



ASTM C 1363

Thermal Performance Test Report

Test Number: 2011-36

Sponsor: Bay Insulation Systems Inc.

Wall Liner System Thermal Blocks R-13 R-25
*Varco Pruden Vee Rib wall panels, 2 girts, rigid foam thermal spacer block,
nominal R-13 unfaced fiberglass insulation, nominal R-25 faced fiberglass
insulation*

Test Date: 6/14/2011

Responsible Party: Mark J. Henry

Operator: Larry Krueger

Witness: Mark Henry

Summary of Results:

Thermal Transmittance, U:	0.197 W/m ² K (0.035 Btu/ hr ft ² F)
Overall Thermal Resistance, Ru:	5.1 m ² K/W (28.8 hr ft ² 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: 2011-36
Test Start Date: 6/14/2011
Test End Date: 6/21/2011
Report Date: 6/21/2011

Test Information:

Wall Liner System Thermal BlockR-13 R-25
Varco Pruden Vee Rib wall panels, 2 girts, rigid foam thermal spacer block, nominal R-13 unfaced fiberglass insulation, nominal R-25 faced fiberglass insulation

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	37.79 deg C (100.02 deg F)
Average Cold Side Ambient Temperature	10.05 deg C (50.09 deg F)
Average Warm Side Air Velocity	0.30 m/s (59.80 fpm)
Average Cold Side Air Velocity	1.31 m/s (257.35 fpm)

Summary of Results:

Thermal Transmittance, U:	0.197 W/m ² K (0.035 Btu/ hr ft ² F)
Overall Thermal Resistance, Ru:	5.1 m ² K/W (28.8 hr ft ² 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 girts were installed in the test frame. Two rows of 1" 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 edge of the facing was taped to the sides of the test frame. Rigid foam thermal spacer blocks 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 Butler 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 4.17 inches, and of the R-25 insulation was 7.07 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 Unfaced	Nominal R-13 unfaced fiberglass blanket insulation Measured thermal resistance: 13.19 hr ft ² F/Btu
R-25 Insulation Faced	Nominal R-25 faced fiberglass blanket insulation Measured thermal resistance: 26.26 hr ft ² F/Btu

Sources for Materials Used: Butler Manufacturing 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 was Owens Corning, and of the R-25 fiberglass was the CertainTeed Corporation.

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	6/14/2011 2:55 PM
Test End Time	6/21/2011 6:51 AM
Time Required to Reach Steady State	151.1 Hours
Steady State Start Time	6/20/2011 10:01 PM
Steady State End Time	6/21/2011 3:56 AM

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	37.79 deg C (100.02 deg F)
Average Cold Side Ambient Temperature	10.05 deg C (50.09 deg F)

Input 61.83 watts (210.98 Btu/hr)

Warm Side Heaters	56.85 watts (193.98 Btu/hr)
Warm Side Fans	3.71 watts (12.66 Btu/hr)
Warm Side AVT & RH Sensor Power	1.27 watts (4.33 Btu/hr)

Loss 21.19 watts (72.32 Btu/hr)

Surround Panel and Flanking Loss	19.85 watts (67.73 Btu/hr)
Side of Test Specimen Frame Adjustment	1.36 watts (4.65 Btu/hr)
Meter Wall and Flanking Loss	-0.02 watts (-0.06 Btu/hr)
Thermopile Voltage (<i>E</i>)	-0.232 mV
Thermopile Null (<i>E₀</i>)	-0.2418 mV
Thermopile Slope (<i>m</i>)	-1.8296

Total Heat Flow Through Test Specimen 40.64 watts (138.66 Btu/hr)

Calculated Thermal Properties	
Specimen Thermal Transmittance (U)	0.197 W/m ² K (0.035 Btu/ hr ft ² F)
Specimen Overall Thermal Resistance (Ru)	5.1 m ² K/W (28.8 hr ft ² F/Btu)

The estimated uncertainty of the results is ± 5 %



Measurements were taken to determine the depth of the insulation. They were taken on the inside from a line behind the test frame to the vapor retarder. The datum line is 19-1/6" from the outside of the test frame. The inside of the panel rib of the wall panel was flush with the outside of the tests frame. 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'
1'-3 from top	Meas.	8.38	8.31	9.06	8.19	7.94	7.88	7.94	7.75	7.50	7.56	7.63	7.63	8.81	7.81	7.94
	Depth	10.69	10.75	10.00	10.88	11.13	11.19	11.13	11.31	11.56	11.50	11.44	11.44	10.25	11.25	11.13
15" below upper girt	Meas.	8.94	8.81	8.50	7.75	7.13	7.06	7.19	7.06	7.13	7.13	7.25	7.38	8.44	7.50	7.50
	Depth	10.13	10.25	10.56	11.31	11.94	12.00	11.88	12.00	11.94	11.94	11.81	11.69	10.63	11.56	11.56
30" below upper girt	Meas.	8.19	8.00	8.06	7.38	7.19	6.88	6.88	6.81	6.75	6.75	6.88	7.13	8.00	7.13	7.50
	Depth	10.88	11.06	11.00	11.69	11.88	12.19	12.19	12.25	12.31	12.31	12.19	11.94	11.06	11.94	11.56
45" below upper girt	Meas.	8.13	7.94	8.38	7.63	7.19	7.00	6.94	6.94	7.06	7.13	7.25	7.50	8.25	7.75	8.06
	Depth	10.94	11.13	10.69	11.44	11.88	12.06	12.13	12.13	12.00	11.94	11.81	11.56	10.81	11.31	11.00
15" above bottom	Meas.	7.50	6.88	7.81	6.75	6.63	6.31	6.50	6.38	6.50	6.50	6.63	6.88	7.44	6.75	7.88
	Depth	11.56	12.19	11.25	12.31	12.44	12.75	12.56	12.69	12.56	12.56	12.44	12.19	11.63	12.31	11.19



