

PERFORMANCE TEST REPORT

Rendered to:

UNITED STATES ALUMINUM CORPORATION

SERIES/MODEL: 451 Center Glaze
PRODUCT TYPE: Aluminum Curtain Wall

Title	Summary of Results
Air Infiltration	0.01 cfm/ft ²
Water Resistance Test Pressure	8.0 psf
Uniform Load Deflection Test Pressure	±30.0 psf
Uniform Load Structural Test Pressure	±45.0 psf

This report contains in its entirety:

Cover Page: 1 page
Report Body: 5 pages
Drawings: 15 pages

Reference should be made to Architectural Testing, Inc. Report No. 79241.03-801-47 for complete test specimen description and data.

PERFORMANCE TEST REPORT

Rendered to:

UNITED STATES ALUMINUM CORPORATION
200 Singleton Dr.
Waxahachie, Texas 75165

Report No.: 79241.03-801-47
Revision 1: 07/24/08
Test Date: 12/14/07
Report Date: 07/11/08
Expiration Date: 12/14/11

Project Summary: Architectural Testing, Inc. was contracted by United States Aluminum Corporation to witness testing on a Series/Model 451 Center Glaze, aluminum curtain wall at the United States Aluminum test facility in Waxahachie, Texas. Test specimen description and results are reported herein. The sample was provided by the client.

Test Methods: The test specimen was evaluated in accordance with the following:

ASTM E 283-04, Test Method for Determining Rate of Airflow Through Exterior Windows, Curtain Walls and Doors Under Specified Pressure Differences Across the Specimen.

ASTM E 330-02, Test Method for Structural Performance of Exterior Windows, Curtain Walls and Doors by Uniform Static Air Pressure Difference.

ASTM E 331-00, Test Method for Water Penetration of Exterior Windows, Curtain Walls and Doors by Uniform Static Air Pressure Difference.

Test Specimen Description:

Series/Model: 451 Center Glaze

Product Type: Aluminum Curtain Wall

Overall Size: 182" wide by 96-3/8" high

Upper Daylight Opening Size (3): 58" wide by 66" high

Lower Daylight Opening Size (3): 58" wide by 24" high

Overall Area: 121.81 ft²

Test Specimen Description: (Continued)

Finish: Painted Aluminum

Glazing Details: Insulating glass units constructed of two sheets of nominal 1/4" thick tempered glass with 1/2" aluminum spacer creating a 1" nominal overall thickness. Glass units were glazed using the NP225 gasket on the interior and exterior. SB200 setting blocks were used at the sill and intermediate horizontals to support the glass units at the quarter points.

Note: No conclusions of any kind regarding the adequacy or inadequacy of the glass in the test specimen can be made.

Frame Construction: Horizontal members were secured to vertical members with two #10 x 1" sheet metal screws. Water deflectors were placed at both ends of the intermediate horizontal members. Vertical fillers snap fit with the mullions/jambs. Sill dams were coped and fitted to the sill pan and secured with two #8 x 1" sheet metal screws. All joints were sealed with silicone sealer.

Drainage:

<u>Description</u>	<u>Quantity</u>	<u>Location</u>
1/8" x 1-1/4" slot	8	Sill pan, 24" on center

Installation: The test specimen was installed to a Spruce-Pine-Fir test frame. The head was secured with an aluminum anchor channel located at the end of each vertical member. The aluminum anchor channel was fastened with six #12 x 3" screw at the intermediate verticals and with four #12 x 3" screws at the jambs. The jambs and sill pan were secured with #12 x 3" screws located 4" from each end and 12" on center thereafter. The perimeter was sealed with silicone sealant.

Test Results: The temperature during testing was 70°F. The results are tabulated as follows:

<u>Test Method</u>	<u>Title of Test</u>	<u>Results</u>
ASTM E 283	Air Infiltration 6.24 psf	0.01 cfm/ft ²
ASTM E 331	Water Resistance 8.0 psf	No leakage
ASTM E 330	Uniform Load Deflection (Deflections reported were taken on the vertical mullion, mullion length was 96") (Loads were held for 10 seconds) 30.0 psf (positive) 30.0 psf (negative)	0.46" 0.44"
ASTM E 330	Uniform Load Structural (Permanent sets reported were taken on the vertical mullion, mullion length was 96") (Loads were held for 10 seconds) 45.0 psf (positive) 45.0 psf (negative)	0.01" 0.02"

General Note: All testing was performed in accordance with the referenced standards.

Tape and film were not used to seal against air leakage during structural testing.

Drawing Reference: The test specimen drawings have been reviewed by Architectural Testing and are representative of the test specimen reported herein.

List of Official Observers:

<u>Name</u>	<u>Company</u>
Terry Hopgood Jim Sturdevant	United States Aluminum Corporation Architectural Testing, Inc.

Detailed drawings, data sheets, representative samples of test specimens, a copy of this report, or other pertinent project documentation will be retained by Architectural Testing, Inc. for a period of four years from the original test date. At the end of this retention period, such materials shall be discarded without notice and the service life of this report will expire.

Results obtained are tested values and were secured by using the designated test methods. No conclusions of any kind regarding the adequacy or inadequacy of the glass in the test specimen can be made. This report does not constitute certification of this product nor an opinion or endorsement by this laboratory. It is the exclusive property of the client so named herein and relates only to the specimen tested. This report may not be reproduced, except in full, without the written approval of Architectural Testing, Inc.

For ARCHITECTURAL TESTING, INC:

James Sturdevant
Laboratory Technician

Joseph A. Reed, P.E.
Director – Engineering and Product Testing

JS:hd/cmd

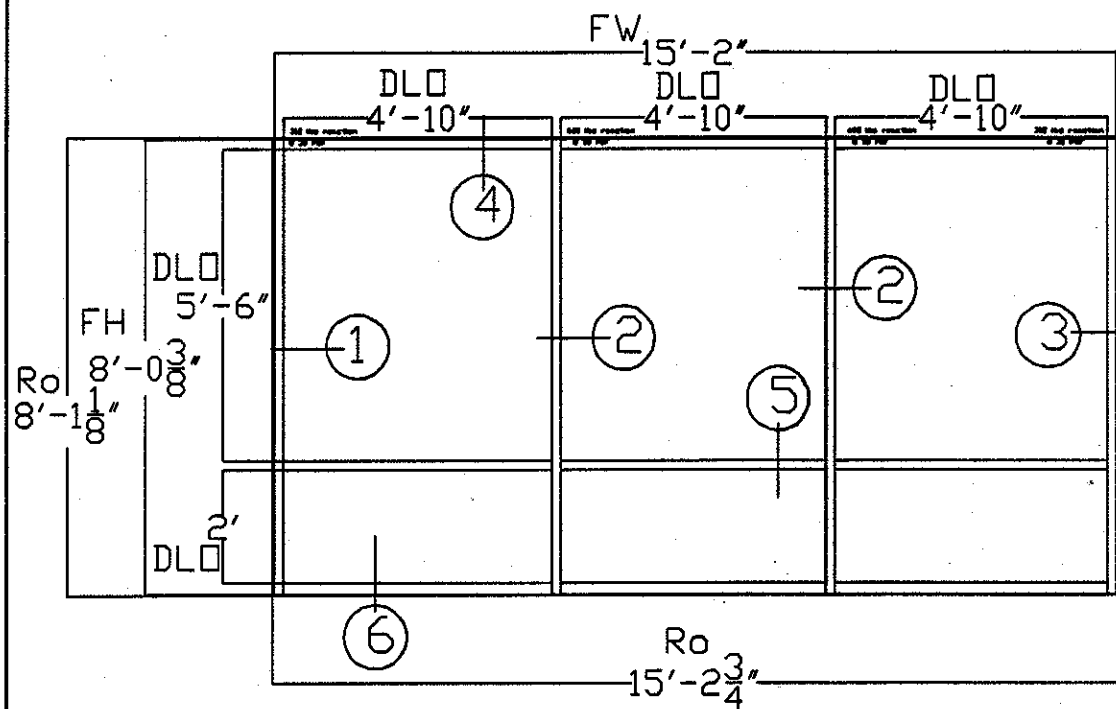
Attachments (pages): This report is complete only when all attachments listed are included.
Appendix-A: Drawings (15)

