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

ASTM C 1363
Thermal Performance Test Report

Test Number: 2011-35
Sponsor: Bay Insulation Systems Inc.

Wall Liner System Thermal Tape R-16 R-25
Varco Pruden Vee Rib panels, 2 girts, 1/8"foam tape, nominal R-16 unfaced fiberglass insulation, nominal R-25 faced fiberglass insulation

Test Date: 6/9/2011

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

Summary of Results:

Thermal Transmittance, U:	0.206 W/m^2 K (0.036 Btu/ hr ft^2 F)
Overall Thermal Resistance, Ru:	4.8 m^2 K/W (27.5 hr ft^2 F/Btu)

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ASTM C 1363 Thermal Performance Test Report Summary

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

Test Number: 2011-35
Test Start Date: 6/9/2011
Test End Date: 6/14/2011
Report Date: 6/16/2011

Test Information:
Wall Liner System Thermal Tape R-16 R-25
Varco Pruden Vee Rib panels, 2 girts, 1/8"foam tape, nominal R-16 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	37.81 deg C (100.06 deg F)
Average Cold Side Ambient Temperature	10.01 deg C (50.02 deg F)
Average Warm Side Air Velocity	0.29 m/s (58.00 fpm)
Average Cold Side Air Velocity	1.31 m/s (257.29 fpm)

Summary of Results:

Thermal Transmittance, U:	0.206 W/m^2 K (0.036 Btu/ hr ft^2 F)
Overall Thermal Resistance, Ru:	4.8 m^2 K/W (27.5 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: Varco Pruden Building Vee Rib
Insulation: Two layers fiberglass
Framing System: Zee girts

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. A layer of foam tape was applied to the outside flange of the girts. 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-16 insulation was 4.9 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
Foam Tape	VentureTape® 9108 White finish 1/8" x 3" polyethylene foam tape Adhesive coated on two sides
R-16 Insulation Unfaced	Nominal R-16 unfaced fiberglass blanket insulation Measured Thermal Resistance: 16.46 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-16 fiberglass was Owens Corning, and of the R-25 fiberglass was CertainTeed Corporation.
The foam tape was from Venture Tape Corporation.

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Measured Test Data

Test Times	
Test Start Time	6/9/2011 3:01 PM
Test End Time	6/14/2011 7:27 AM
Time Required to Reach Steady State	101.0 Hours
Steady State Start Time	6/13/2011 8:02 PM
Steady State End Time	6/14/2011 6:57 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	37.81 deg C (100.06 deg F)
Average Cold Side Ambient Temperature	10.01 deg C (50.02 deg F)

Input	**64.49 watts (220.05 Btu/hr)**
Warm Side Heaters	59.51 watts (203.04 Btu/hr)
Warm Side Fans	3.71 watts (12.66 Btu/hr)
Warm Side AVT & RH Sensor Power	1.27 watts (4.34 Btu/hr)

Loss	**21.88 watts (74.66 Btu/hr)**
Surround Panel and Flanking Loss	19.85 watts (67.73 Btu/hr)
Side of Test Specimen Frame Adjustment	2.05 watts (6.98 Btu/hr)
Meter Wall and Flanking Loss	-0.02 watts (-0.05 Btu/hr)
Thermopile Voltage (E)	-0.233 mV
Thermopile Null (E_0)	-0.2418 mV
Thermopile Slope (m)	-1.8296

Total Heat Flow Through Test Specimen	**42.61 watts (145.38 Btu/hr)**

Calculated Thermal Properties	
Specimen Thermal Transmittance (U)	0.206 W/m^2 K (0.036 Btu/ hr ft^2 F)
Specimen Overall Thermal Resistance (Ru)	4.8 m^2 K/W (27.5 hr ft^2 F/Btu)

The estimated uncertainty of the results is ± 5 %

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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	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
from top	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	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
girt	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	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
girt	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	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
girt	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	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
bottom	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

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Surface temperature measurements.

Description	Average deg C	Average 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

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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

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Mark J. Henry
Senior Research Engineer

Attachments:

