

## NFRC U-FACTOR, SHGC, VT, & CONDENSATION RESISTANCE COMPUTER SIMULATION REPORT

#### Rendered to: UNITED STATES ALUMINUM

SERIES/MODEL: FT 451 Storefront (Exterior Set)

 Report Number:
 B8198.02-116-45

 Report Date:
 04/02/12

 Expiration Date:
 04/02/16



### NFRC U-FACTOR, SHGC, VT, & CONDENSATION RESISTANCE COMPUTER SIMULATION REPORT

# Rendered to: UNITED STATES ALUMINUM 200 Singleton Road Waxahachie, Texas 75165

 Report Number:
 B8198.02-116-45

 Simulation Date:
 04/02/12

 Report Date:
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#### **Project Summary:**

Architectural Testing, Inc. was contracted to perform U-Factor, Solar Heat Gain Coefficient, Visible Transmittance, and Condensation Resistance\* computer simulations in accordance with the National Fenestration Rating Council (NFRC). The products were evaluated in full compliance with NFRC requirements to the standards listed below.

\*NFRC's Condensation Resistance rating is NOT equivalent to a Condensation Resistance Factor (CRF) determined in accordance with AAMA 1503.

#### **Standards:**

NFRC 100-2010: Procedure for Determining Fenestration Product U-Factors

NFRC 200-2010: Procedure for Determining Fenestration Product Solar Heat Gain

Coefficient and Visible Transmittance at Normal Incidence

NFRC 500-2010: Procedure for Determining Fenestration Product Condensation

Resistance Values

#### **Software:**

Frame and Edge Modeling: THERM 6.3.19
Center-of-Glass Modeling: WINDOW 6.3.9
Total Product Calculations: WINDOW 6.3.9

**Spectral Data Library:** 22.0

#### **Simulations Specimen Description:**

**Series/Model:** FT 451 Storefront (Exterior Set) **Type:** Glazed Wall System, Window Wall

Frame Material: AT Aluminum w/ Thermal Breaks - All Members

**Sash Material:** NA Not Applicable **Standard Size:** 2000mm x 2000mm

130 Derry Court York, PA 17406-8405 phone: 717-764-7700 fax: 717-764-4129 www.archtest.com



#### **Modeling Assumptions/Technical Interpretations:**

- 1) To prevent air infiltration, tape was applied to all interior sash crack locations.
- 2) Material finish grouped per NFRC 100, Section 4.2.1 L

#### **Specialty Products Table:**

The specialty products method allow the manufacturer to determine the overall product SHGC and VT for any glazing option. The center of glass SHGC and/or VT must be determined using WINDOW 6.3.9. The method gives overall product SHGC and VT indexed on center of glass properties. All values used in the calculations are truncated to six decimal place precision.

	No Dividers	Dividers < 1	Dividers > 1
SHGC0	0.018980	0.022390	0.025586
SHGC1	0.903890	0.803043	0.708513
VT0	0.000000	0.000000	0.000000
VT1	0.884910	0.780653	0.682928

SHGC = SHGC0 + SHGCc (SHGC1 - SHGC0) VT = VT0 + VTc (VT1 - VT0)

#### **Validation Matrix:**

The following products are part of a validation matrix. Only one is required for validation testing.

Product Line	Report Number
None	-



#### **Spacer Option Description**

	Sealant		
Spacer Type	Primary	Secondary	Code
Tin-Plate Intercept Spacer	Butyl Rubber	Butyl Rubber	CU-D

**Grid Option Description** 

Grid Size	Grid Type	Grid Pattern
None		

**Reinforcement Option Description** 

Location	Material
None	

**Gas Filling Technique Description** 

Gas Filling Techniq	ue Description
Fill Type	Method
84.48% Xenon	Dual Probe w/Concentration Sensor
76.09% Argon	Single Probe Timed
85.82% Argon	Single Probe Timed
83.03% Argon	Single Probe Timed
88.65% Argon	Single Probe Timed
87.42% Argon	Single Probe Timed
64.98% Argon	Single Probe Timed
74.70% Argon	Single Probe Timed
60.79% Argon	Single Probe Timed
62.42% Argon	Single Probe Timed
86.02% Argon	Single Probe Timed
81.67% Argon	Single Probe Timed
94.60% Xenon	Evacuated Chamber

#### **Edge-of-Glass Construction**

Interior Condition	EPDM gasket between aluminum frame and glazing.
Exterior Condition	EPDM gasket between aluminum frame and glazing.