Revision Log

<u>Rev. #</u>	<u>Date</u>	<u>Page(s)</u>	<u>Revision(s)</u>
0	07/11/08	N/A	Original report issue – Reissued Report No. 79241.01-801-47 with Florida P.E. review and seal
1	07/24/08	Page 2	Under Installation, corrected next to last sentence to, "The jambs and sill pan were secured with #12 x 3" screws located 4" from each end and 12" on the center thereafter."
		Appendix-A	Replaced second drawing sheet with revised drawing

Appendix A

Drawings



SHIM NEAR TOP OF JAMBS

Series 451 Center Glaze Mock Up



Architectural Testing

Test sample complies with these details.
Deviations are noted.

Report# 7924101
Date 11/18/08 Tech JS

Elevations

TEST RESULTS

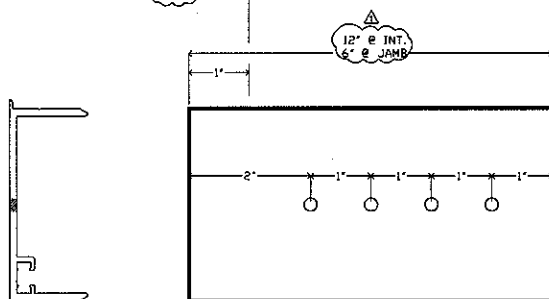
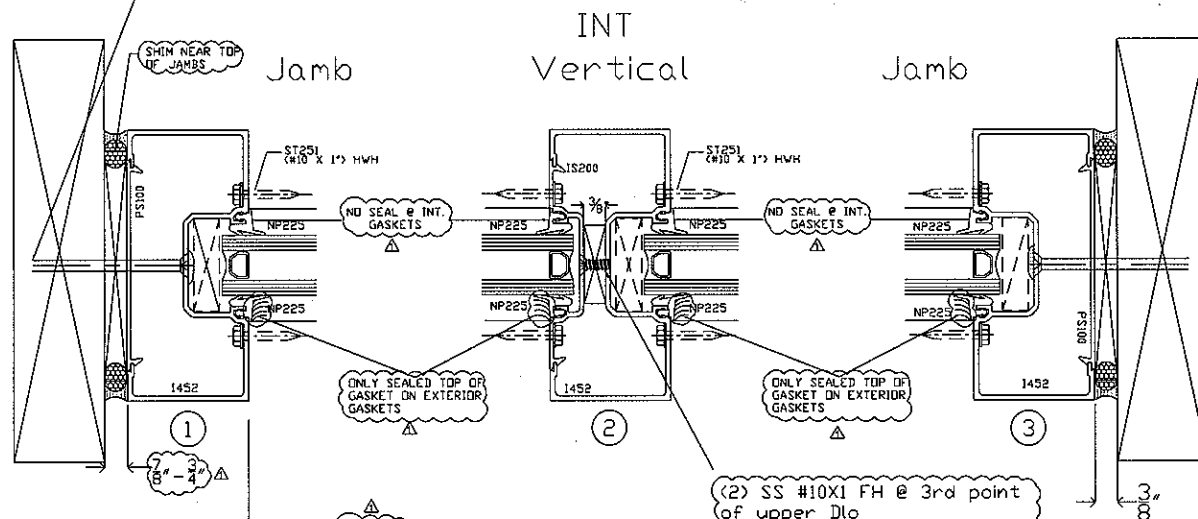
* 30 DESIGN LOAD	PASSED	NO SCREWS IN FILLERS
* 45	PASSED	NO SCREWS IN FILLERS
* 67.5	PASSED	NO SCREWS IN FILLERS
(30psf DESIGN LOAD)	PASSED	WITH SCREWS IN FILLER
(45psf OVERLOAD)	PASSED	WITH SCREWS IN FILLER
(67.5psf)	NO STRUCTURAL FAILURE	WITH SCREWS IN FILLERS

* UNOFFICIAL WITNESSED BY USAC PERSONNEL
(OFFICIALLY WITNESS BY ATI REPRESENTATIVE)

Design For
-30 Psf Wind Pressure
-1" Clear Tempered Insulated Glass

Bill Of Materials		SERIES 451 THERMAL MOCK UP		
Item	Part#	Description	Qty	Supplier
1	I-452	FRAME JAMB	3	INTEX TX
2	IS452	HEAD	2	INTEX TX
3	IS463	SILL	2	INTEX TX
4	IS200	INT. VERT. FILLER	21	INTEX TX
5	IM453	GLASS STOP	2	INTEX TX
6	IH 463	INT. HORIZONTAL	3	INTEX TX
7	PS 100	JAMB VERT. FILLER	2	INTEX TX
8	FT 400	SILL PAN	1	INTEX TX
HARDWARE				
8	ST 251	#10x1" PH SMS	16	A.B.S.
9	WD 200	WATER DEFLECTOR DEEP POCKET	3	ASHLAND
10	WD210	WATER DEFLECTOR SHALLOW OCKE	1	ASHLAND
11	ST 244	# 10 X 3/4" PHSMS		A.B.S.
GLAZING				
12	SB 200	SETTING BLOCK	4	TREMCO
13	NP 225	TOP LOAD GASKET		TREMCO
14	WB 452	WEDGE BLOCK	6	TREMCO

#12 FLAT HEAD
@ 4" FROM ENDS
AND 12" OC 3" LONG



Jamb Anchor



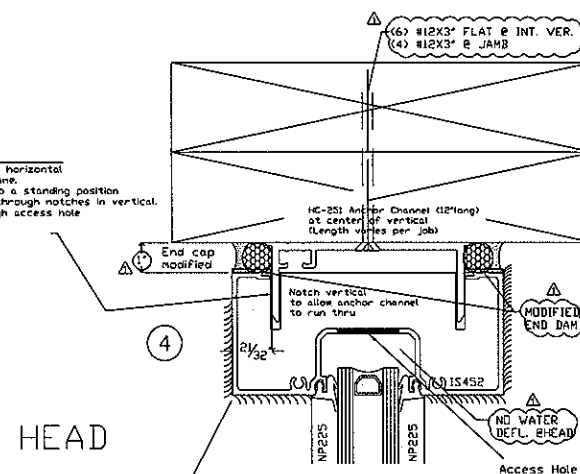
Architectural Testing

Test sample complies with these details
Deviations are noted.