Revision Log

Rev #	Date	Page(s)	Revision(s)
Original	6/16/2011	All	

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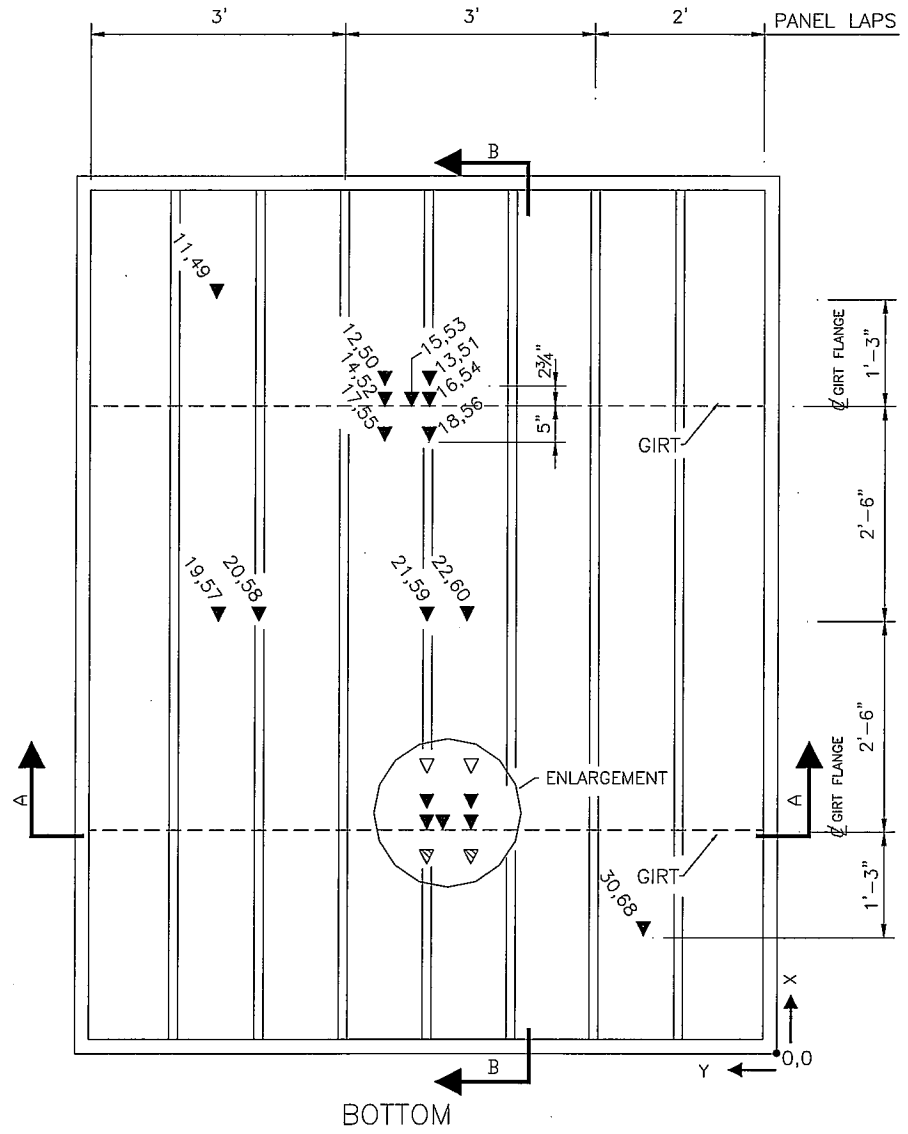
DRAWING A – PLAN VIEW

WALL LINER SYSTEM TAPE R–16 R–25



NOTES

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

LEGEND

▽ = EXTERIOR ONLY
▽ = INTERIOR ONLY
▼ = BOTH

TEST 2011–35

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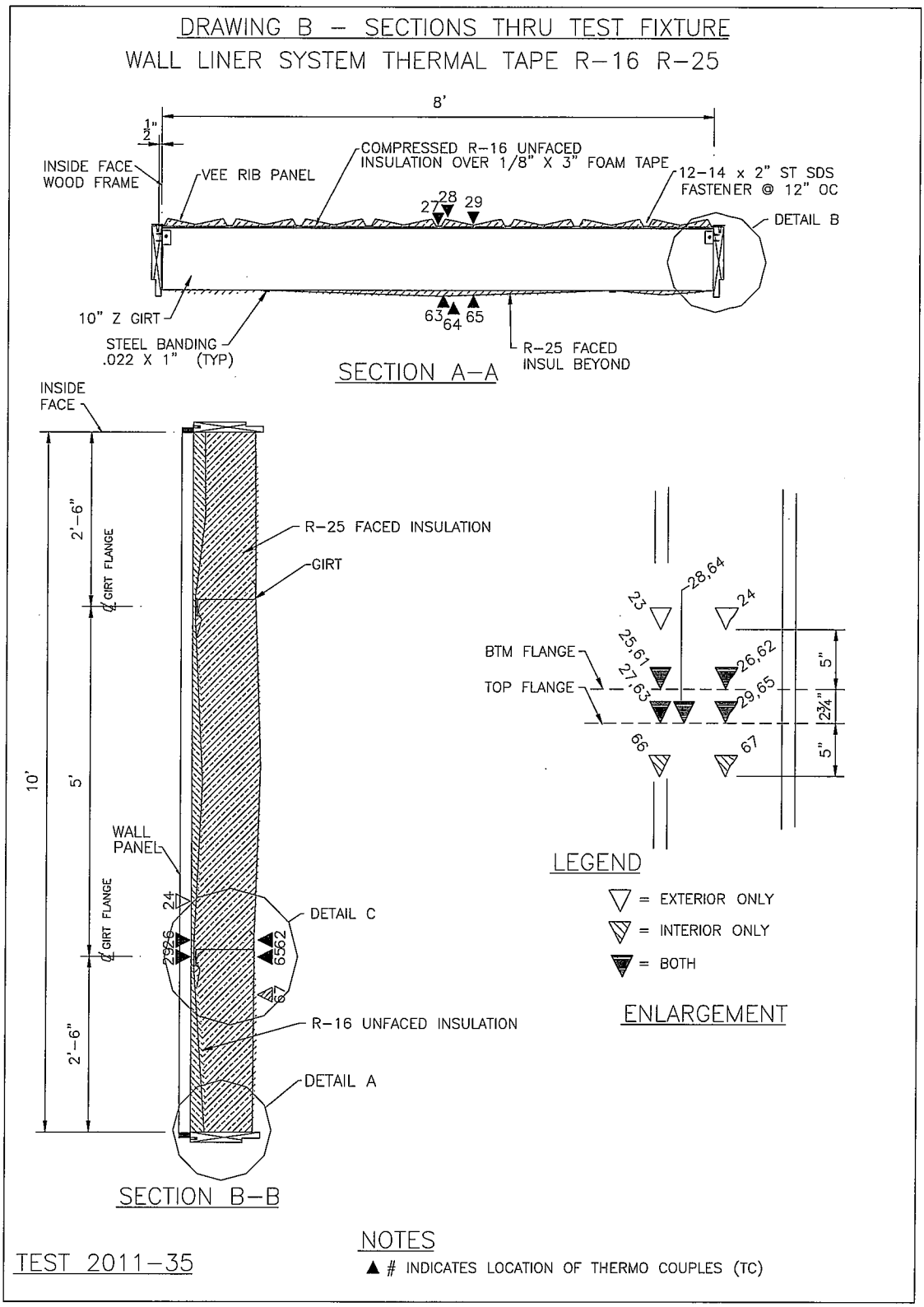