Specimen Surface Temperatures

Description	Average	Average
	deg C	deg F
Test Specimen Surface (Climate) # 11	10.58	51.04
Test Specimen Surface (Climate) # 12	10.84	51.51
Test Specimen Surface (Climate) #13	11.30	52.34
Test Specimen Surface (Climate) # 14	10.74	51.34
Test Specimen Surface (Climate) # 15	10.94	51.69
Test Specimen Surface (Climate) # 16	11.99	53.57
Test Specimen Surface (Climate) # 17	10.64	51.14
Test Specimen Surface (Climate) # 18	10.77	51.39
Test Specimen Surface (Climate) # 19	10.21	50.37
Test Specimen Surface (Climate) # 20	10.31	50.55
Test Specimen Surface (Climate) # 21	10.39	50.70
Test Specimen Surface (Climate) # 22	10.35	50.64
Test Specimen Surface (Climate) # 23	10.79	51.41
Test Specimen Surface (Climate) # 24	10.47	50.84
Test Specimen Surface (Climate) # 25	11.51	52.72
Test Specimen Surface (Climate) # 26	10.62	51.11
Test Specimen Surface (Climate) # 27	10.45	50.81
Test Specimen Surface (Climate) # 28	10.44	50.78
Test Specimen Surface (Climate) # 29	10.34	50.62
Test Specimen Surface (Climate) # 30	10.15	50.27
Test Specimen Surface (Meter) # 49	37.37	99.26
Test Specimen Surface (Meter) # 50	34.80	94.64
Test Specimen Surface (Meter) # 51	35.31	95.55
Test Specimen Surface (Meter) # 52	37.02	98.63
Test Specimen Surface (Meter) # 53	37.03	98.65
Test Specimen Surface (Meter) # 54	36.99	98.57
Test Specimen Surface (Meter) # 55	37.34	99.20
Test Specimen Surface (Meter) # 56	37.31	99.16
Test Specimen Surface (Meter) # 57	37.07	98.72
Test Specimen Surface (Meter) # 58	37.26	99.07
Test Specimen Surface (Meter) # 59	37.22	99.00
Test Specimen Surface (Meter) # 60	37.25	99.05
Test Specimen Surface (Meter) # 61	34.28	93.71
Test Specimen Surface (Meter) # 62	34.25	93.65
Test Specimen Surface (Meter) # 63	36.40	97.53
Test Specimen Surface (Meter) # 64	36.44	97.59
Test Specimen Surface (Meter) # 65	36.49	97.68
Test Specimen Surface (Meter) # 66	37.10	98.78
Test Specimen Surface (Meter) # 67	37.10	98.79
Test Specimen Surface (Meter) # 68	37.00	98.61



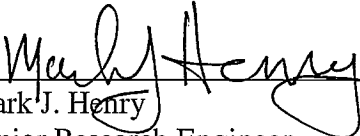
BlueScope Buildings North America, Inc.
Research Center
13500 Botts Road
Grandview, Missouri 64030

Accreditations:

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

Latest Apparatus Calibration Date: August 2010

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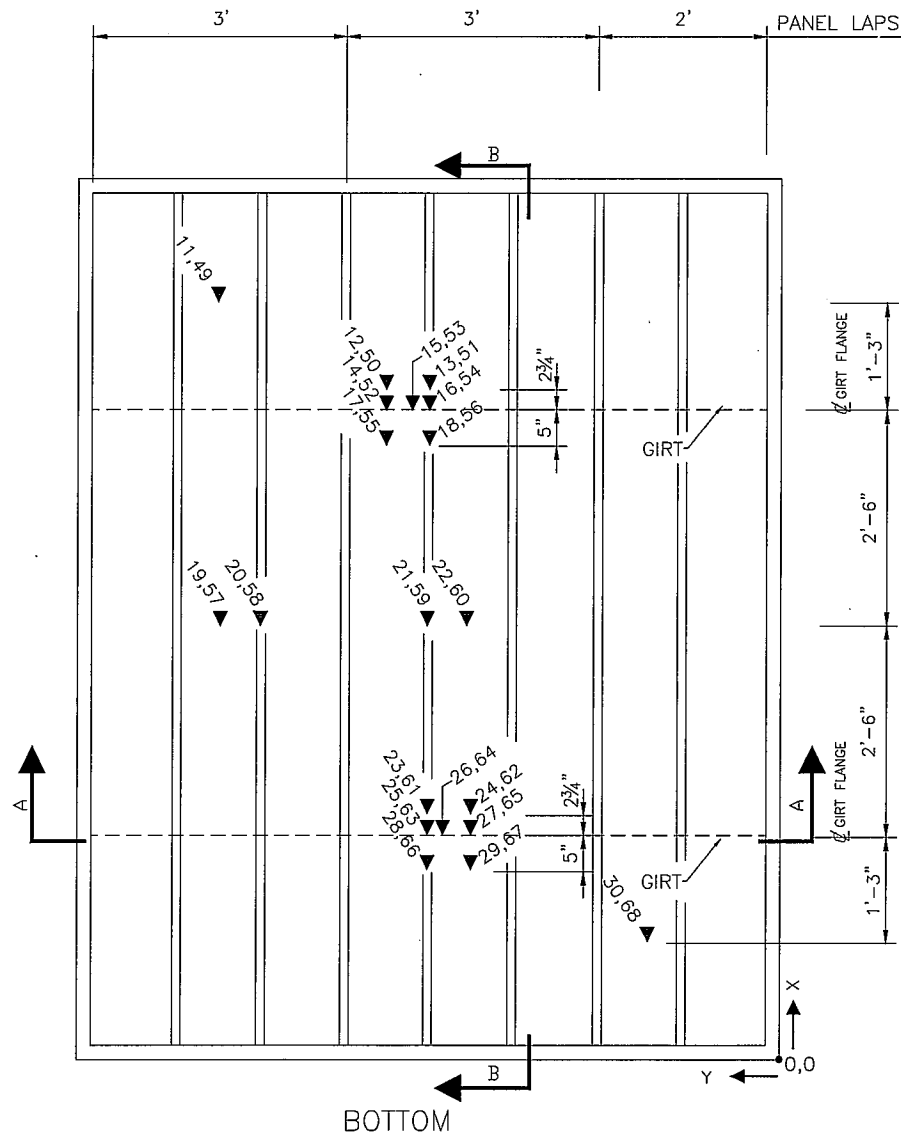
Mark J. Henry
Senior Research Engineer