Report# 79421.03-801-47
Date 7/17/08 Tech HO

ANCHOR INSTALLATION:

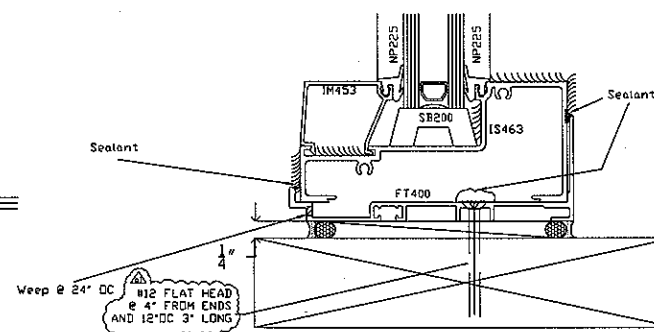
- 1-Lay the anchor into horizontal then erect the frame.
- 2-Raise the frame into a standing position then slide anchor through notches in vertical.
- 3-Insert bolts through access hole then into anchor

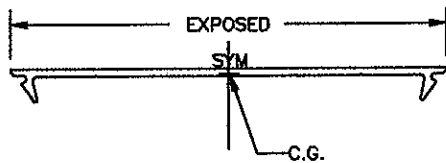


HEAD



INT
Horizontal





		U.S. ALUMINUM CORP.		3604
FLAT SNAP IN COVER		B.R		7/12/89
PS100		2 X SIZE		

ACTUAL SIZE

NOTE
SNAPS WITH:



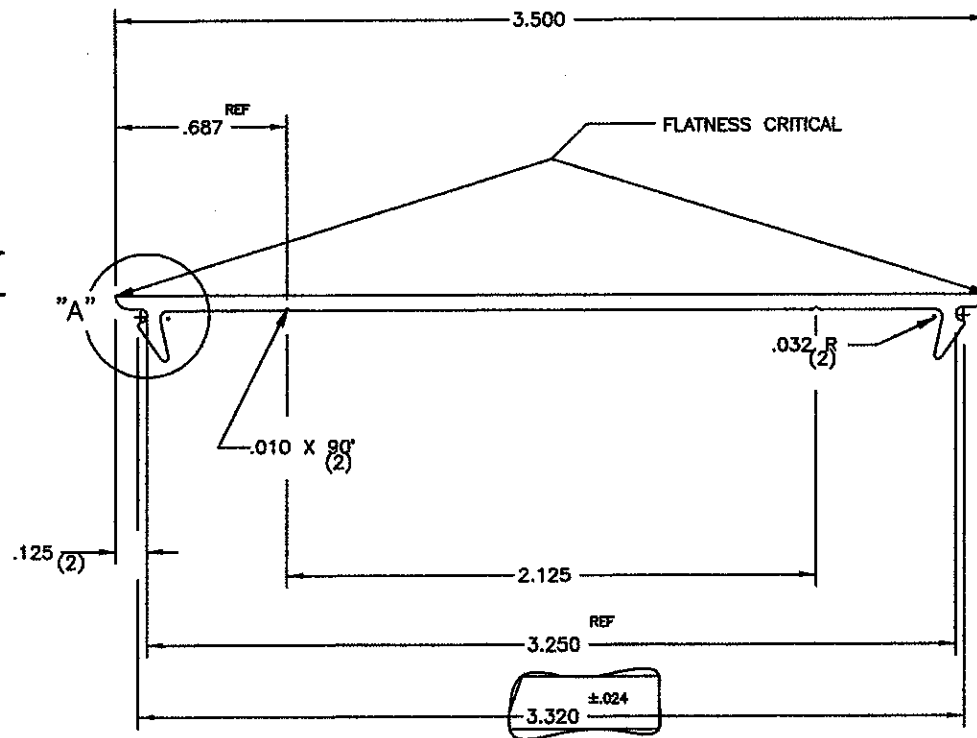
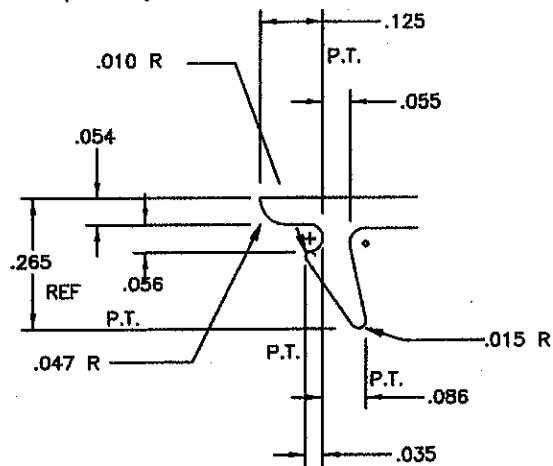
Architectural Testing

Test sample complies with these details.
Deviations are noted.

Report# 79247.01
Date 11/8/88 Tech JS

DETAIL "A"

(4X SIZE)



				.062
	.239	P-17250	2	
	.287	3.750	8 X STD-2	
	7.890	SOLID	B02-8	
	27.	6 63	3604	

TYP WALL WAS .085		12/8	U.S. ALUMINUM CORP.		T-30883	C
B	SECTION PROPS. REV.	B.R.	90			
C	ADDED .010x90° ID MARKS FOR EC-TX	DG	10-27	4.5" VERT. MULL (1" GL)	BRIAN	8/20/90
				I-452 TL	2 X SIZE	

NOTE:

1. SNAPS W/IS100; DIE #30888
SNAPS W/IS200; DIE #30889
2. PAINT PERIMETER: 7.708"

SECTION PROPERTIES:

$I_{xx} = 2.577 \text{ in}^4$
 $S_{xx} = 1.145 \text{ in}^3$ (B)
 $I_{yy} = 0.400 \text{ in}^4$
 $S_{yy} = 0.924 \text{ in}^3$

