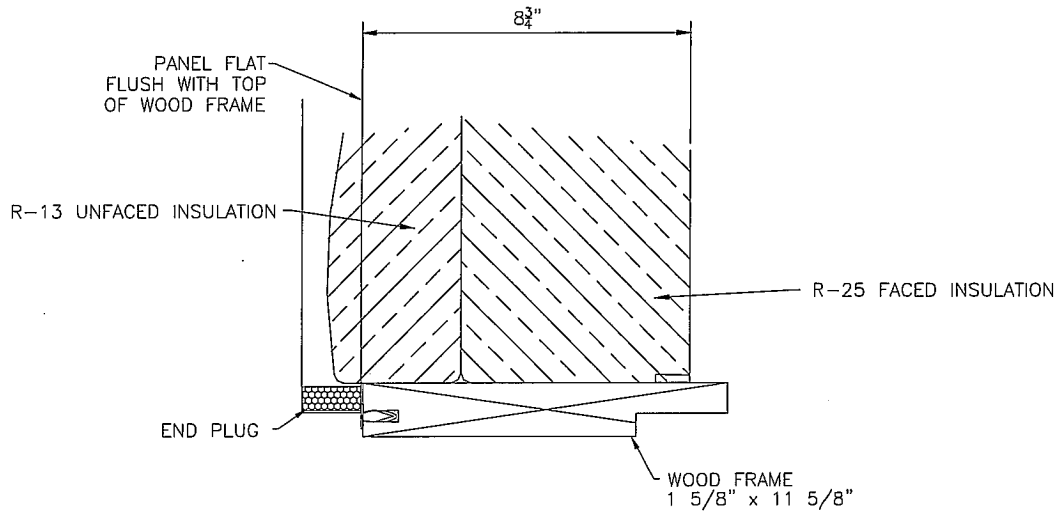
TEST 2011-61



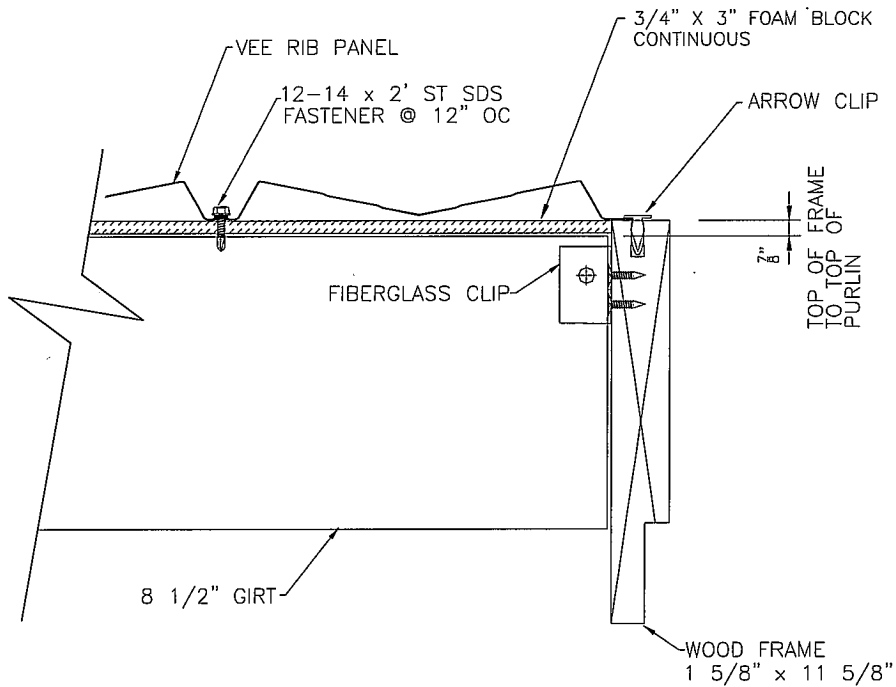
DRAWING B – SECTIONS THRU TEST FIXTURE  
WALL FILLED CAVITY R-25/R-13 SYSTEM THERMAL BLOCK