Attachments:

Revision Log

Rev #	Date	Page(s)	Revision(s)
Original	6/21/2011	All	

DRAWING A – PLAN VIEW
 WALL LINER SYSTEM THERMAL BLOCK R-13 R-25

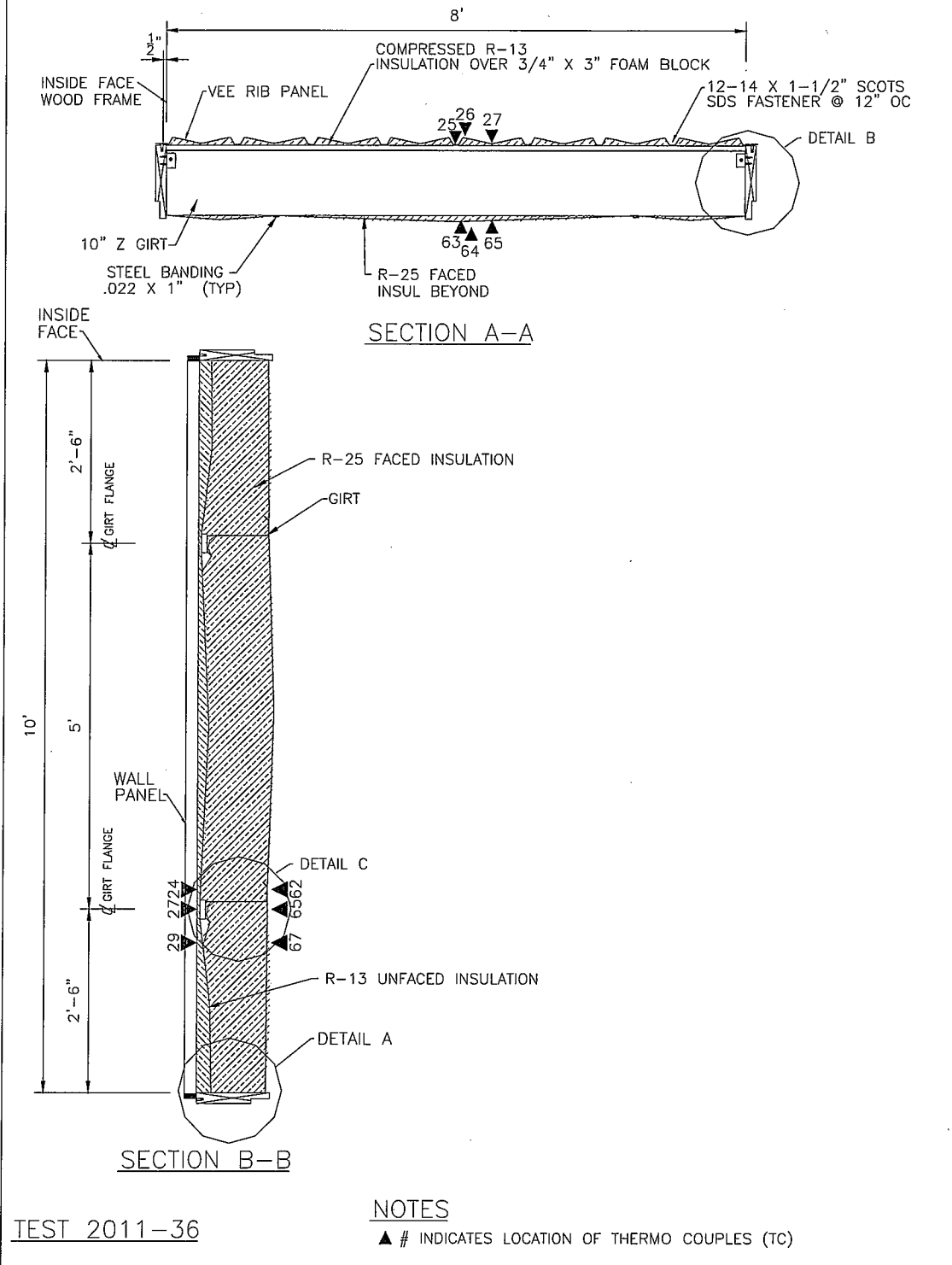


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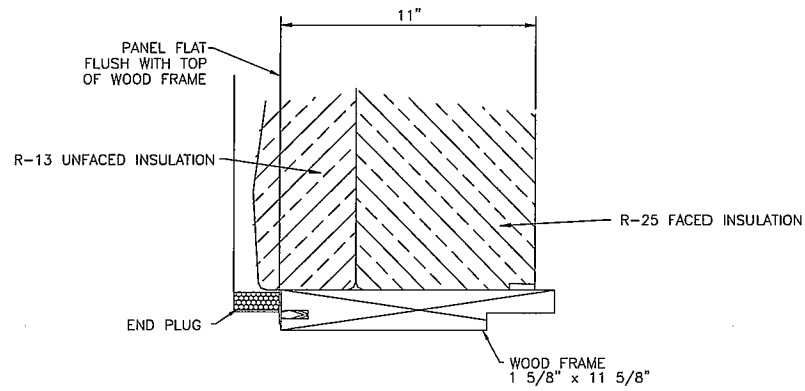
- (TC) 11 THRU 30 ARE ON THE CLIMATE SURFACE
- (TC) 49 THRU 68 ARE ON THE METER SIDE
- ▼## INDICATES LOCATION OF THERMO COUPLES (TC)

TEST 2011-36

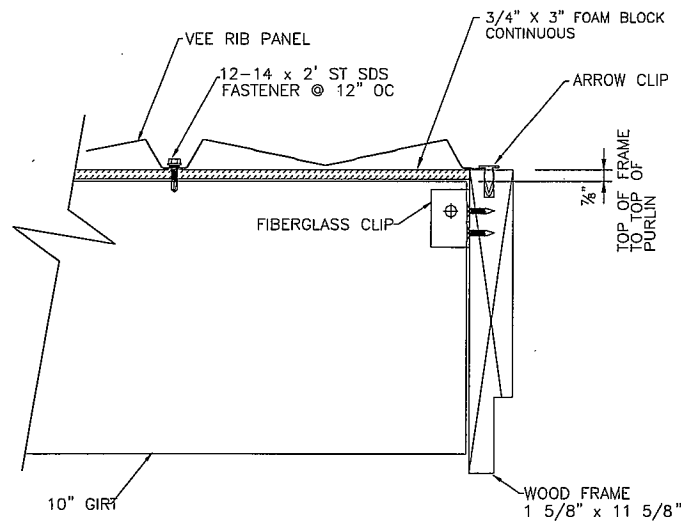
DRAWING B - SECTIONS THRU TEST FIXTURE
 WALL LINER SYSTEM THERMAL BLOCK R-13 R-25