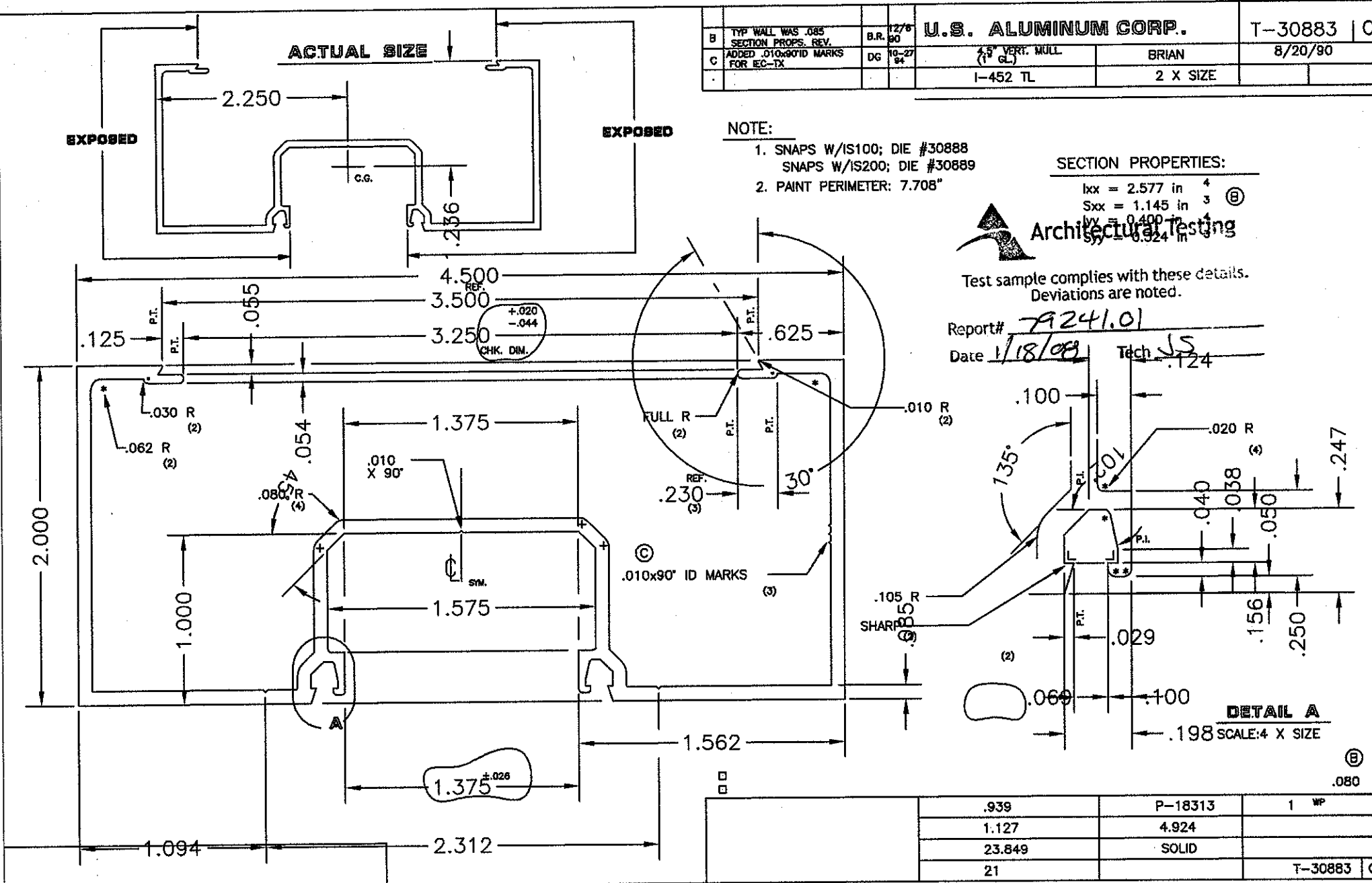


Architectural Testing

Test sample complies with these details.
Deviations are noted.

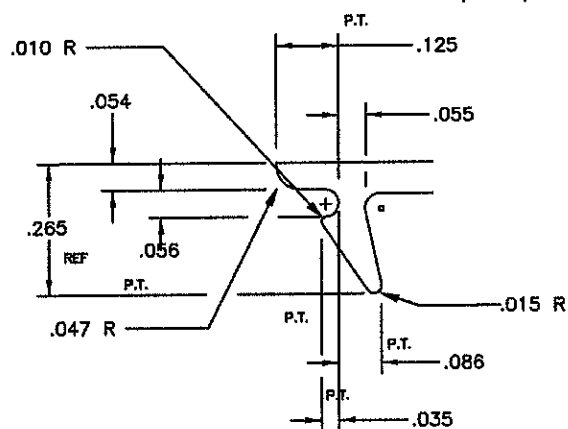
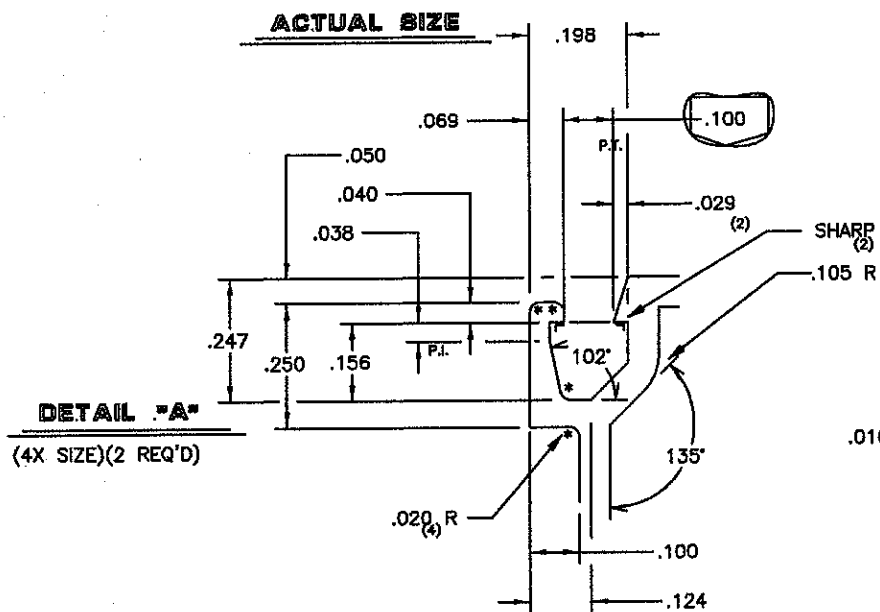
Report# 79241.01

Date 1/18/98 Tech. JS

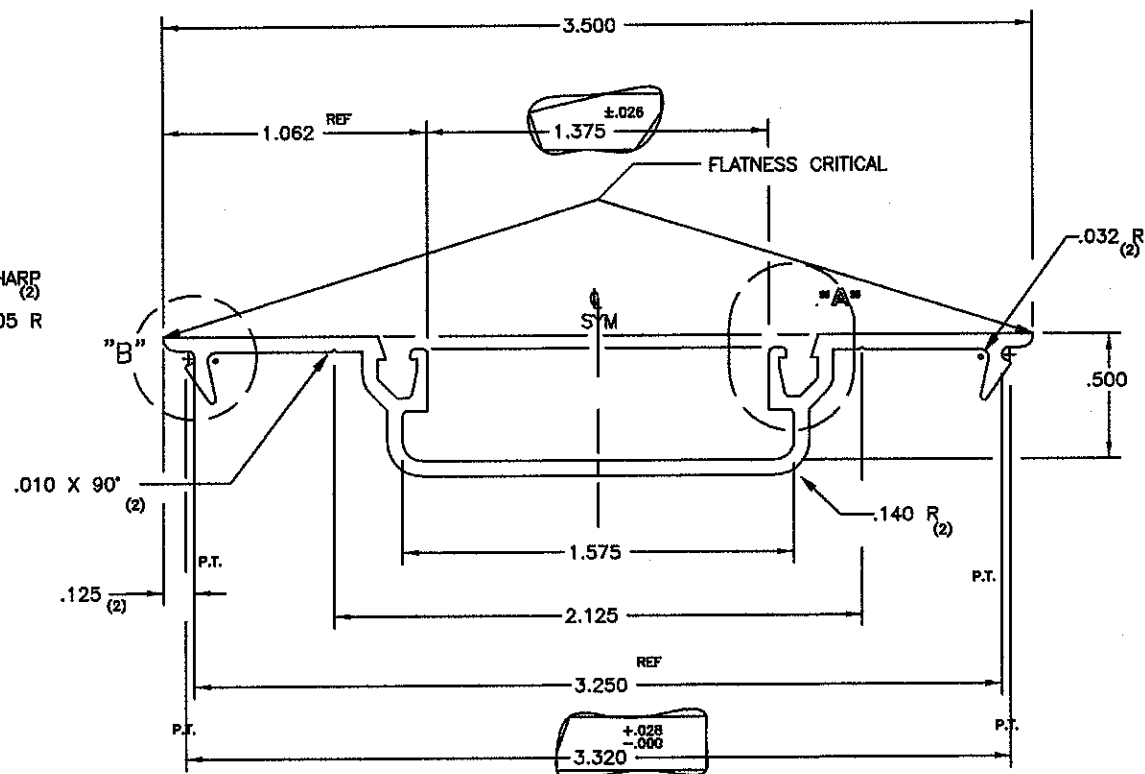


NOTE
SNAPS W/S-451; DIE #30900

				U.S. ALUMINUM CORP.		T-30889	
				SNAP IN FILLER	BRIAN	8/27/90	
				IS200 TL	2 X SIZE		



SECTION PROPERTIES:

$$\begin{array}{ll} l_{xx} = 0.332 & \text{in } 4 \\ S_{xx} = 0.190 & \text{in } 3 \\ l_{yy} = 0.014 & \text{in } 4 \\ S_{yy} = 0.045 & \text{in } 3 \end{array}$$


DETAIL "B"

(4X SIZE)(2 REQ'D)


Architectural Testing
 with these detail...

Test sample complies with these details.
Deviations are noted.

