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Research Center
13500 Botts Road
Grandview, MO 64030-2897
Phone 816-968-5700

ASTM C 1363
Thermal Performance Test Report

Test Number: 2010-49
Sponsor: Lamtec Corporation

Long Tab Banded/Filled Cavity System
Banding below purlins, Long tab R-19 faced fiberglass, R-11 unfaced fiberglass

Test Date: 10/15/2010

Responsible Party: Mark J. Henry
Operator: Larry Krueger
Witness: Mark Henry

Summary of Results:

Thermal Transmittance, U:	0.209 W/m^2 K (0.037 Btu/ hr ft^2 F)
Overall Thermal Resistance, Ru:	4.8 m^2 K/W (27.2 hr ft^2 F/Btu)

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ASTM C 1363 Thermal Performance Test Report Summary

Prepared For:
Lamtec Corporation
5010 River Road
Mt. Bethel, Pennsylvania 18343-5610

Test Number: 2010-49
Test Start Date: 10/15/2010
Test End Date: 10/20/2010
Report Date: 11/5/2010

Test Information:
Long Tab Banded/Filled Cavity System
Banding below purlins, Long tab R-19 faced fiberglass, R-11 unfaced fiberglass

Test Orientation / Heat Flow Direction:
Normal Roof / 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	37.77 deg C (99.99 deg F)
Average Cold Side Ambient Temperature	9.99 deg C (49.99 deg F)
Average Warm Side Air Velocity	0.30 m/s (59.08 fpm)
Average Cold Side Air Velocity	1.32 m/s (259.20 fpm)

Summary of Results:

Thermal Transmittance, U:	0.209 $W/m^2 K$ (0.037 Btu/ hr ft^2 F)
Overall Thermal Resistance, Ru:	4.8 m^2 K/W (27.2 hr ft^2 F/Btu)

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Specimen Size: 2.44 m x 3.05 m (8.00 ft x 10.00 ft)
Panel Type: MR-24® roof system
Insulation: Fiberglass, 2-layers
Framing System: Z-purlins

Specimen Construction: Construction of the specimen was supervised by Hal Robbins, Lamtec Corporation, and Carl Lewis, Bay Insulation Systems, Inc. The construction took place on October 7 and 8. The specimen was built to represent a typical field assembly. The steel banding was attached to the inside of face of the test frame. It was set at depth equal to that of the bottom of the purlins. It was then attached to the bottom flange of the purlins with self-drilling screws that are typical of field installations. The banding was perpendicular to the purlins. Double-faced tape was placed on the top flanges of the purlins. Pieces of faced nominal R-19 insulation were cut to eight foot lengths and placed in the cavity between the purlins and between the purlins and the side of the test frame. The long tabs of the insulation facing extended to the tops of the purlin flanges. The long tabs allowed the fiberglass insulation to press up against the webs of the purlins. Along the perimeter of the test frame the insulation facing was fastened to the test frame with thin wood strips that were stapled to the test frame. Pieces of unfaced nominal R-11 insulation were cut to 10 foot lengths and placed over the R-19 insulation and the tops of the purlins. The MR24 Roof system panels were installed in a typical manner. The panel clips were attached to the purlins with standard self-tapping screws. Then 1" x 3" thermal spacer blocks were placed between the panel clips and above the purlins. The MR-24 panels were placed and seamed in a normal manner. The perimeter of the roof panels were taped to the test frame to prevent air leakage.

Specimen Conditioning: The insulation was received at the Butler Research Center on October 7. 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.

Materials Used:

Material Name	Description
Roof Panel	MR-24® roof system panel, 24 ga, 24 inch wide, Galvalume Plus finish
Thermal Spacer Blocks	1" x 3" extruded polystyrene (FOAMULAR® 250) Nominal R-5
R-11 Fiberglass	Nominal R-11 unfaced NAIMA 202-96 fiberglass blanket insulation Measured thermal resistance: 11.83 hr ft^2 °F/Btu
R-19 Fiberglass	Nominal R-19 faced NAIMA 202-96 fiberglass blanket insulation Measured thermal resistance: 20.69 hr ft^2 °F/Btu WMP-VR-R Plus facing
Steel Banding	1" wide x 0.022" thick steel banding