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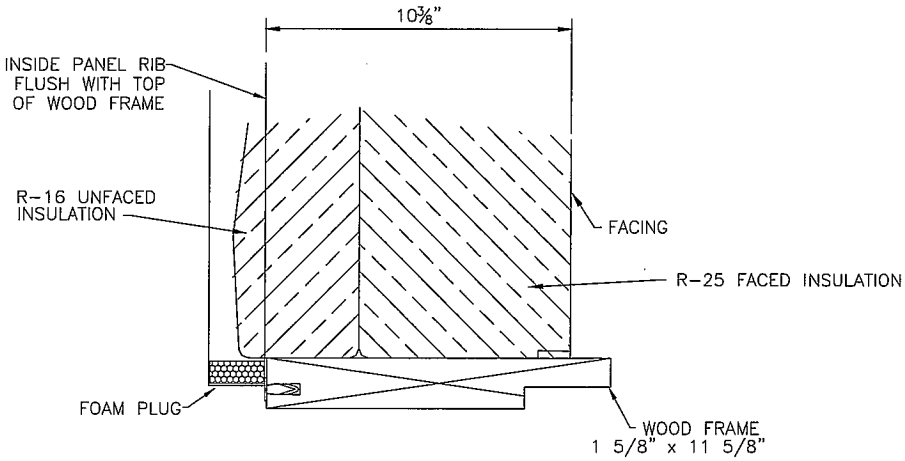
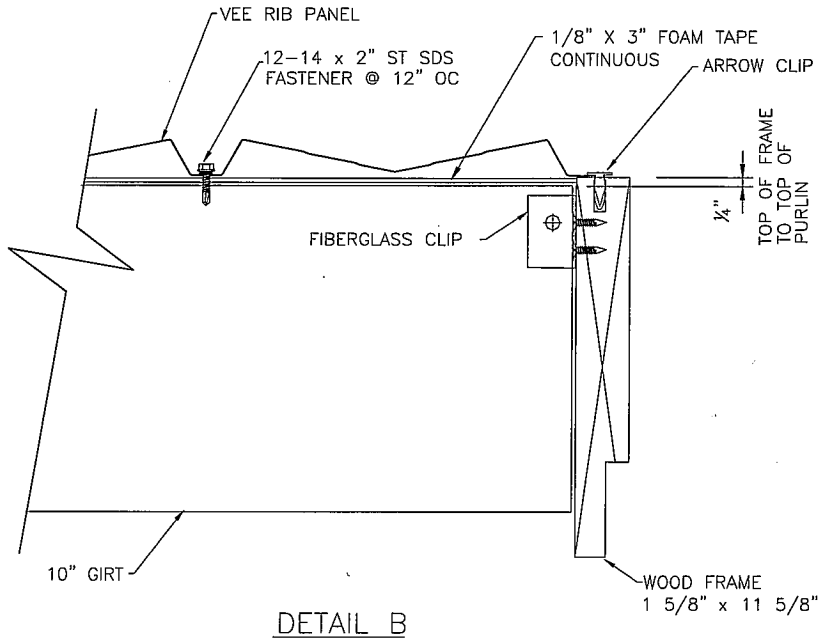
DRAWING C – DETAILS
WALL LINER SYSTEM THERMAL TAPE R–16 R–25