Report# 79241.01
Date 1/18/08 Tech S

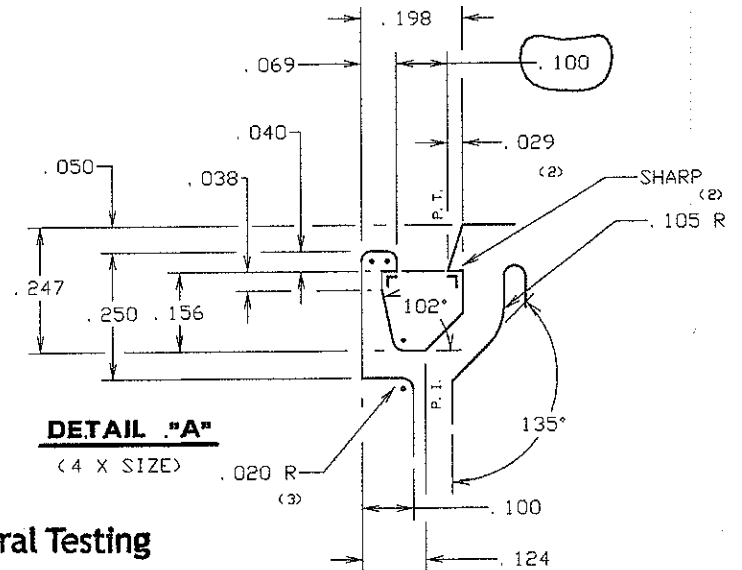
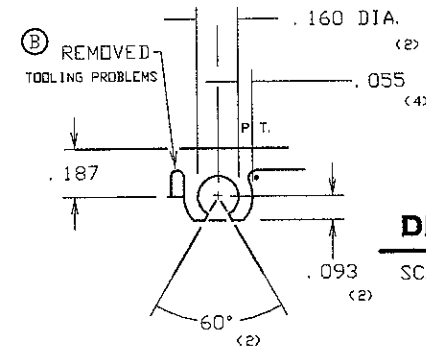
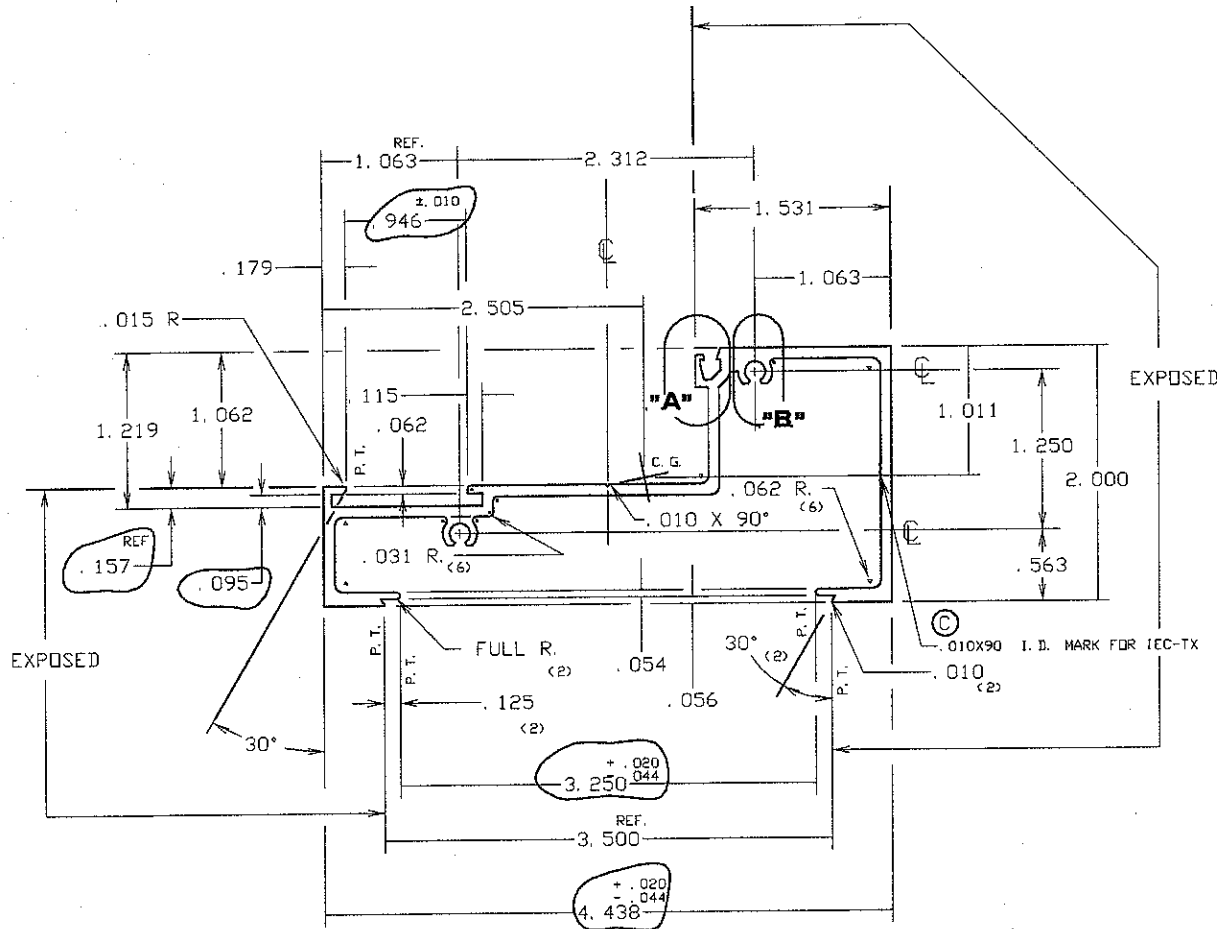
			.082
.322	P-18332	2	W 4945
.386	3.625	9X	4945
10.742	SOLID	BQ2-12	
28	7" = 63	T-30889	

B DET REMOVD-TOOL PRBMS
C ADDED .010X90 I.D. MARK FOR IEC-TX ONLY

MM 11/93
MM 11/1194

U.S. ALUMINUM CORP.
4.5" HORIZONTAL
1 GLASS
IS463 TL

T-30885 C
BRIAN
8/21/90
FULL SIZE



SECTION PROPERTIES:

Ixx = 2.223 in⁴
Sxx = 0.887 in³
Iyy = 0.344 in⁴
Syy = 0.340 in³

NOTE:

1. SNAPS W/IP453; DIE #30890
W/IS200; DIE #30889
2. PAINT PERIMETER: 5.189"



Architectural Testing

Test sample complies with these details.
Deviations are noted.

Report# 79241.01

Date 1/18/08 Tech SS

.905 (B)
1.086 (B)
21.187 (B)
20 (B)