Sources for Materials Used: Butler Manufacturing supplied the MR-24 roof panels, panel clips, and panel clip fasteners.
Bay Insulation Systems supplied the faced and unfaced fiberglass insulation, the thermal spacer blocks, the steel banding and the banding fasteners. The original manufacturer of the fiberglass insulation was CertainTeed Corporation and Knauf Insulation. The original manufacturer of the extruded polystyrene was Owens Corning. The manufacturer of the facing was Lamtec Corporation

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Measured Test Data

Test Times	
Test Start Time	10/15/2010 2:41 PM
Test End Time	10/20/2010 8:35 AM
Time Required to Reach Steady State	68.3 Hours
Steady State Start Time	10/18/2010 11:00 AM
Steady State End Time	10/18/2010 9:55 PM

Test Information	
Metered Area	10.48 m^2 (112.75 ft^2)
Specimen Area	7.43 m^2 (80.00 ft^2)
Average Warm Side Ambient Temperature	37.77 deg C (99.99 deg F)
Average Cold Side Ambient Temperature	9.99 deg C (49.99 deg F)

Input	**66.47 watts (226.79 Btu/hr)**
Warm Side Heaters	58.98 watts (201.24 Btu/hr)
Warm Side Fans	6.24 watts (21.27 Btu/hr)
Warm Side AVT & RH Sensor Power	1.25 watts (4.27 Btu/hr)

Loss	**23.32 watts (79.57 Btu/hr)**
Surround Panel and Flanking Loss	19.79 watts (67.53 Btu/hr)
Side of Test Specimen Frame Adjustment	3.40 watts (11.61 Btu/hr)
Meter Wall and Flanking Loss	0.13 watts (0.44 Btu/hr)
Thermopile Voltage (E)	-0.323 mV
Thermopile Null (E_0)	-0.2536 mV
Thermopile Slope (m)	-1.8550

Total Heat Flow Through Test Specimen	**43.15 watts (147.22 Btu/hr)**

Calculated Thermal Properties	
Specimen Thermal Transmittance (U)	0.209 W/m^2 K (0.037 Btu/ hr ft^2 F)
Specimen Overall Thermal Resistance (Ru)	4.8 m^2 K/W (27.2 hr ft^2 F/Btu)

The estimated uncertainty of the results is ± 5 %

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Accreditations:

Test Specification	Description	Accredited By
ASTM C 1363-05	ASTM C 1363-05	International Accreditation Service, Inc.

Latest Apparatus Calibration Date: August 2010

Butler Manufacturing will retain a copy of this test report for a minimum of four years. This report is the property of the Test Sponsor as mentioned in this test report and relates only to the products and assemblies as tested. This report may not be reproduced, except in full, without the prior written consent of Butler Manufacturing. The results obtained are tested values. This report is not an endorsement about the tested products and does not constitute a certification of the products tested.

For Butler Manufacturing

Mark J. Henry
Senior Research Engineer

Attachments:

