

**AAMA 1503-09 THERMAL PERFORMANCE  
TEST REPORT**

**Rendered to:**

**UNITED STATES ALUMINUM**

**SERIES/MODEL: FT601 Curtain Wall (Bratton Corp)**

**TYPE: Glazed Wall Systems (Site-built)**

Summary of Results	
Thermal Transmittance (U-Factor)	0.50
Condensation Resistance Factor - Frame ( $CRF_f$ )	60
Condensation Resistance Factor - Glass ( $CRF_g$ )	63
Unit Size	78-3/4" x 78-3/4" (2000 mm x 2000 mm)
Layer 1	1/4" AGC Comfort TiAC 36 (e=0.034*, #2)
Gap 1	0.50" Gap, Stainless Steel Spacer (SS-D), Air-Filled*
Layer 2	1/4" Clear Tempered

Reference must be made to Report No. 93419.02-116-46, dated 08/13/09 for complete test specimen description and data.

**AAMA 1503-09 THERMAL PERFORMANCE TEST REPORT**

Rendered to:

UNITED STATES ALUMINUM  
200 Singleton Drive  
Waxahachie, Texas 75165

Report Number: 93419.02-116-46  
Test Date: 08/04/09  
Report Date: 08/13/09  
Expiration Date: 08/04/13

**Test Sample Identification:**

**Series/Model:** FT601 Curtain Wall (Bratton Corp)

**Type:** Glazed Wall Systems (Site-built)

**Test Sample Submitted by:** Client

**Test Procedure:** The condensation resistance factor (CRF) and thermal transmittance (U) were determined in accordance with AAMA 1503-09, *Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections*

- |   |         |
|---|---------|
| 1. Average warm side ambient temperature                  | 69.80 F |
| 2. Average cold side ambient temperature                  | -0.39 F |
| 3. 15 mph dynamic wind applied to test specimen exterior. |         |
| 4. 0.0" $\pm$ 0.04" static pressure drop across specimen. |         |

**Test Results Summary:**

- |   |      |
|---|------|
| 1. Condensation resistance factor - Frame (CRF <sub>f</sub> ) | 60   |
| Condensation resistance factor - Glass (CRF <sub>g</sub> )    | 63   |
| 2. Thermal transmittance due to conduction (U <sub>c</sub> )  | 0.50 |
| (U-factors expressed in Btu/hr·ft <sup>2</sup> ·F)            |      |

**Test Sample Description:**

<b>CONSTRUCTION</b>	<b>Frame</b>
Size (in.) Non-Standard	78-3/4" x 78-3/4"
Daylight Opening (in.)	36-3/8" x 75-1/8" (x2)
<b>CORNERS</b>	Butt
Fasteners	Screws
Sealant	No
<b>MATERIAL</b>	AU (0.19")*
Color Exterior	White
Finish Exterior	Paint
Color Interior	White
Finish Interior	Paint
<b>GLAZING METHOD</b>	Pocket

\* Skipped-debridge thermal break

**Glazing Information:**

<b>Layer 1</b>	1/4" AGC Comfort TiAC 36 (e=0.034*, #2)
<b>Gap 1</b>	0.50" Gap, Stainless Steel Spacer (SS-D), Air-Filled*
<b>Layer 2</b>	1/4" Clear Tempered
<b>Gas Fill Method</b>	N/A*
<b>Desiccant</b>	Yes

*\*Stated per Client/Manufacturer*

*NA Non-Applicable*

*See Description Table Abbreviations*

**Test Sample Description:** (Continued)

<b>COMPONENTS</b>			
	<b>Type</b>	<b>Quantity</b>	<b>Location</b>
<b>WEATHERSTRIP</b>			
	EPDM Pressure gasket	1 Row	Interior and exterior glazing perimeter
<b>HARDWARE</b>			
	Aluminum sill receptor (AU 0.19")	1	Sill
<b>DRAINAGE</b>			
	No visible weeps		

### Test Duration:

1. The environmental systems were started at 09:56 hours, 08/03/09.
2. The thermal performance test results were derived from 03:37 hours, 08/04/09 to 07:37 hours, 08/04/09.