DRAWING B – SECTIONS THRU TEST FIXTURE
 WALL LINER SYSTEM THERMAL BLOCK R-13 R-25



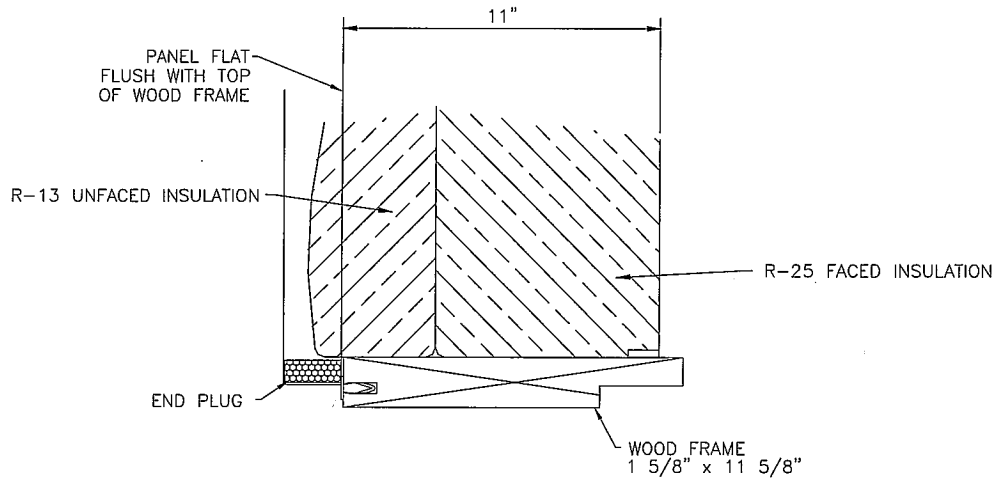
DETAIL A



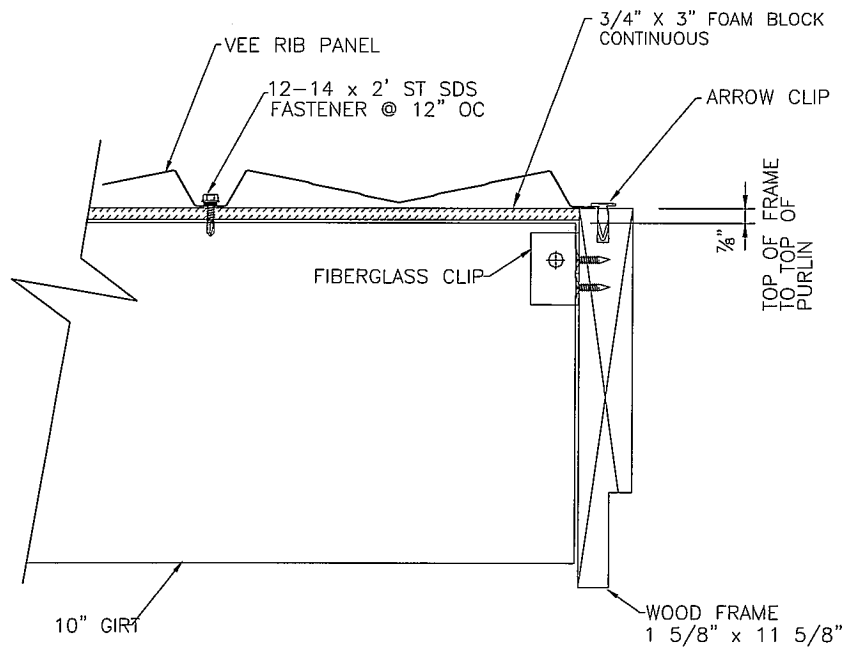
DETAIL B

TEST 2011-36

DRAWING C – SECTIONS THRU TEST FIXTURE
WALL LINER SYSTEM THERMAL BLOCK R-13 R-25



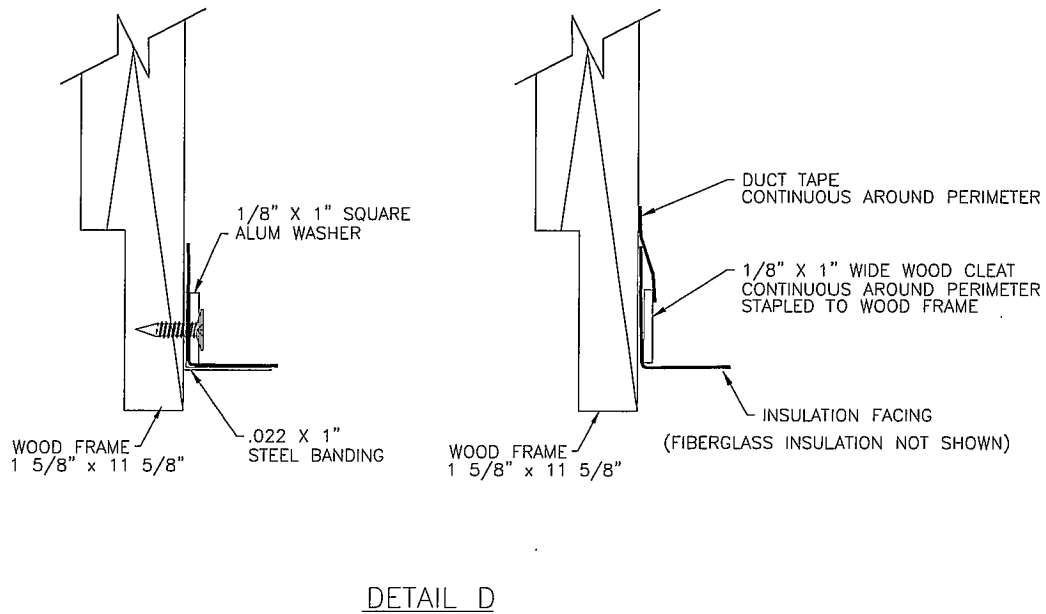
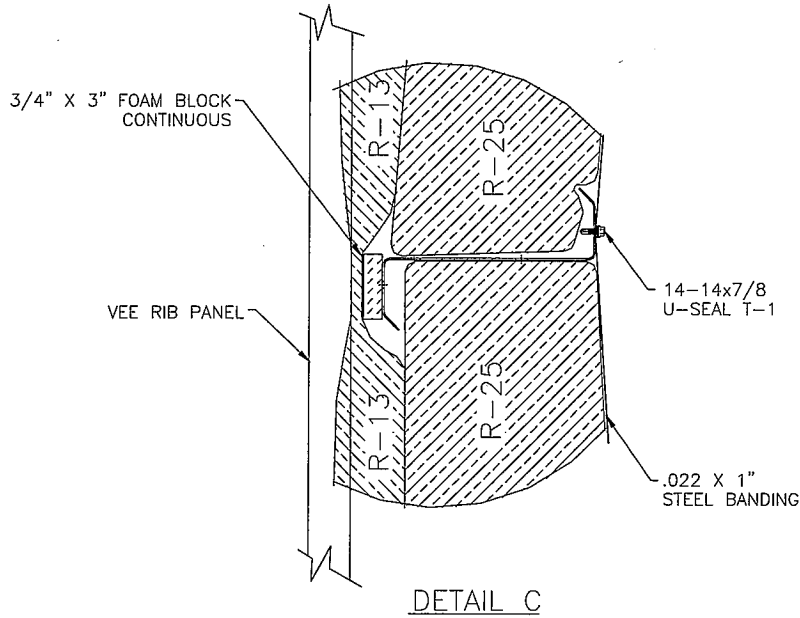
DETAIL A