Revision Log

Rev #	Date	Page(s)	Revision(s)
Original	11/5/2010	All	

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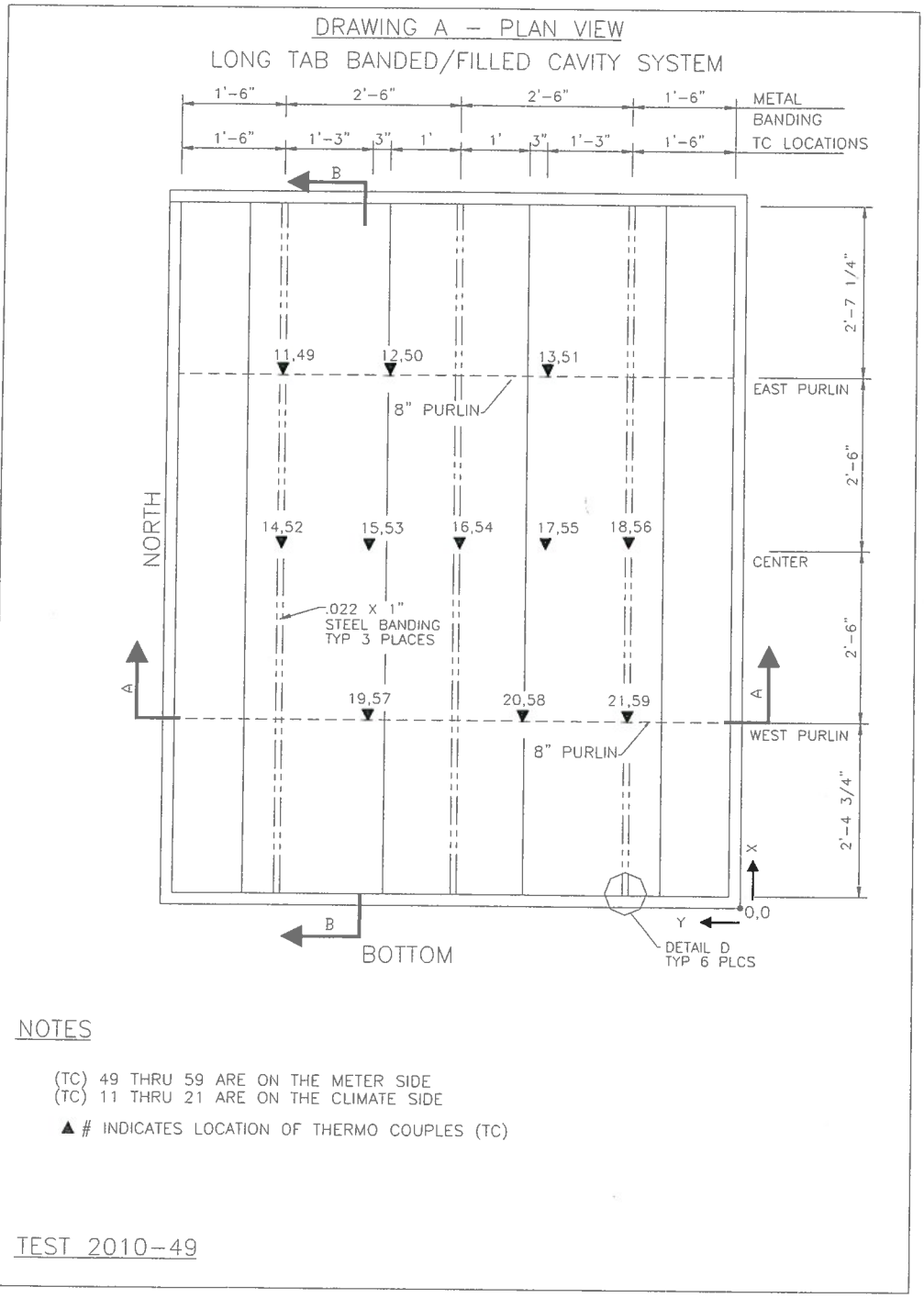

NOTES

(TC) 49 THRU 59 ARE ON THE METER SIDE
(TC) 11 THRU 21 ARE ON THE CLIMATE SIDE

▲ # INDICATES LOCATION OF THERMO COUPLES (TC)