### Condensation Resistance Factor (CRF):

The following information, condensed from the test data, was used to determine the condensation resistance factor:

$T_h$	=	Warm side ambient air temperature	69.80 F
$T_c$	=	Cold side ambient air temperature	-0.39 F
$FT_p$	=	Average of pre-specified frame temperatures (14)	42.00 F
$FT_r$	=	Average of roving thermocouples (4)	35.58 F
$W$	=	$(FT_p - FT_r) / [FT_p - (T_c + 10)] \times 0.40$	0.079
$FT$	=	$FT_p(1-W) + W (FT_r) =$ Frame Temperature	41.49 F
$GT$	=	Glass Temperature	43.79 F
$CRF_g$	=	Condensation resistance factor – Glass	63
		$CRF_g = (GT - T_c) / (T_h - T_c) \times 100$	
$CRF_f$	=	Condensation resistance factor – Frame	60
		$CRF_f = (FT - T_c) / (T_h - T_c) \times 100$	

The CRF number was determined to be 60 (on the size as reported). When reviewing this test data, it should be noted that the frame temperature (FT) was colder than the glass temperature (GT) therefore controlling the CRF number. Refer to the 'CRF Report' page and the 'Thermocouple Location Diagram' page of this report.

### Thermal Transmittance ( $U_c$ ):

$T_h$	=	Average warm side ambient temperature	69.80 F
$T_c$	=	Average cold side ambient temperature	-0.39 F
P	=	Static pressure difference across test specimen	0.00 psf
		15 mph dynamic perpendicular wind at exterior	
Nominal sample area			43.07 ft <sup>2</sup>
Total measured input to calorimeter			1629.20 Btu/hr
Calorimeter correction			113.12 Btu/hr
Net specimen heat loss			1516.09 Btu/hr
$U_c$	=	Thermal Transmittance	0.50 Btu/hr·ft <sup>2</sup> ·F

### Glazing Deflection (in.):

	Left Glazing	Right Glazing
Edge Gap Width	0.50	0.50
Estimated center gap width upon receipt of specimen in laboratory (after stabilization)	0.32	0.32
Center gap width at laboratory ambient conditions on day of testing	0.32	0.32
Center gap width at test conditions	0.34	0.38

The sample was inspected for the formation of frost or condensation, which may influence the surface temperature measurements. The sample showed no evidence of condensation/frost at the conclusion of the test.

A calibration of the Architectural Testing Inc. 'thermal test chamber' (ICN 000001) in York, Pennsylvania was conducted in April 2009 in accordance with Architectural Testing Inc. calibration procedure.

Prior to testing the specimen was sealed with silicone on the interior side and checked for air infiltration per Section 9.3.4.

## CRF Report

Time: 05:37 06:07 06:37 07:07 07:37 AVERAGE

### Pre-specified Thermocouples - Frame

1	36.22	36.25	36.25	36.26	36.21	36.24
2	38.76	38.81	38.89	38.86	38.89	38.85
3	35.83	35.80	35.83	35.83	35.80	35.82
4	43.73	43.75	43.82	43.83	43.82	43.79
5	44.72	44.72	44.71	44.70	44.70	44.71
6	44.64	44.58	44.64	44.65	44.64	44.63
7	44.24	44.29	44.27	44.27	44.25	44.26
8	46.08	46.09	46.12	46.07	46.08	46.09
9	42.34	42.36	42.39	42.41	42.35	42.37
10	44.12	44.15	44.18	44.18	44.18	44.16
11	39.22	39.24	39.26	39.24	39.24	39.24
12	40.23	40.21	40.24	40.27	40.28	40.25
13	45.22	45.27	45.34	45.29	45.31	45.28
14	42.31	42.21	42.25	42.31	42.43	42.30
FTP	41.98	41.98	42.01	42.01	42.01	42.00

### Pre-specified Thermocouples - Glass

15	30.89	30.93	30.97	30.96	31.01	30.95
16	51.76	51.65	51.73	51.77	51.76	51.73
17	41.22	41.21	41.33	41.26	41.33	41.27
18	42.81	42.84	42.88	42.87	42.85	42.85
19	54.12	54.11	54.15	54.11	54.11	54.12
20	41.85	41.80	41.85	41.78	41.82	41.82
GT	43.78	43.76	43.82	43.79	43.81	43.79

### Cold Point (Roving) Thermocouples

21	34.60	34.60	34.60	34.60	34.60	34.60
22	35.70	35.70	35.70	35.70	35.70	35.70
23	35.80	35.80	35.80	35.80	35.80	35.80
24	36.20	36.20	36.20	36.20	36.20	36.20
FT <sub>R</sub>	35.58	35.58	35.58	35.58	35.58	35.58
W	0.08	0.08	0.08	0.08	0.08	0.08
FT	41.47	41.47	41.50	41.50	41.50	41.49