DETAIL B

TEST 2011-36

DRAWING D – DETAILS
 WALL LINER SYSTEM THERMAL BLOCK R-13 R-25

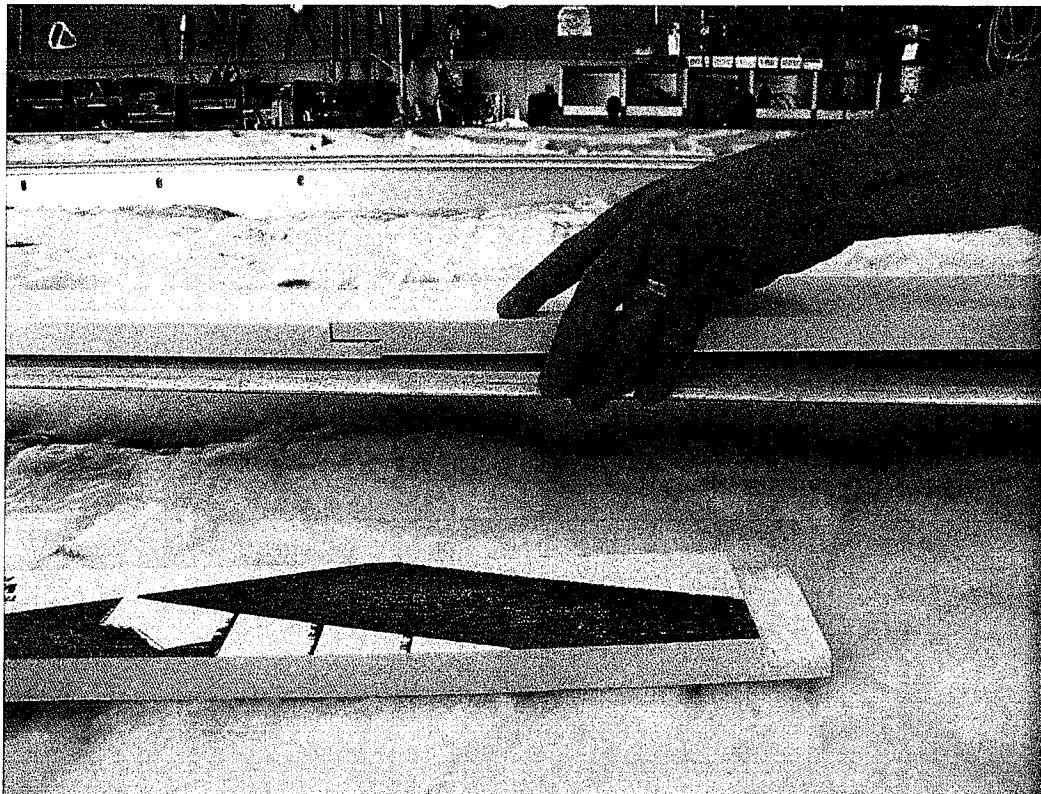
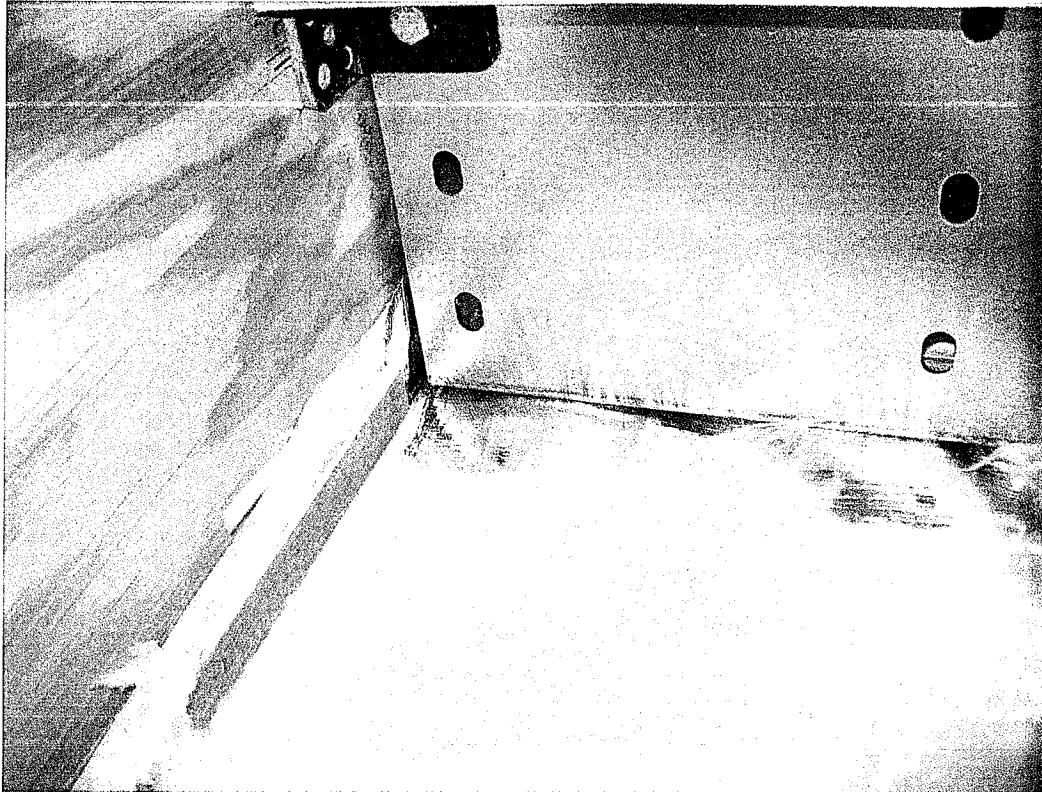