DETAIL A



DETAIL B

TEST 2011–35

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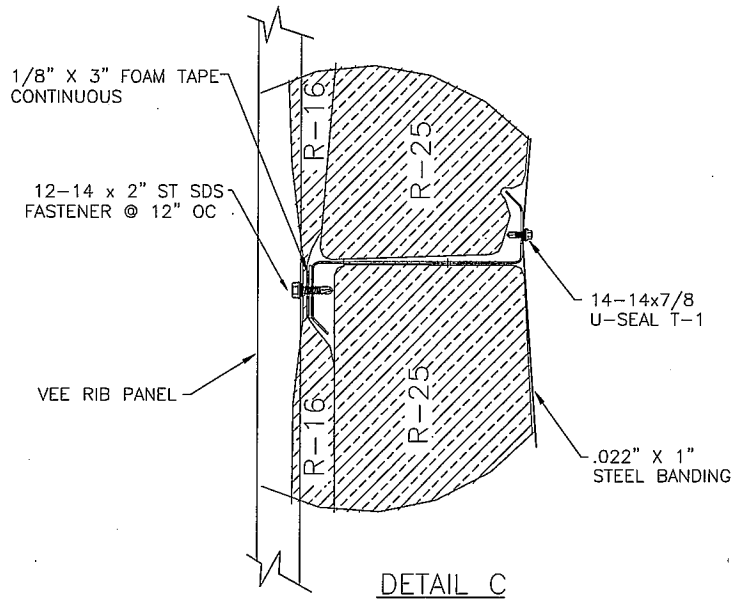
DRAWING D – DETAILS
WALL LINER SYSTEM THERMAL TAPE R–16 R–25



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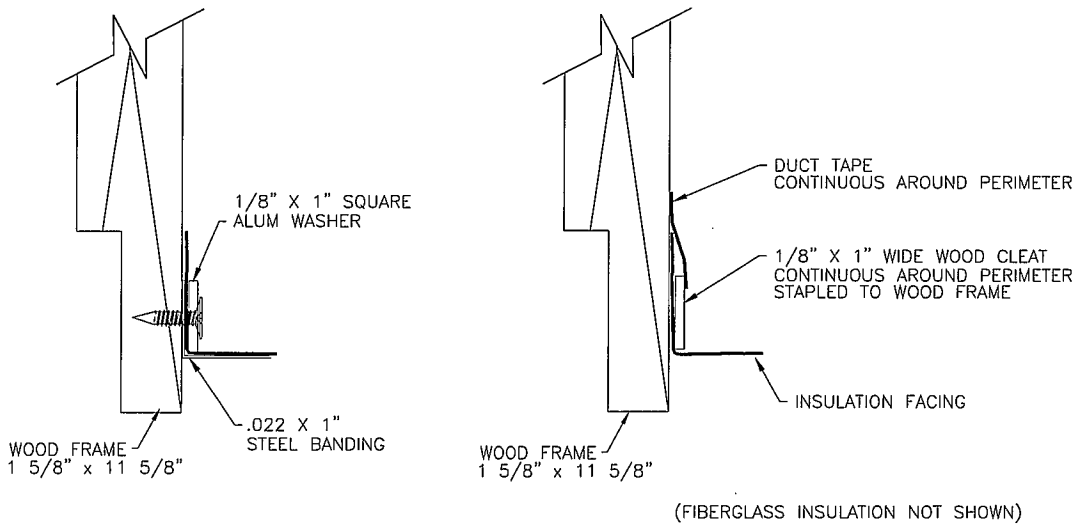

DETAIL D

TEST 2011–35

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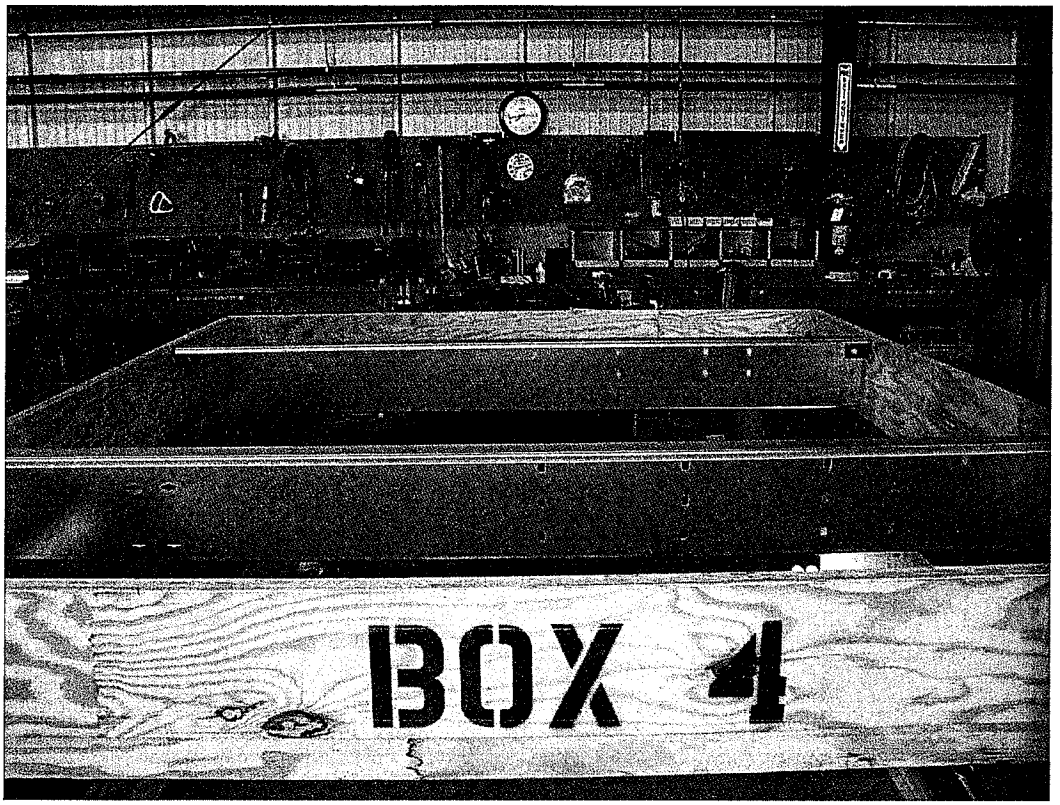