TEST 2010-49

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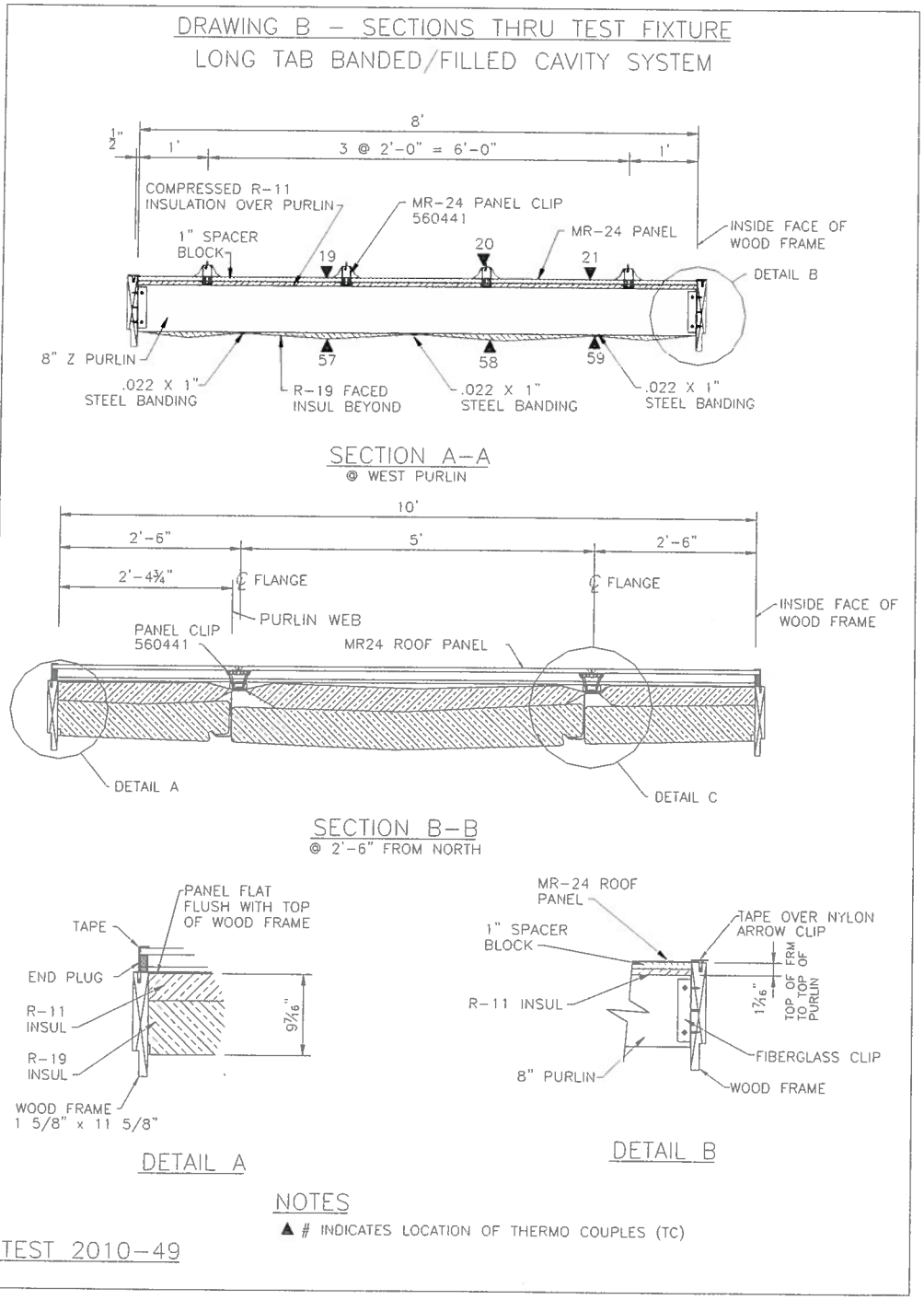

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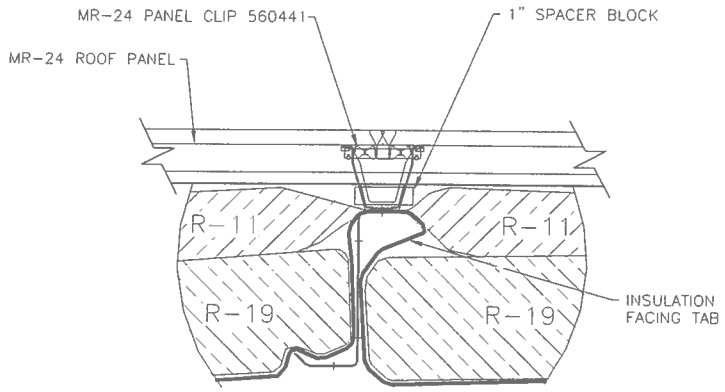
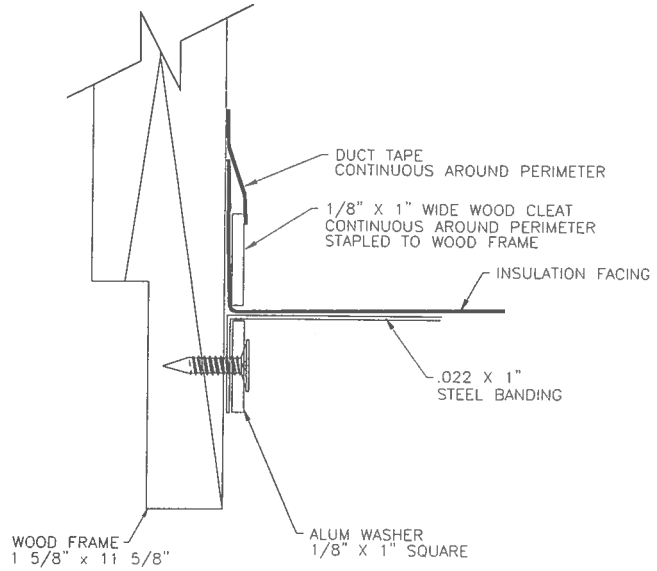
DRAWING C – FOAM BOARD LAYOUT
LONG TAB BANDED/FILLED CAVITY SYSTEM