TEST 2011-36





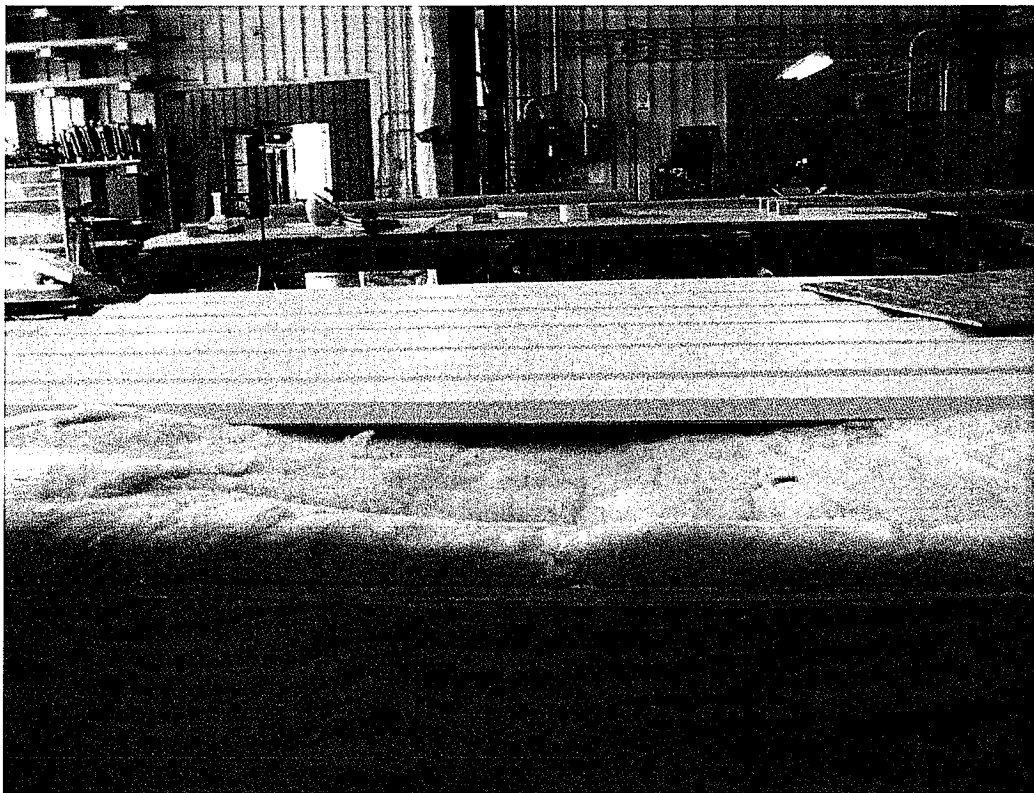
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