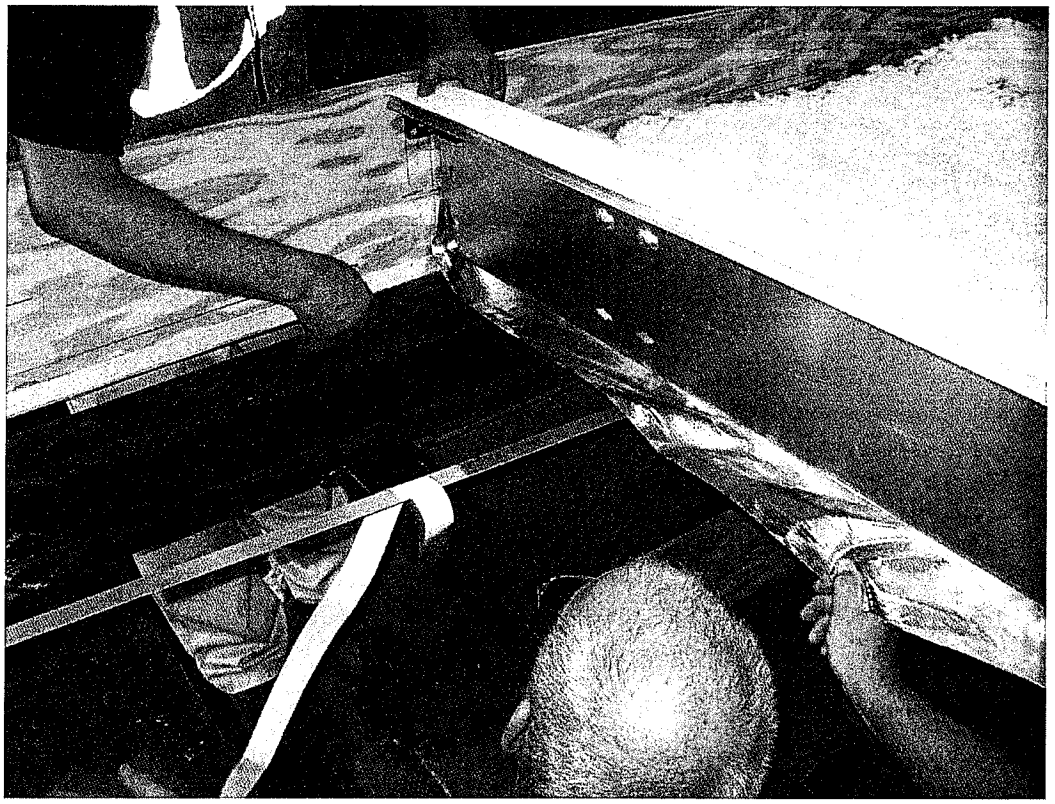

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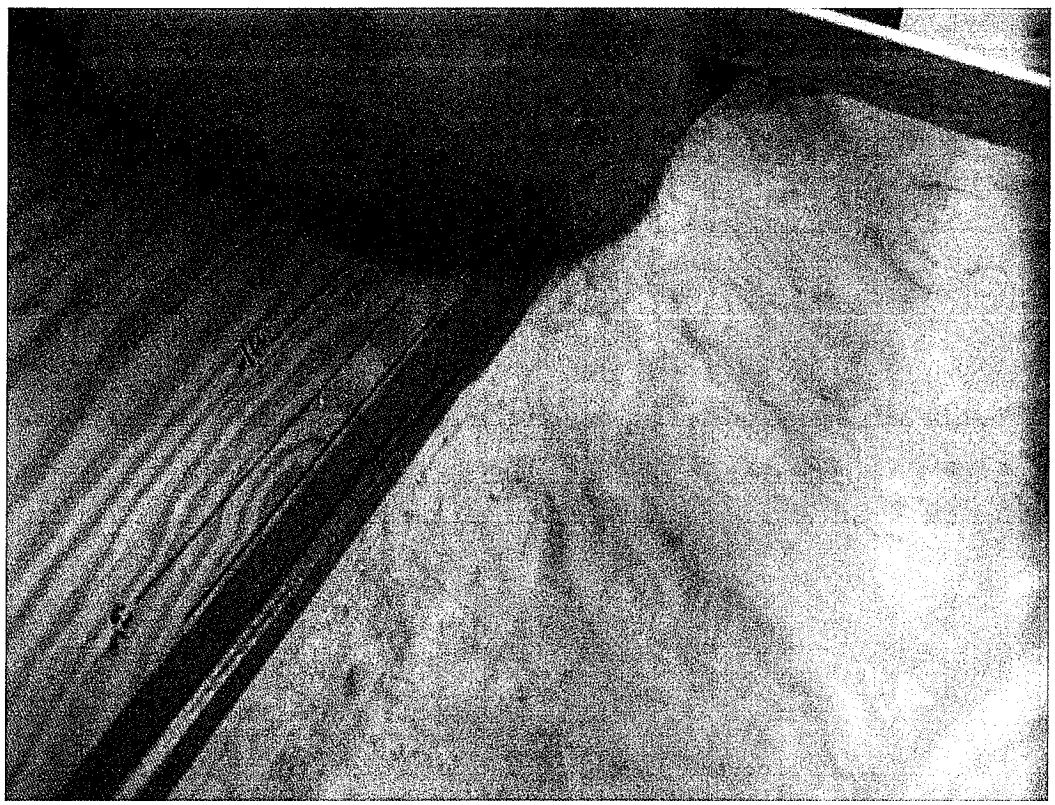