P-18303
4.868
SOLID

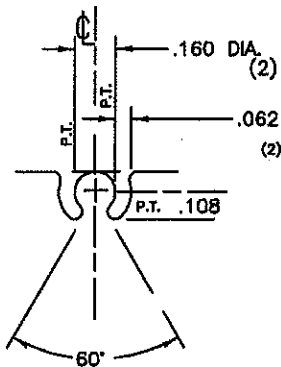
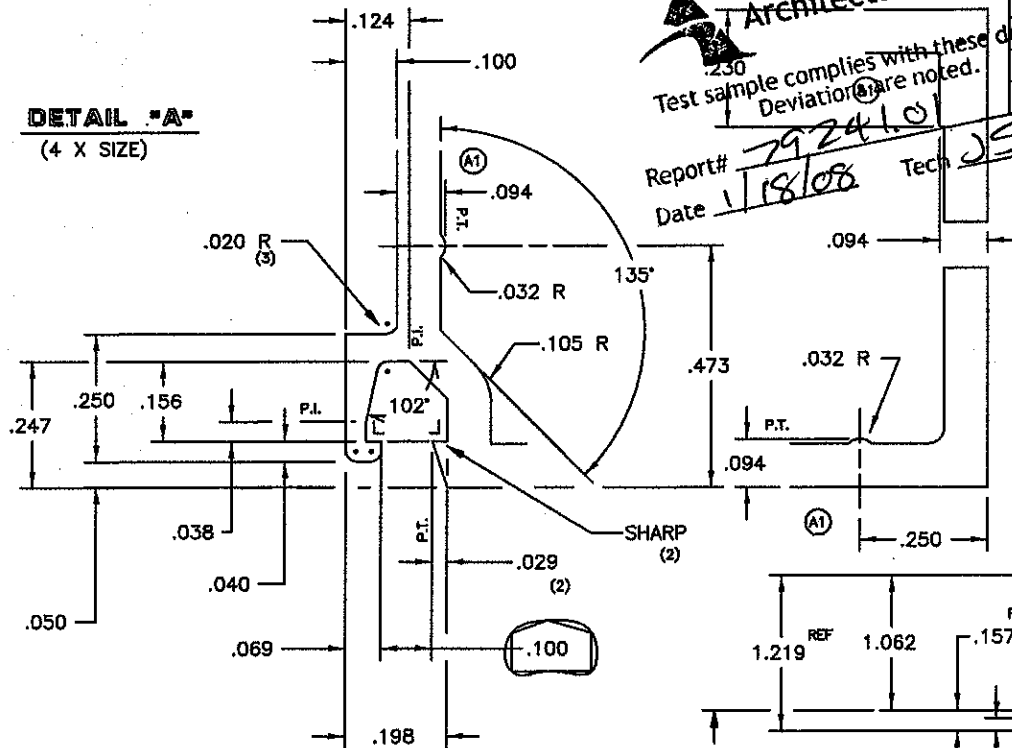
1 WP

T-30885 C

230
Test sample complies with these
Deviations are noted.

Report# 71
Date 1/18/08 Tech 5

DETAIL "A"
(4 X SIZE)



DETAIL "B"
(2X SIZE)(2 PLACES)

SECTION PROPERTIES:

$$\begin{array}{ll} I_{xx} = 2.510 \text{ in}^4 & 4 \\ S_{xx} = 1.029 \text{ in}^3 & 3 \\ I_{yy} = 0.482 \text{ in}^4 & 4 \\ S_{yy} = 0.406 \text{ in}^3 & 3 \end{array}$$

NOTE:

1. SNAP FITS W/IM453; DIE#30890
2. OUTSIDE PERIMETER: 17.205"
3. PAINT PERIMETER: 7.000"
4. XXX INDICATES I.D. MARK FOR IEC-TX
5. USES ANCHOR EXTR # 31867; IR456

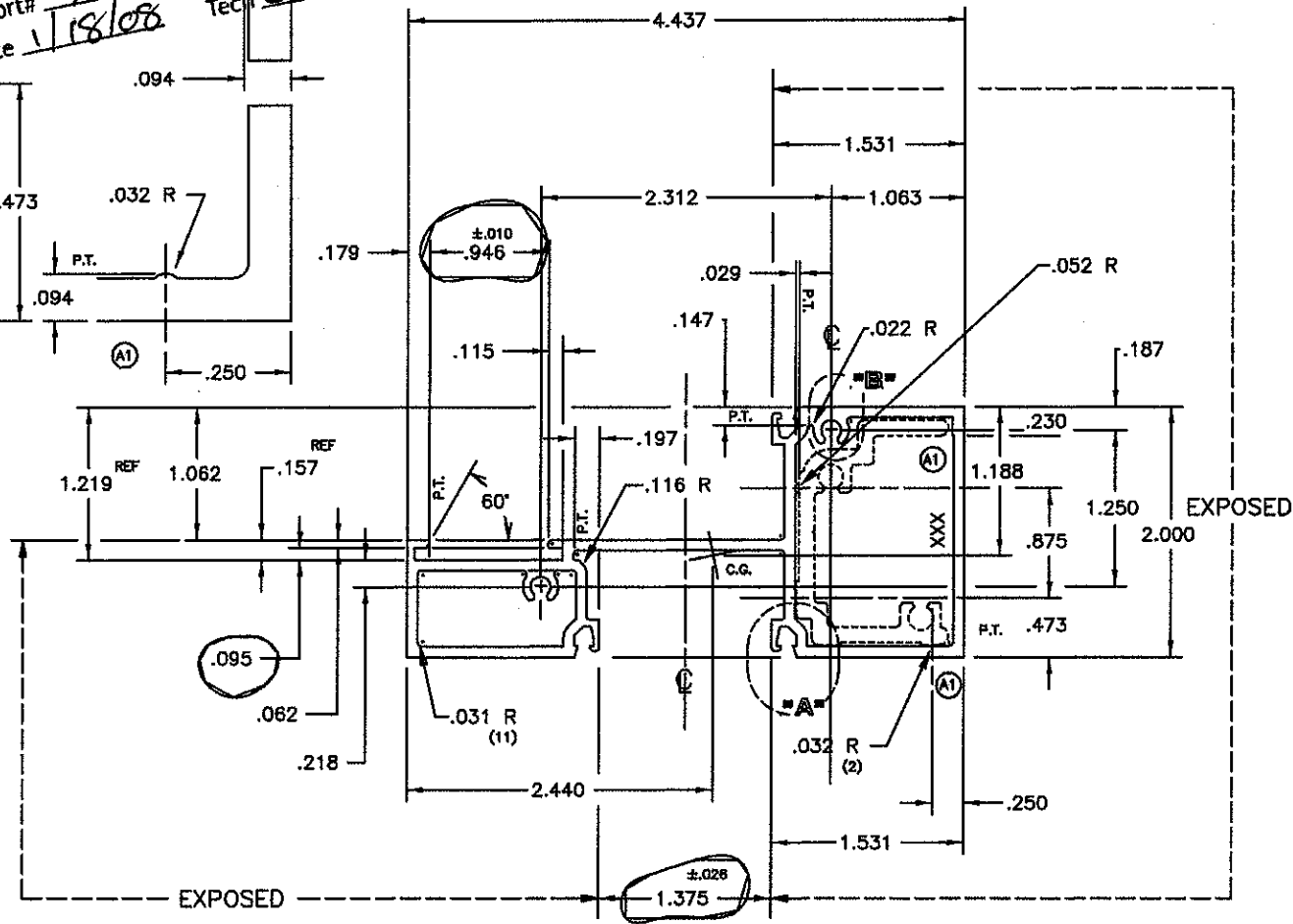
U.S. ALUMINUM CORP.