DRAWING C – SECTIONS THRU TEST FIXTURE  
 WALL FILLED CAVITY R-25/R-13 SYSTEM THERMAL BLOCK



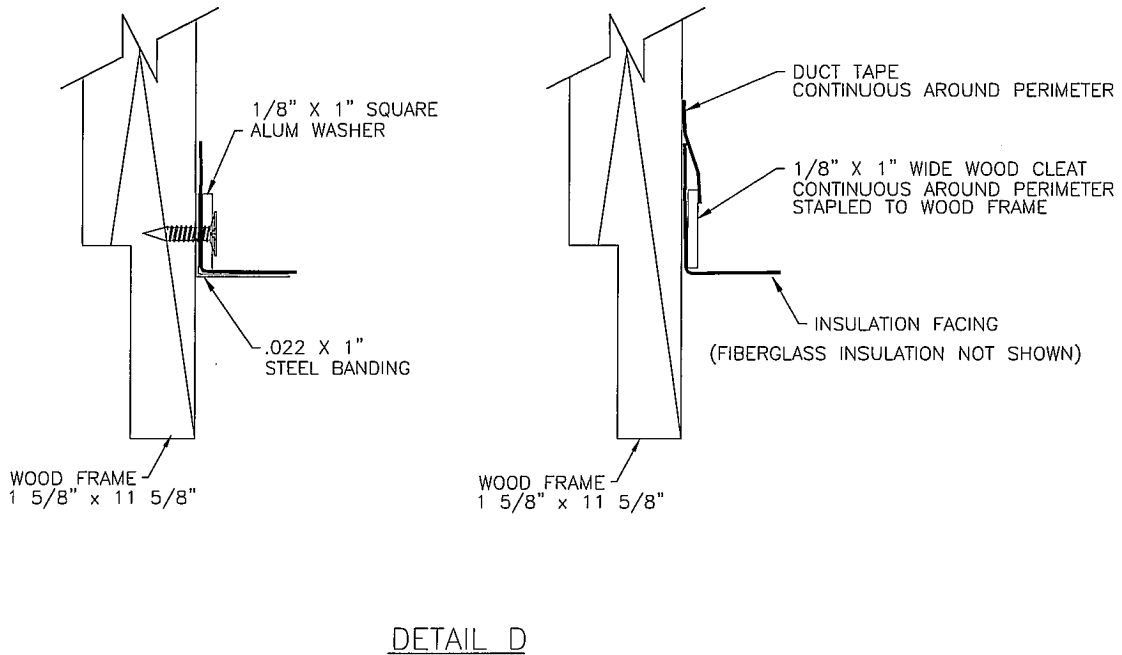
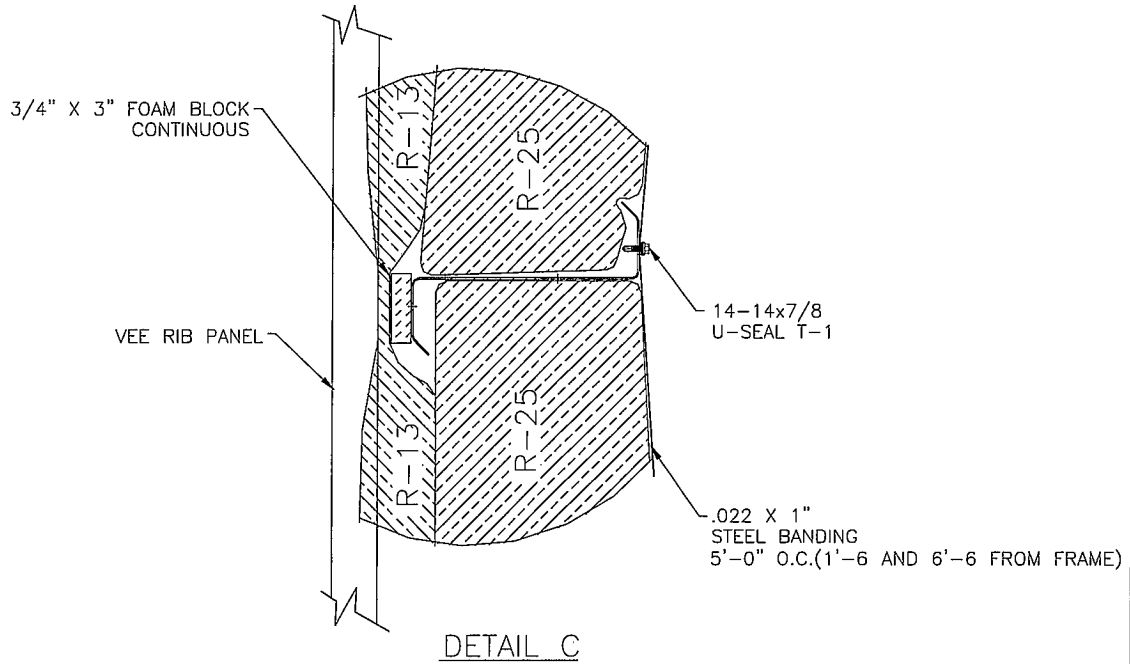
DETAIL A



DETAIL B

TEST 2011-61

DRAWING D – DETAILS  
 WALL FILLED CAVITY R-25/R-13 SYSTEM THERMAL BLOCK



TEST 2011-61