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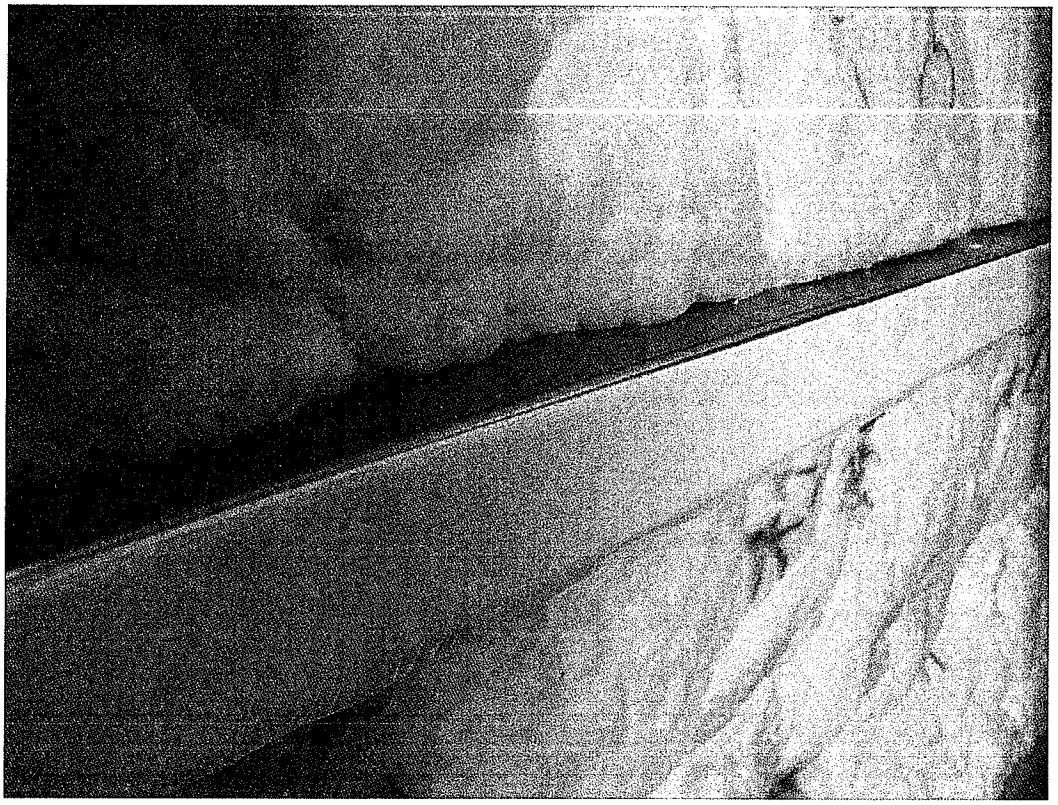