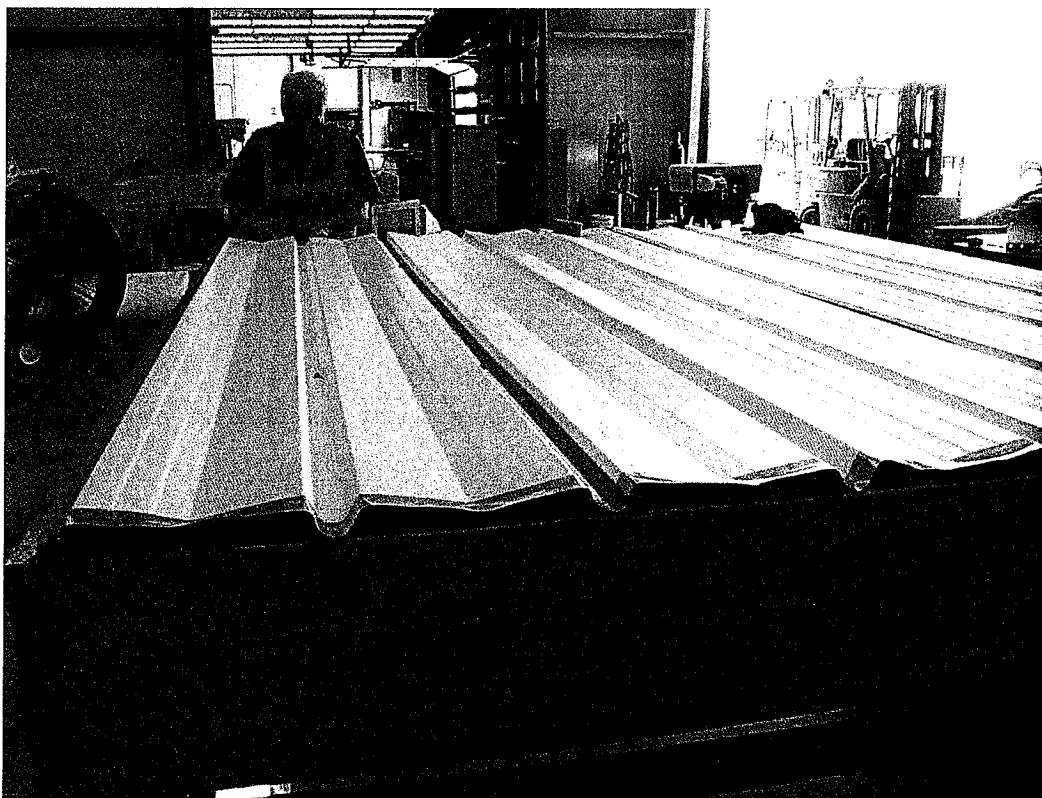
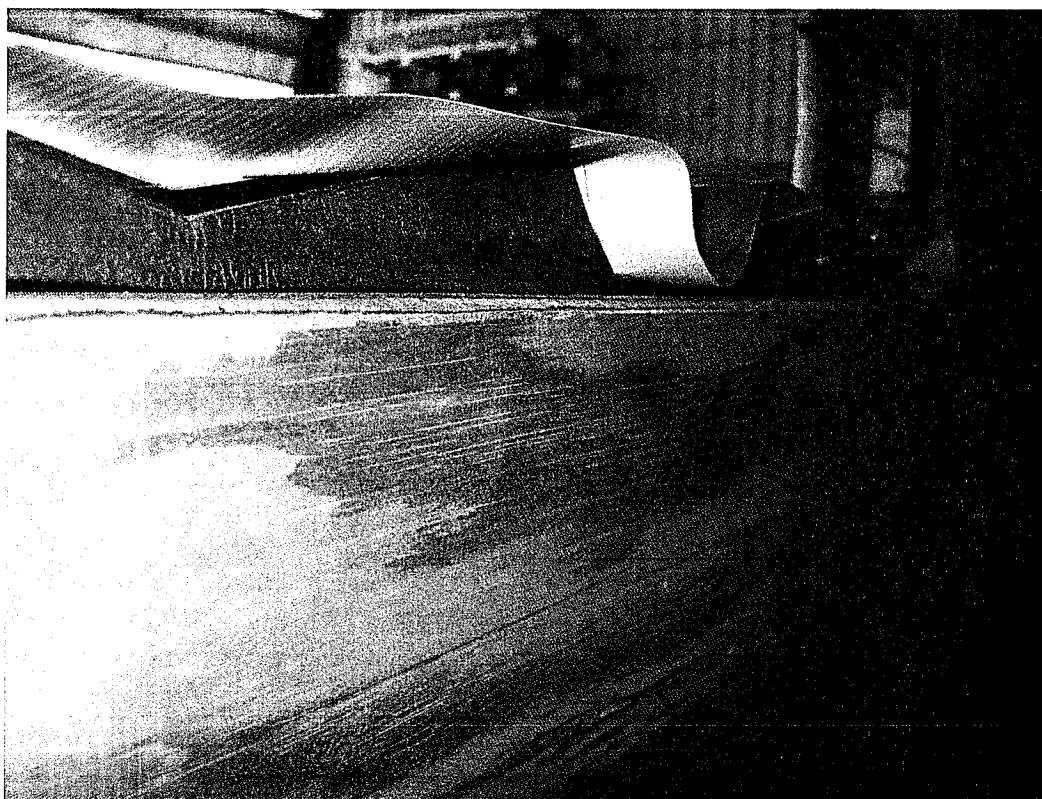