### Warm Side - Room Ambient Air Temperature

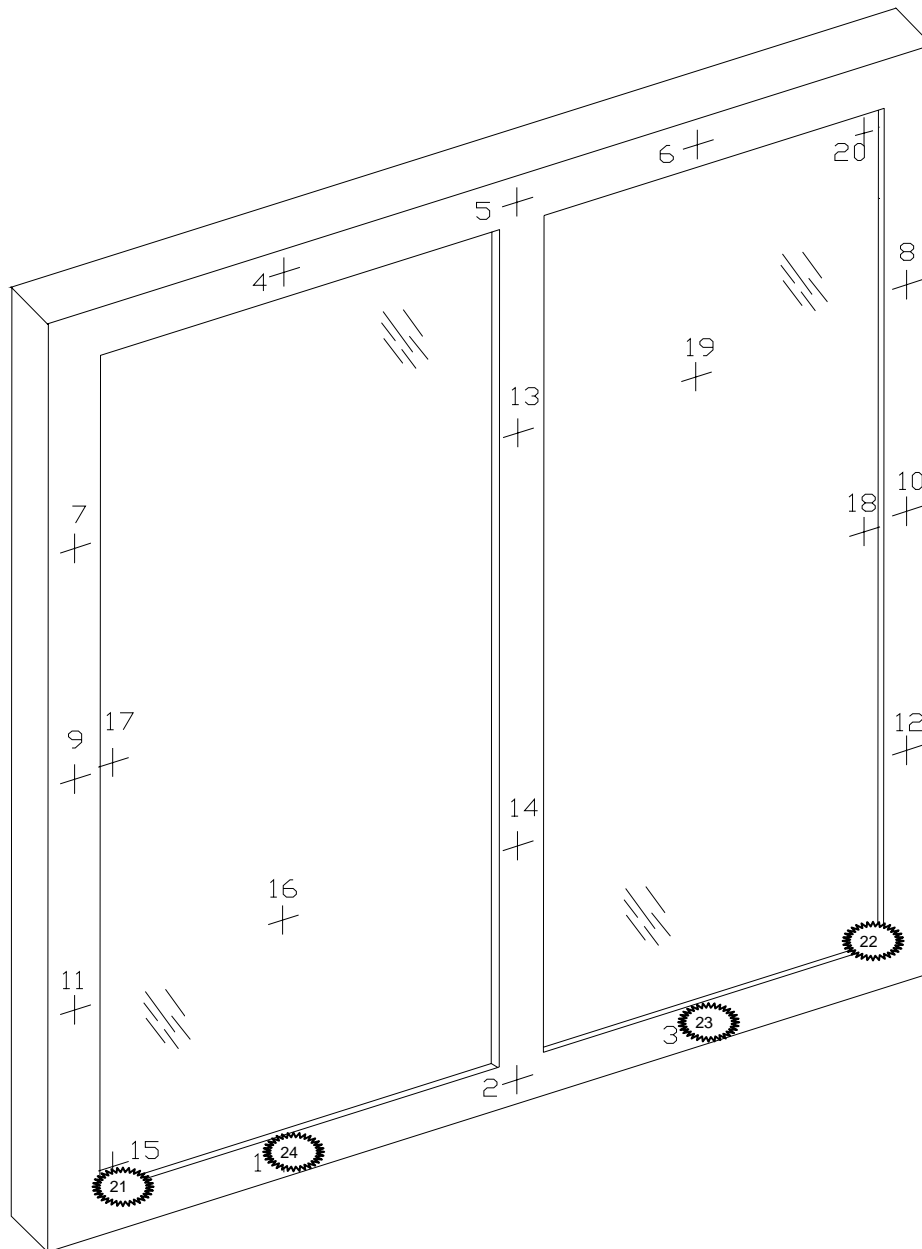
69.81	69.81	69.82	69.79	69.80	69.81
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### Cold Side - Room Ambient Air Temperature





-0.43	-0.41	-0.40	-0.25	-0.42	-0.38
-------	-------	-------	-------	-------	-------

CRF <sub>f</sub>	60	60	60	60	60	60
CRF <sub>g</sub>	63	63	63	63	63	63

### Thermocouple Location Diagram



#### Cold Point Locations

	21. 34.60
	22. 35.70
	23. 35.80
	24. 36.20



Detailed drawings, data sheets, representative samples of the test specimens, a copy of this report, or other pertinent project documentation will be retained by Architectural Testing, Inc. until 8/4/2013. At the end of this retention period such materials shall be discarded without notice and the service life of this report by Architectural Testing, Inc. will expire.

Results obtained are tested values and were secured by using the designated test methods. 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(s) tested. This report may not be reproduced, except in full, without the written approval of Architectural Testing, Inc.

For ARCHITECTURAL TESTING, INC.