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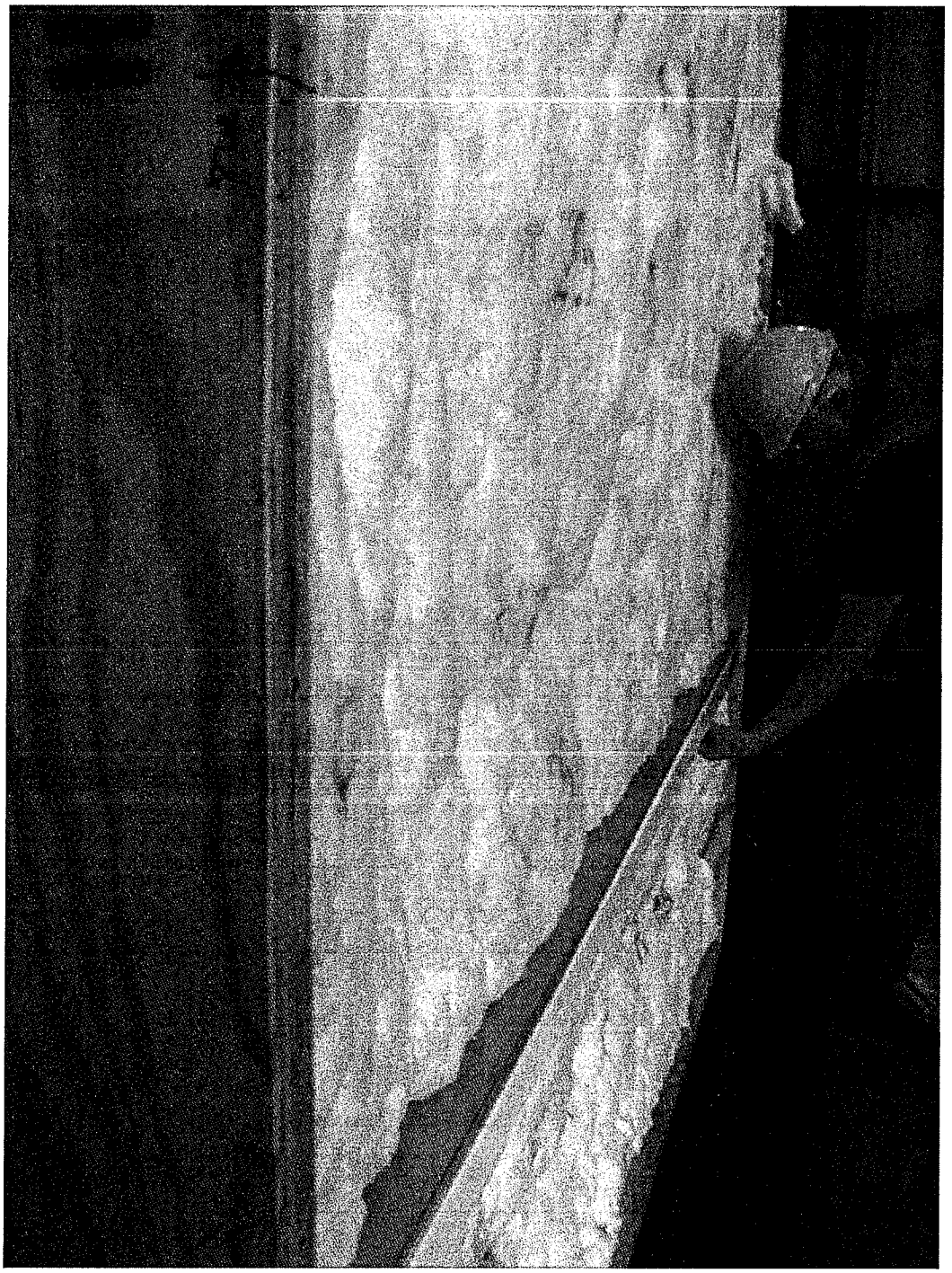

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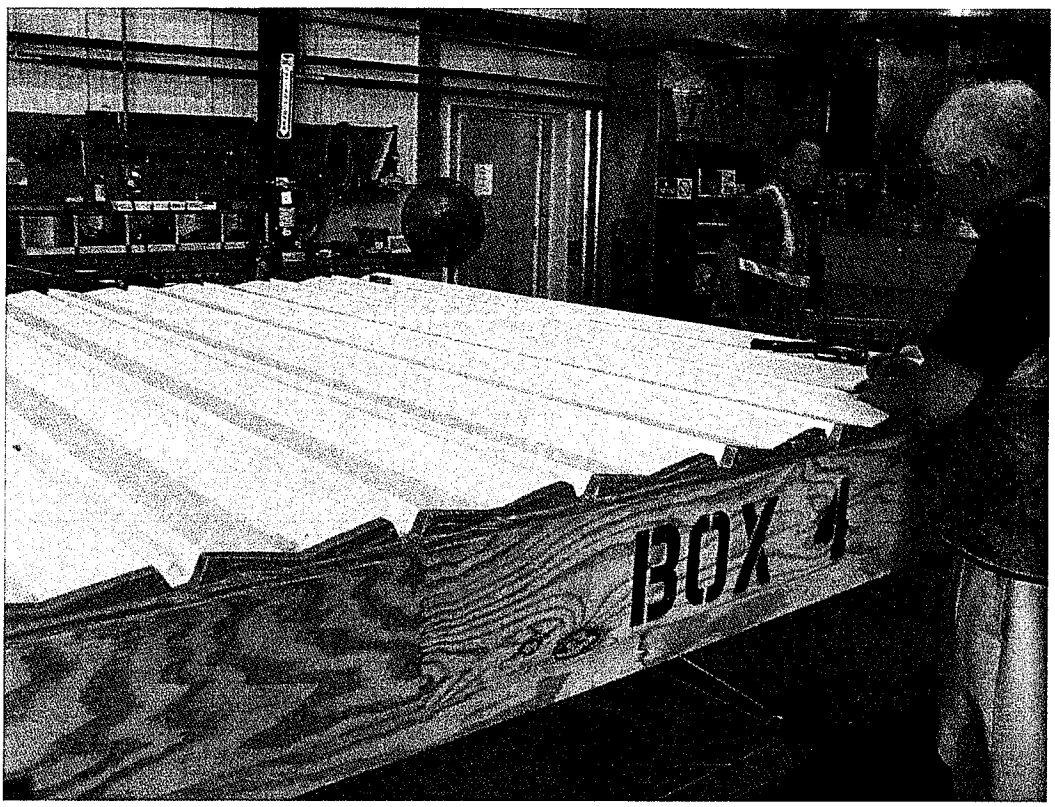