DETAIL C



DETAIL D

TEST 2010-49

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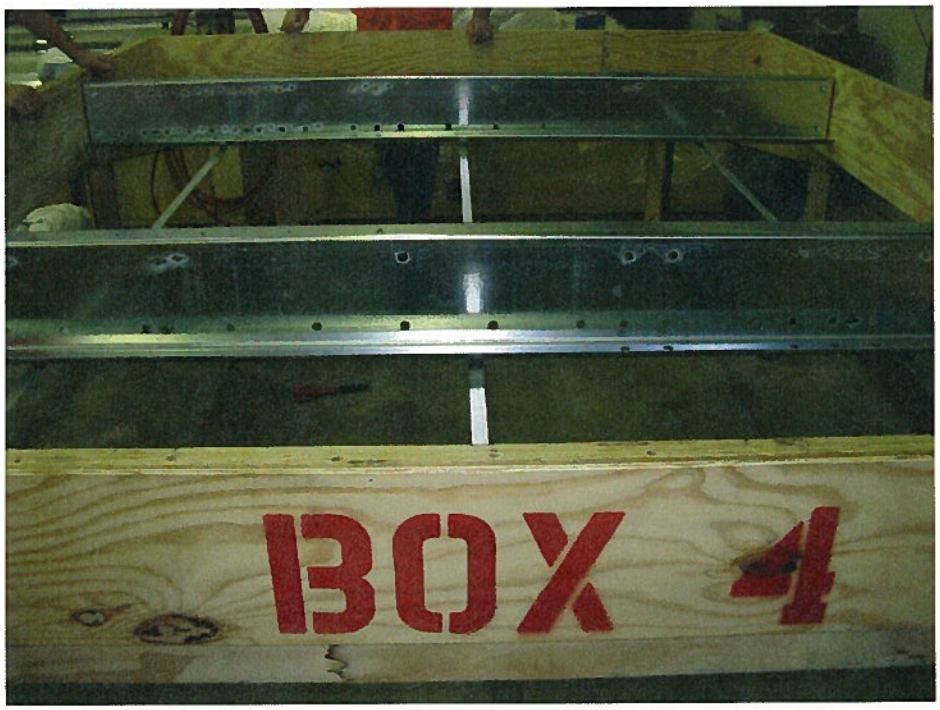

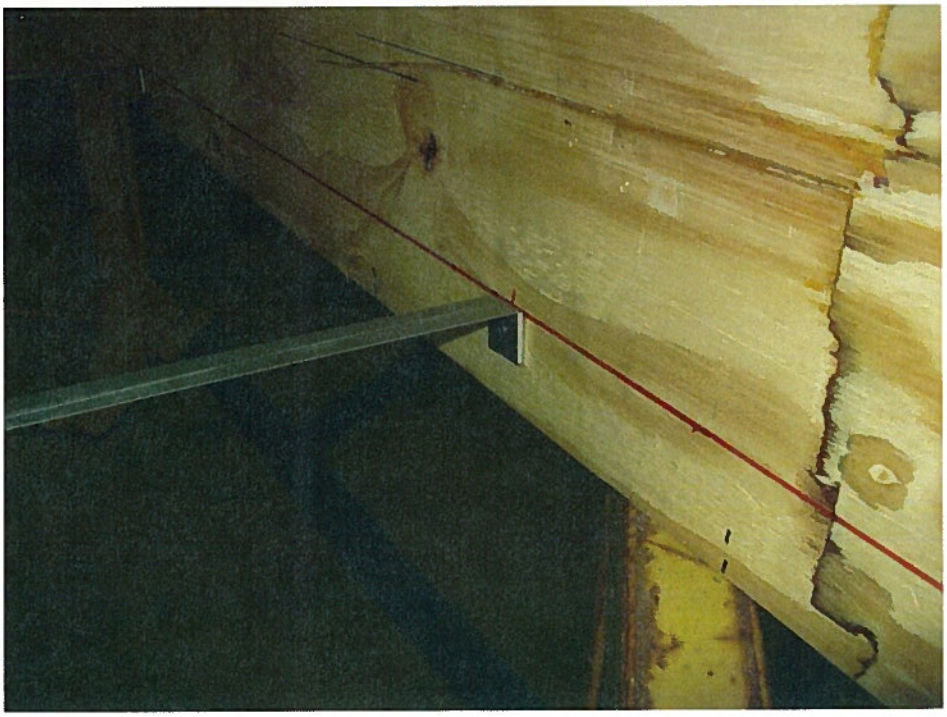

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