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Benjamin W. Green  
Technician

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Shon W. Einsig  
Senior Technician  
Individual-In-Responsible-Charge

BWG:kmm  
93419.02-116-46

Attachments (pages): This report is complete only when all attachments listed are included.

Appendix-A: Description Table Abbreviations (1)

Appendix-B: Drawings (13)

### Revision Log

<b>Rev. #</b>	<b>Date</b>	<b>Page(s)</b>	<b>Revision(s)</b>
.02R0	08/13/09	All	Original Report Issue. Work requested by Terry Hopgood of United States Aluminum.

## Appendix A: Description Table Abbreviations

CODE	Frame / Sash Types
AI	Aluminum w/ Vinyl Inserts (Caps)
AL	Aluminum
AP	Aluminum w/ Thermal Breaks - Partial
AS	Aluminum w/ Steel Reinforcement
AT	Aluminum w/ Thermal Breaks - All Members ( $\geq 0.21"$ )
AU	Aluminum Thermally Improved - All Members (0.062" - 0.209")
AV	Aluminum / Vinyl Composite
AW	Aluminum-clad Wood
FG	Fiberglass
PA	ABS Plastic w/ All Members Reinforced
PC	ABS Plastic-clad Aluminum
PF	ABS Plastic w/ Foam-filled Insulation
PH	ABS Plastic w/ Horizontal Members Reinforced
PI	ABS Plastic w/ Reinforcement - Interlock
PL	ABS Plastic
PP	ABS Plastic w/ Reinforcement - Partial
PV	ABS Plastic w/ Vertical Members Reinforced
PW	ABS Plastic-clad Wood
ST	Steel
VA	Vinyl w/ All Members Reinforced
VC	Vinyl-clad Aluminum
VF	Vinyl w/ Foam-filled Insulation
VH	Vinyl w/ Horizontal Members Reinforced
VI	Vinyl w/ Reinforcement - Interlock
VP	Vinyl w/ Reinforcement - Partial
VV	Vinyl w/ Vertical Members Reinforced
VW	Vinyl-clad Wood
VY	Vinyl
WA	Aluminum / Wood composite
WD	Wood
WV	Vinyl / Wood composite
WF	Fiberglass/Wood Combination
WC	Composite/Wood Composite (Shaped vinyl/wood composite members)
CW	Copper Clad Wood
CO	Vinyl/Wood Composite Material

CODE	Spacer Types (See sealant)
A1	Aluminum
A2	Aluminum (Thermally-broken)
A3	Aluminum-reinforced Polymer
A4	Aluminum / Wood
A5	Aluminum-reinforced Butyl (Swiggle)
A6	Aluminum / Foam / Aluminum
A7	Aluminum U-shaped
A8	Aluminum-Butyl (Corrugated) (Duraseal)
ER	EPDM Reinforced Butyl
FG	Fiberglass
GL	Glass
OF	Organic Foam
P1	Duralite
PU	Polyurethane Foam
SU	Stainless Steel, U-shaped
CU	Coated Steel, U-shaped (Intercept)
S2	Steel (Thermally-broken)
S3	Steel / Foam / Steel
S5	Steel-reinforced Butyl
S6	Steel U-channel w/ Thermal Cap
SS	Stainless Steel
CS	Coated Steel
TP	Thermo-plastic
WD	Wood
ZE	Elastomeric Silicone Foam
ZF	Silicone Foam
ZS	Silicone / Steel
N	Not Applicable
TS	Thermo-plastic w/ stainless steel substrate

CODE	Tint Codes
AZ	Azurlite
BL	Blue
BZ	Bronze
CL	Clear
EV	Evergreen
GD	Gold
GR	Green
GY	Gray
LE	Low 'e' Coating
OT	Other (use comment field)
RC	Solar or Reflective Coating
RG	Roller Shades between glazing
RS	Silver (reflective coating)
SF	Suspended Polyester Film
SR	Silver
BG	Blinds between the Glazing
DV	Dynamic Glazing-Variable
DY	Dynamic Glazing-NonVariable

CODE	Gap Fill Codes
AIR	Air
AR2	Argon/Krypton Mixture
AR3	Argon / Krypton / Air
ARG	Argon/Air
CO2	Carbon Dioxide
KRY	Krypton/Air
SF6	Sulfur Hexafluoride
XE2	Xenon/Krypton/Air
XE3	Xenon/Argon/Air
XEN	Xenon/Air
N	Not Applicable