H-60234	A1
---------	----

INTERM. 4 1/2
HORIZ (1" GL)
IH463

MAMO
FULL

4/23/98



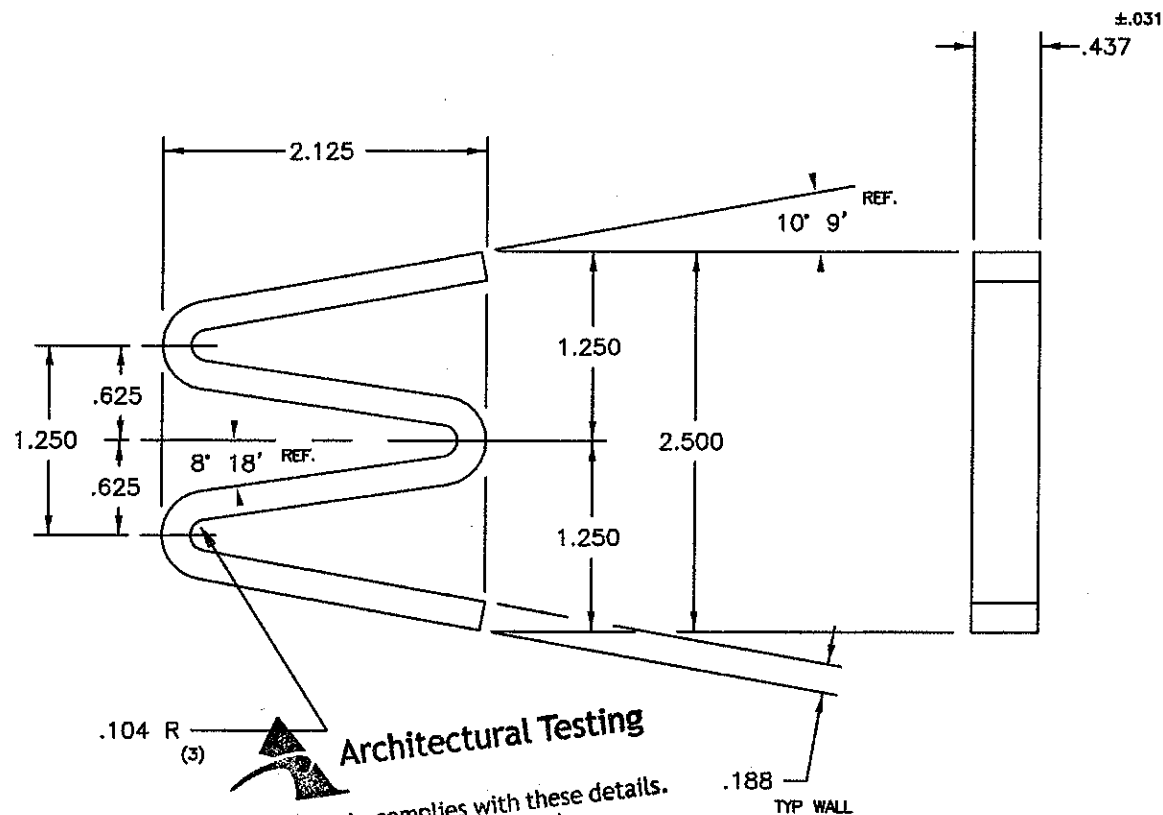
.085

	1.192	P-29934	1
	1.430	4.868	SC PORTHOLE 12x6 1/2
	28.317	HOLLOW III	30665
	20	8 = 45 // SUE	H-60234 A1

T-31730 B

NOTE:

1. MATERIAL: EPDM, BLACK; TREMCO TR547E OR EQUAL
2. HARDNESS: 60 ± 5 SHORE
3. AREA: .936

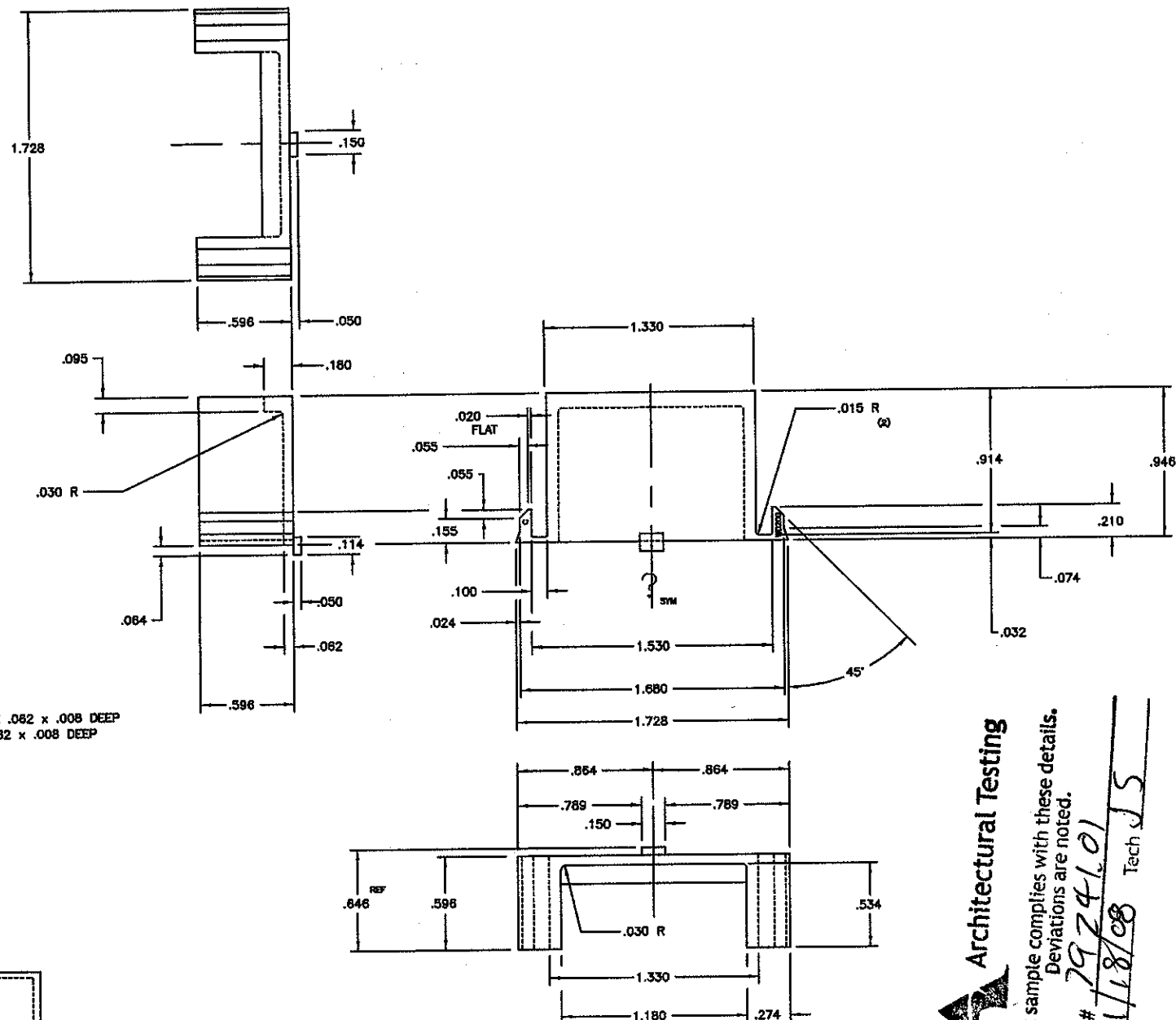


Architectural Testing

Test sample complies with these details.
Deviations are noted.

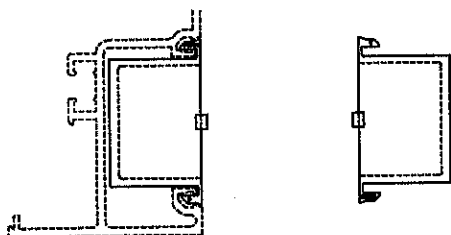
Report# 79241.01
Date 1/18/08 Tech JS

				U.S. ALUMINUM CORP.		
				MAMO	W SIDE BLOCKS -	USA-1009
				10/18/93	FLUSH FRONT SYSTEM	
				FULL SIZE	PART NO.: WB452	



NOTES:

1. MATERIAL: NYLON
2. COLOR: WHITE
3. FINISH: EDM
4. PART NUMBER: (WD200) ENGRAVE .082 x .008 DEEP
5. CAVITY NUMBER: (C) ENGRAVE .082 x .008 DEEP
6. TYPICAL WALL THICKNESS: .050 EXCEPT WHERE NOTED.