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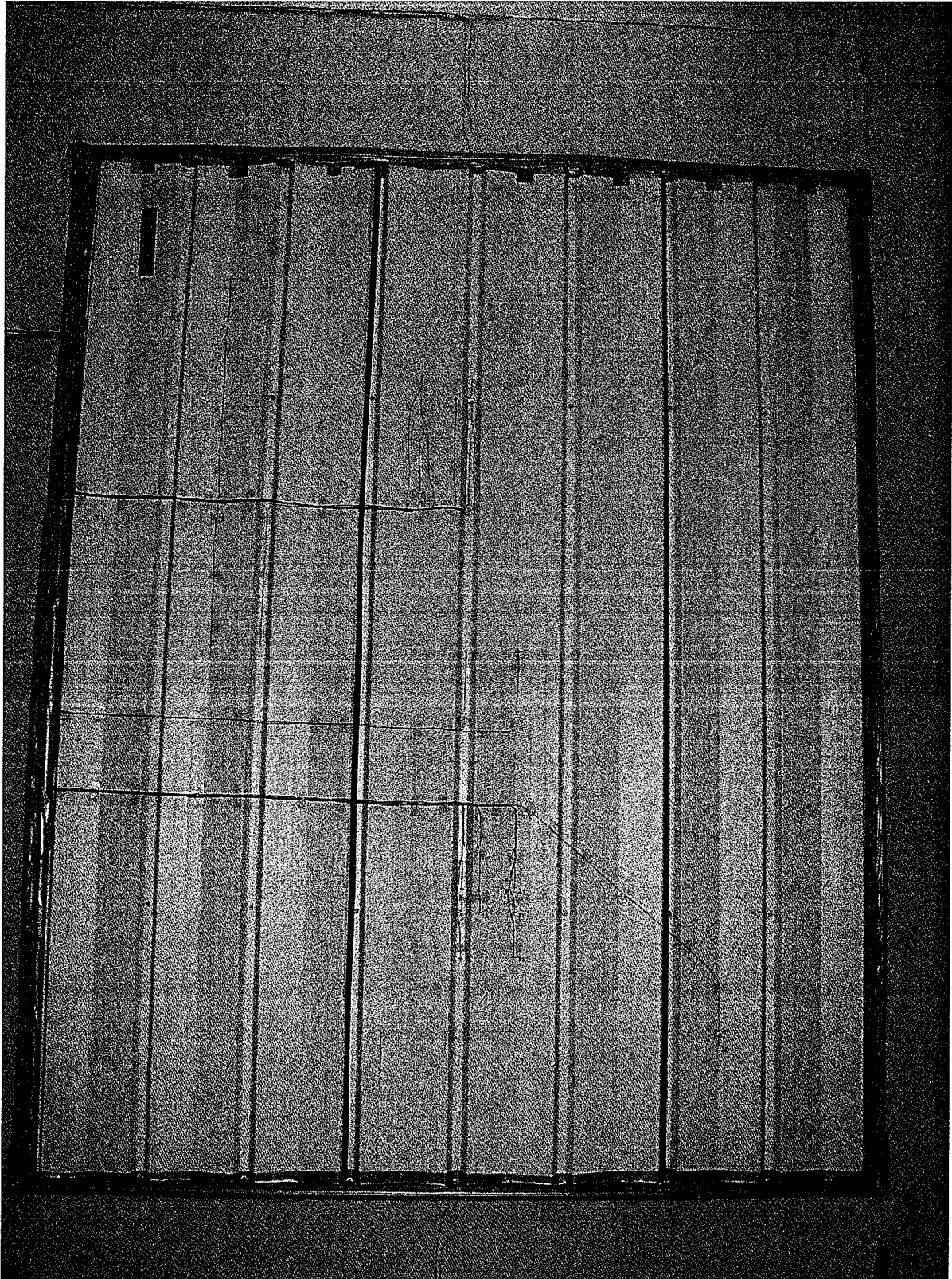


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