DOOR DETAILS	
N	Not Applicable
CODE	Door Type
EM	Embossed
FL	Flush
LF	Full Lite
LH	1/2 - Lite
LQ	1/4 - Lite
LT	3/4 - Lite
RP	Raised Panel
CODE	Skin
AL	Aluminum
FG	Fiberglass
GS	Galvanized Steel
ST	Steel
WD	Wood
VY	Vinyl
CODE	Panel
FG	Fiberglass
PL	Plastic
WP	Wood - Plywood
WS	Wood - Solid
CODE	Sub-Structure
GS	Galvanized Steel
ST	Steel
WD	Wood
VY	Vinyl
CODE	Core Fill
CH	Cellular - Honeycomb
EP	Expanded Polystyrene
PI	Polyisocyanurate
PU	Polyurethane
WP	Wood - Plywood
WS	Wood - Solid
XP	Extruded Polystyrene

CODE	Spacer Sealant
D	Dual Seal Spacer System
S	Single Seal Spacer System

CODE	Grid Description
N	No Muntins
G	Grids between glass
S	Simulated Divided Lites
T	True Muntins

CODE	Grid Size Codes
	Blank for no grids
0.75	Grids < 1"
1.5	Grids $\geq 1"$

CODE	Thermal Breaks
F	Foam
U	Urethane
V	Vinyl
FB	Fiberglass
O	Other
AB	ABS
NE	Neoprene
AI	Air
N	Not Applicable
P	Polyamide

## **Appendix B: Drawings**



FT752

ST251  
#10 X 1" HWH

RX810

NP225

WD452

NP225

DL0

2

DL0

4

SYN	REVISOR	DATE	BY

THIS SPACE RESERVED FOR STRUCTURAL ENGINEER

THIS SPACE RESERVED FOR RETRO-BASE USE ONLY

United States Aluminum	
780 California Road P.O. Box 1000 Vero Beach, FL 32909	
DESIGNED BY	SYSTEM
DCW	2" FLUSH BUT
03.12.09	STOREFRONT
PROJECT BY	DETAILS
SCALE	WORKING FILE
FULL	USA-3104
	6 OF 7

SUBSIDIARY OF INTERNATIONAL ALUMINUM CORPORATION



Test sample complies with these details.  
Deviations are noted.