USED ON LEFT

USED ON RIGHT

SCALE: FULL SIZE

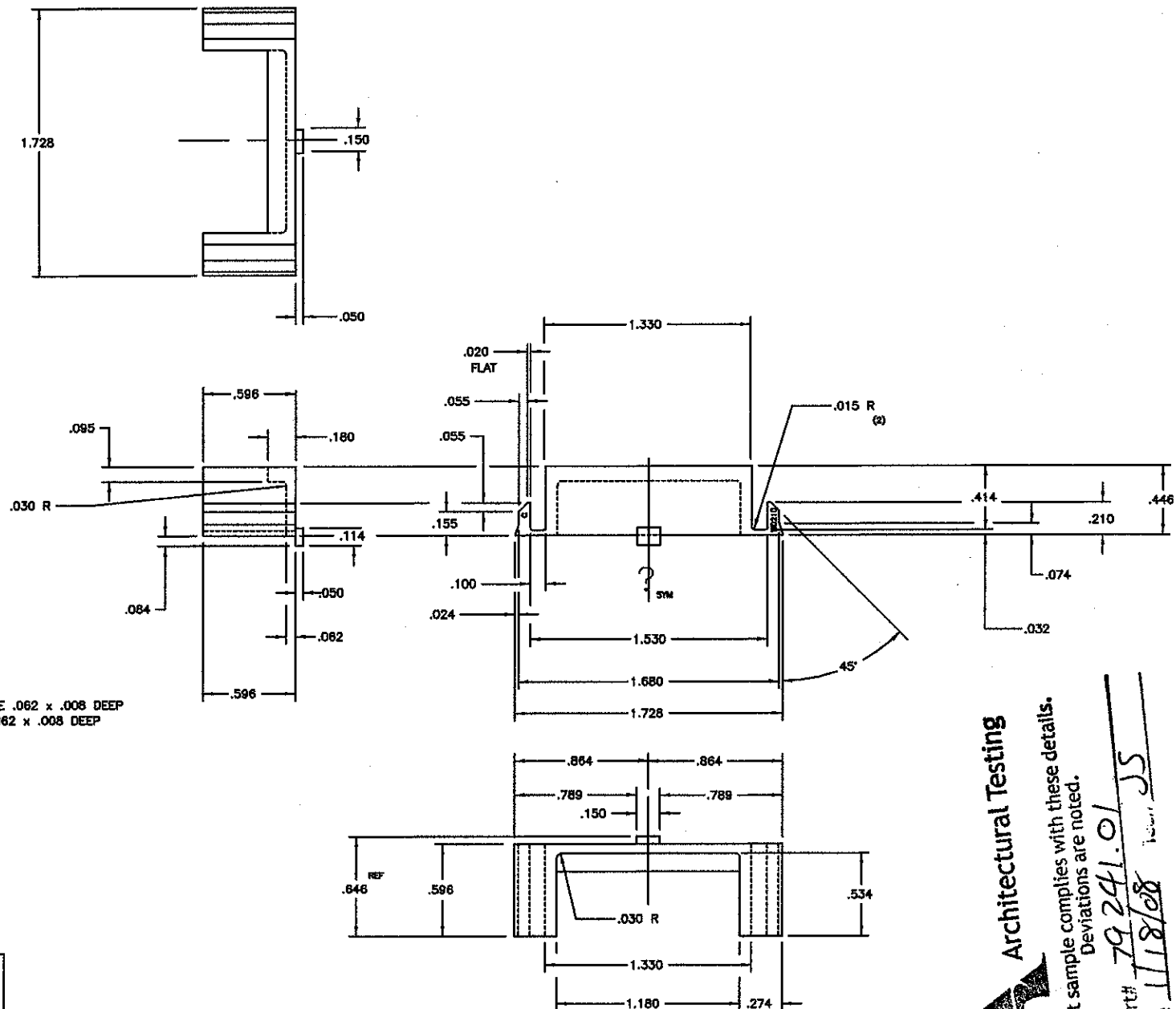
Architectural Testing

Test sample complies with these details.
Deviations are noted.

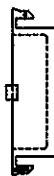
Report# 79241.01

Date 1/18/08 Tech JS

					U.S. ALUMINUM CORP.		
					MAMO	WATER DEFLECTOR	
B	REVISED IN AGREEMENT WITH VENDOR	MM	4/30 95	2/16/95		TOP LOAD SYSTEMS	USA-1064B
				2X SIZE		PART NUMBER: WD200	

**NOTES:**

1. MATERIAL: NYLON
2. COLOR: WHITE
3. FINISH: EDM
4. PART NUMBER: (WD210) ENGRAVE .062 x .008 DEEP
5. CAVITY NUMBER: (C) ENGRAVE .062 x .008 DEEP
6. TYPICAL WALL THICKNESS: .050 EXCEPT WHERE NOTED.



USED ON LEFT

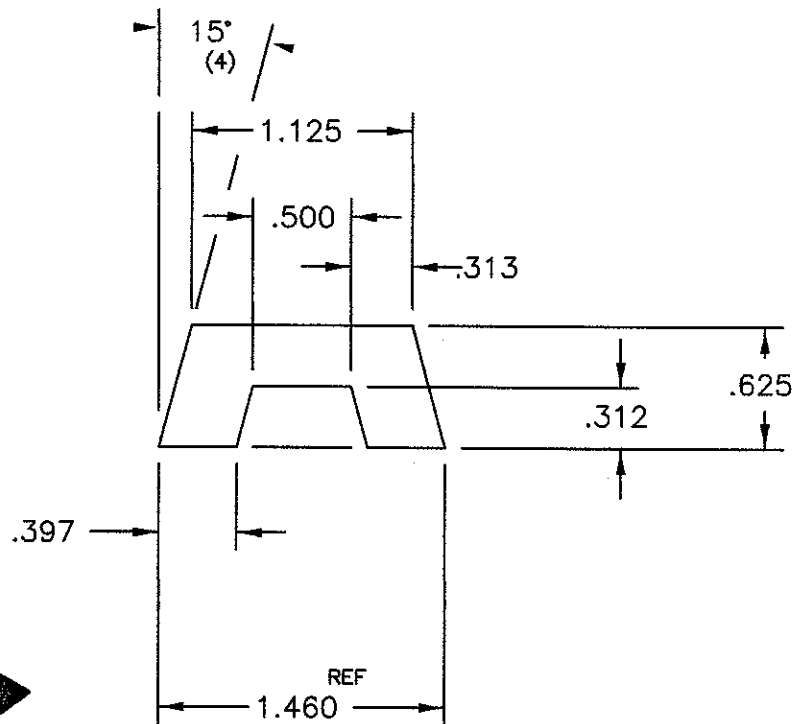
USED ON RIGHT

SCALE: FULL SIZE

Architectural Testing
 Test sample complies with these details.
 Deviations are noted.

Report# 79241.01
 Date 11/8/08

				U.S. ALUMINUM CORP.		
				MAMO	WATER DEFLECTOR	
				2/16/95	TOP LOAD SYSTEMS	
				2X SIZE	PART NUMBER: WD210	
B	REVISED IN AGREEMENT WITH VENDOR	MM	9/30/95			USA-1065B



Architectural Testing

Test sample complies with these details.
Deviations are noted.

Report# 79241.01

Date 11/18/08 Tech JS

EPDM

AREA: .626

90^{±5} SHORE A DUROMETER

CUT 4" LONG

PART NO: SB200

copied on computer 12/8/93, mm

U.S.ALUMINUM CORP/TEXAS

A.B.C.	SETTING BLOCK FOR 2" X 4 1/2" FLUSH GLAZE	USA-T-634
5/7/85		
FULL SIZE		