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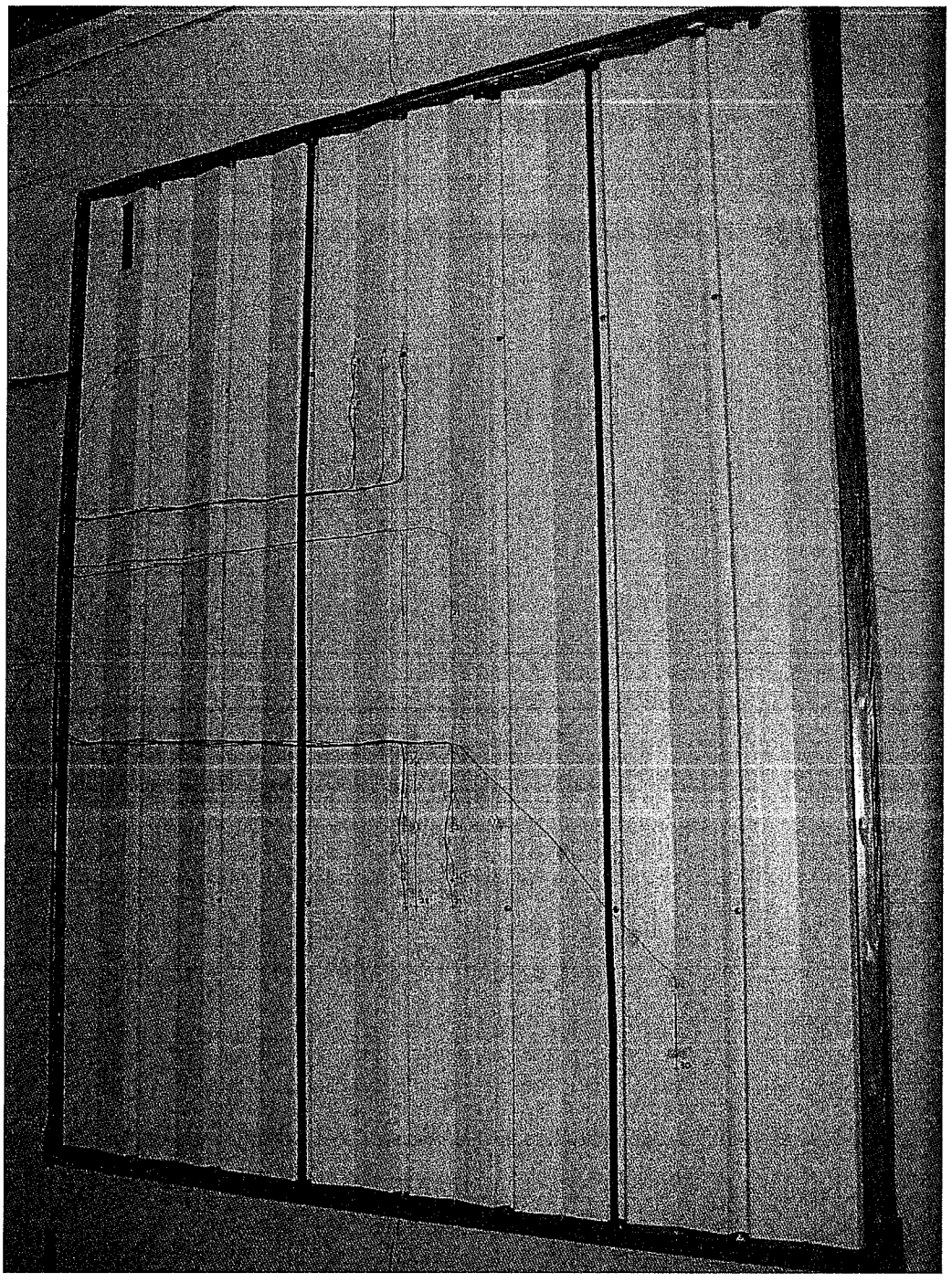

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