Report# 93418.01

Date 08/12/09 Tech BULB

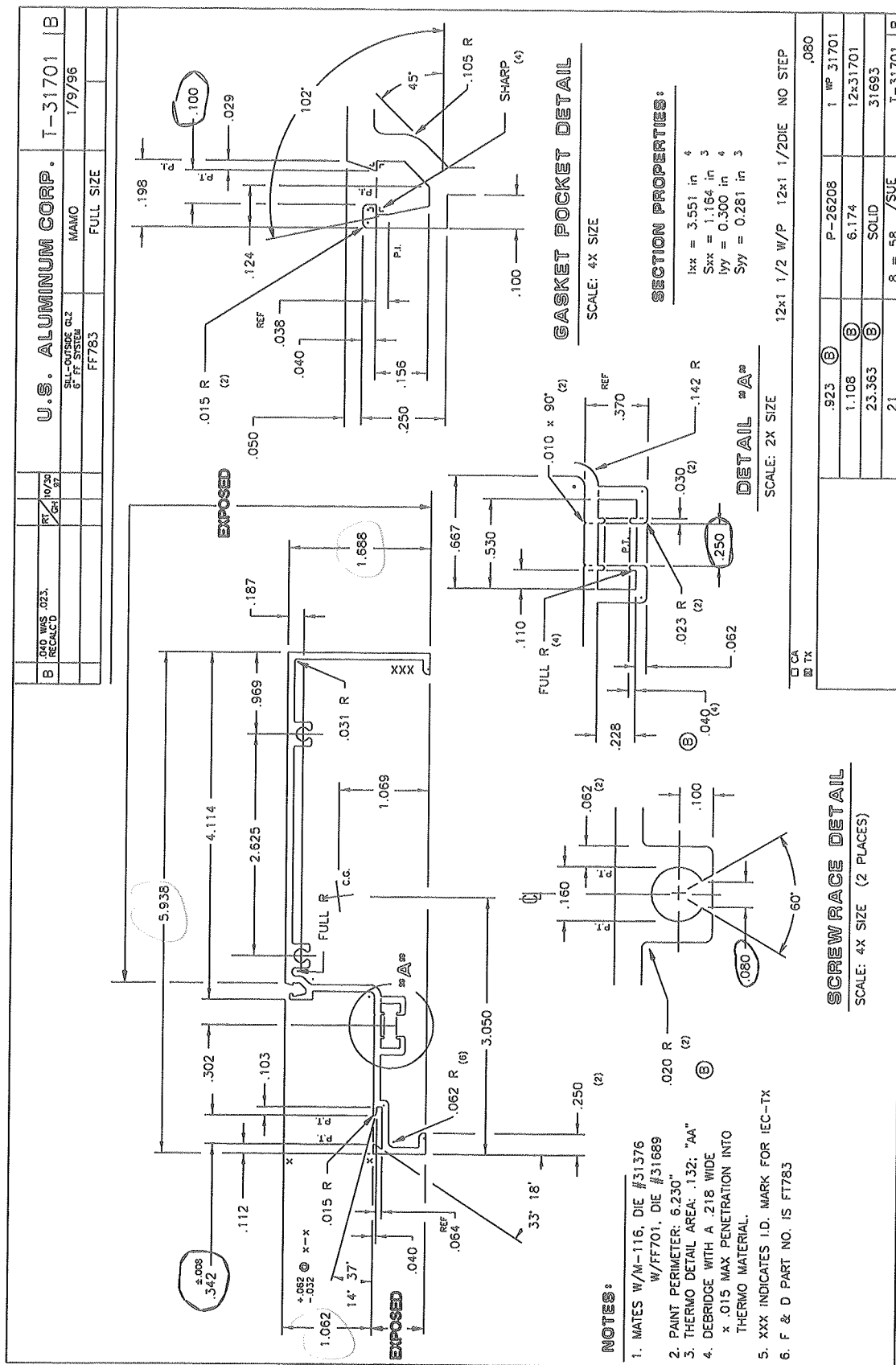






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## Architectural Testing

Test sample complies with these details.  
Deviations are noted.

REDDI

0202

Date 08/12/19 Tech

Technical drawing of a metal profile, likely a door or window frame component, showing dimensions and callouts.

**Dimensions:**

- Overall length: 1200
- Top flange thickness: .340
- Bottom flange thickness: .340
- Bottom flange width: 520
- Reference dimension (REF): .187 MIN.
- Internal width dimension: 3.625 (B) TYP.
- Internal width dimension: 2.000 (B) TYP.
- Internal width dimension: 2.000 (B) TYP.
- Internal width dimension: .375 (B) TYP.

**Callouts:**

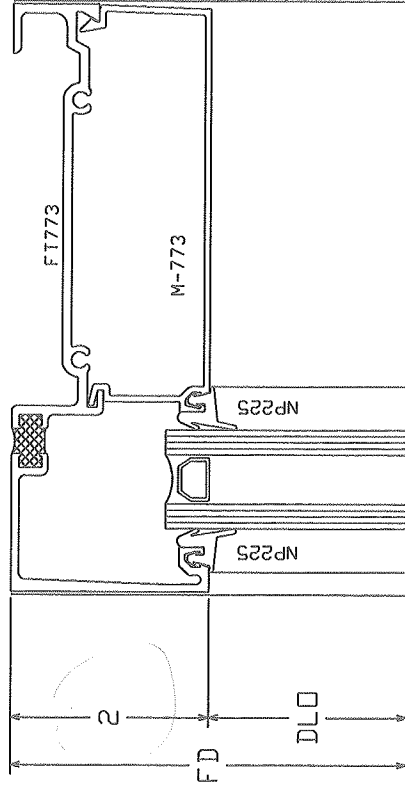
- RX810 (RF810)
- TYP.

**Stock Length:** STOCK LENGTH

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Test sample complies with these details.  
Deviations are noted.

Report# 9544401 Tech BW6  
Date 8/12/09



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United States Aluminum

12500 Oldham Road  
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Test sample complies with these details.  
Deviations are noted.

Report# 9341001  
Date 08/12/02 Tech BWG

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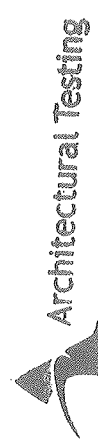
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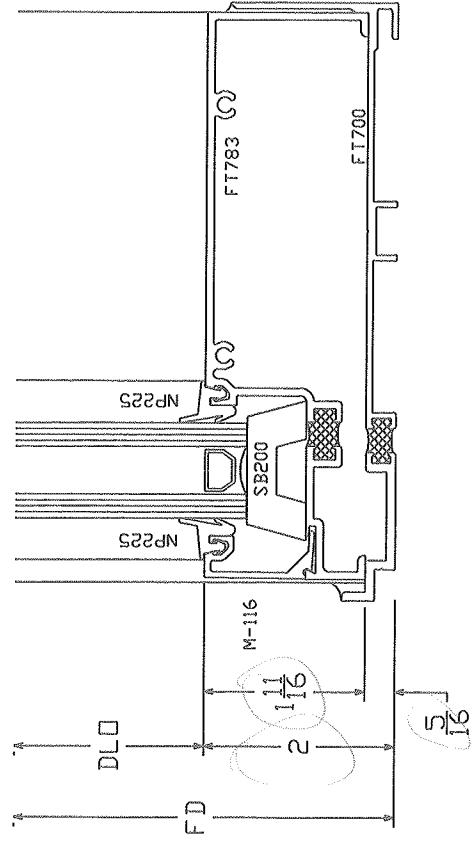
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Test sample complies with these details.  
Deviations are noted.

Report# 93419.01  
Date 08/16/09 Tech BULG



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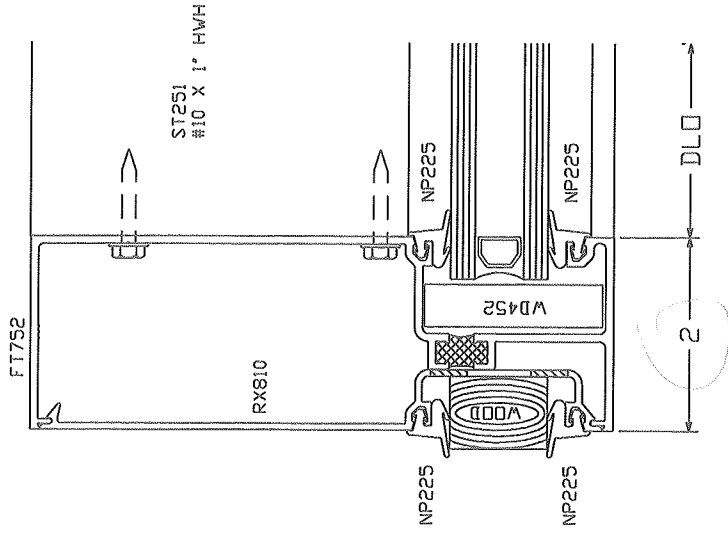
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THIS SPACE RESERVED FOR STRUCTURAL ENGINEER

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United States Aluminum	
225 N. W. 10th Ave., Suite 2000	
Miami, FL 33136	
Phone: 305.571.7200	
Fax: 305.571.7205	
DESIGN BY	SYSTEM
DCW	SERIES FT601
DATE	6" FLUSH BUT
03.12.09	STOREFRONT
APPROVED BY	DESCRIPTION
	DETAILS
SCALE	DRAWING TITLE
FULL	USA-3104
	SHEET
	4 OF 7

SUBSIDIARY OF INTERNATIONAL ALUMINUM CORPORATION



3

THIS SPACE RESERVED FOR STRUCTURAL ENGINEER	
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United States Aluminum 720 Co-Heater Road Fort Lauderdale, FL 33309 Phone: (305) 441-7200 Telex: 157000 Fax: (305) 441-7200	
DESIGNED BY	DCW
DATE	03.12.09
APPROVED BY	REVISION
SCALE	FULL
PROJECT	USA-3104
SHEET	5 OF 7

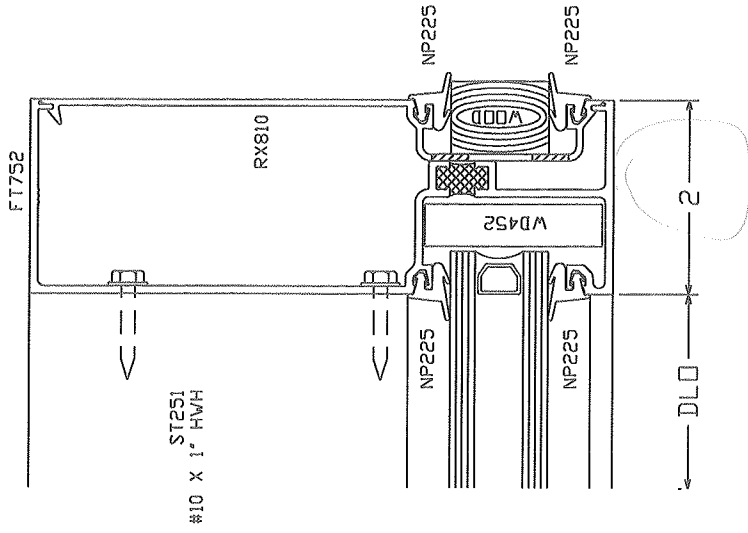
SYN	REVISION	DATE	BY

SUBSIDIARY OF INTERNATIONAL ALUMINUM CORPORATION



Test sample complies with these details.  
Deviations are noted.

Report# 03419.01  
Date 03/12/09 Tech BW



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SYM	REVISION	DATE	BY

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United States Aluminum

700 California Road  
Rock Hill, SC 29730  
803-963-1100  
www.usa-aluminum.com

DESIGNED BY	DCW	SYSTEM	SERIES FT601
DATE	03.12.09	DESCRIPTION	6" FLUSH OUT STOREFRONT
APPROVED BY		DETAILS	

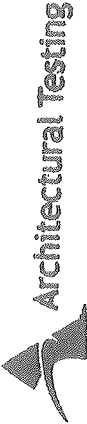
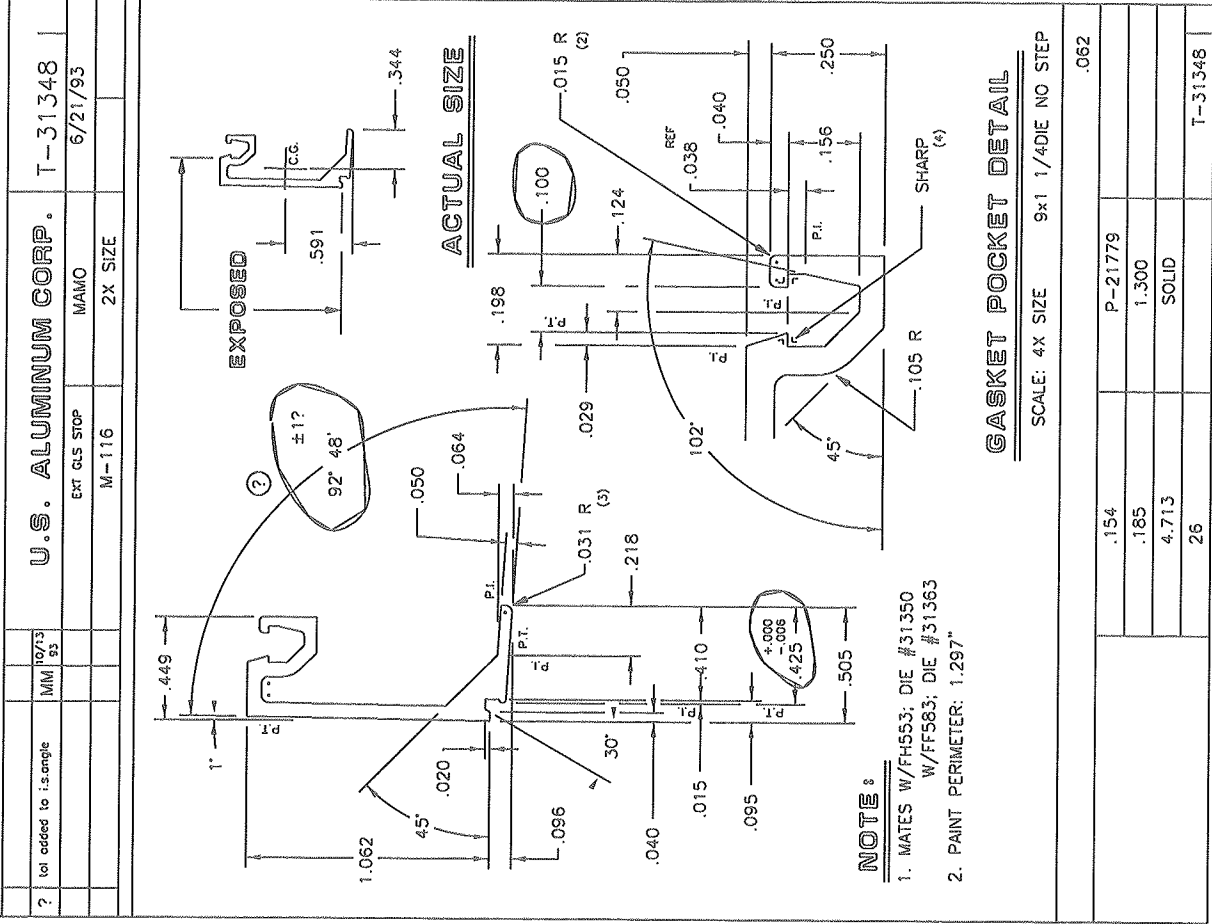
SCALE	FULL	DRAWING NO.	USA-3104	SHEET	7 DF 7
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Test sample complies with these details.  
Deviations are noted.

Report# 03419.01  
Date 02/12/09 Tech BW/b





Test sample complies with these details.  
Deviations are noted.

Report# 93419.01  
Date 08/12/09 Tech 6118