Weatherstripping

Type	Quantity	Location
None	-	-

#### Frame/Sash Materials Finish

Interior	Painted Aluminum
Exterior	Painted Aluminum



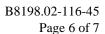
#### NFRC 100/200/500 Summary Sheet FT 451 Storefront (Exterior Set)

_								`						
ID	Pane Thickness 1	Gap Width 1	Pane Thickness 2	Solar Gap Width 2		Gain Co		Cap Fill	Visik	Com-e (Surface#)  String Surface#)		(J	Conden Resist	
1	COG=	0.4400												
	0.222	0.500	0.225					XEN84.48				CL	A1-D	N
	U-Facto	r	0.58	SHGC	(N)			0.62	VT (N)		0.65		CR	34
2	COG=	0.4200		•										
	0.222	0.500	0.225					ARG76.09		0.652(#2)		GY	A1-D	N
	U-Facto	r	0.56	SHGC (	(N)			0.25	VT (N)		0.21		CR	34
3	COG=	0.4000												
	0.220	0.500	0.225					ARG85.82		0.566(#2)		GY	A1-D	N
	U-Facto		0.54	SHGC	(N)			0.25	VT (N)		0.18		CR	34
4	COG=				ı			1	1					
	0.226	0.500	0.225					ARG83.03		0.471(#2)		ΑZ	A1-D	N
	U-Facto		0.53	SHGC (	( <b>N</b> )			0.18	VT (N)		0.14		CR	34
5	COG=			1	1			Г	ı					
	0.220	0.500						ARG88.65		0.395(#2)		GY	A1-D	N
	U-Facto		0.51	SHGC (	( <b>N</b> )			0.14	VT (N)		0.06		CR	34
6	COG=		1	1	I		1	1 D G G G 10	1	0.040(#0)		GY		
	0.232							ARG87.42		0.318(#2)		CL	A1-D	N
7	U-Facto COG=		0.50	SHGC	(N)			0.43	VT (N)		0.50		CR	35
,		0.500	ı			1		ARG64.98		0.215(#2)		CL	A1-D	N
	U-Facto		0.223	SHGC	(N)			0.57	VT (N)	0.213(#2)	0.65	CL	CR	35
8	COG=			SHGC	(14)			0.57	<b>V 1</b> (1 <b>V</b> )		0.03		CK	33
		1	0.225					ARG74.7		0.166(#2)		CL	A1-D	N
	U-Facto		0.46	SHGC	(N)			0.41	VT (N)	0.100(112)	0.47	OB	CR	35
9	COG=				(- 1)				(- 1)		****		-	
	0.223	0.500	0.225					ARG60.79		0.087(#2)		CL	A1-D	N
	U-Facto	r	0.45	SHGC	(N)			0.50	VT (N)	· · · ·	0.67		CR	35
10	COG=	0.2600												
	0.223	0.500	0.225					ARG62.42		0.035(#2)		CL	A1-D	N
	U-Facto	r	0.43	SHGC (	(N)			0.35	VT (N)		0.62		CR	35



#### NFRC 100/200/500 Summary Sheet FT 451 Storefront (Exterior Set)

ID	Pane Thickness 1	Gap Width 1	Pane Thickness 2	Gap Width 2	Pane Thickness 3	Gap Width 3	Pane Thickness 4	Gap Fill	Low-e (Surface#)		Tint	Spacer	Grid Type
	U-Factor Solar Heat Gain Coefficient (SHGC) Visible Transmittance (VT)				Γ)	Condensation							
	·	-racio	)1		Gri	ds (None	/<1/>=1	)	Grids (None	/<1/>=1)		Resist	tance
11	COG=	0.2400											
	0.223	0.500	0.223					ARG86.02	0.035(#2) / 0.0	)35(#3)	CL	A1-D	N
	U-Facto	r	0.42	SHGC (	(N)			0.33	VT (N)	0.55		CR	36
12	COG=	0.2200											
	0.223	0.500	0.223					XEN81.67	0.018(#2) / 0.0	)18(#3)	CL	A1-D	N
	U-Facto	r	0.40	SHGC (	(N)			0.24	VT (N)	0.46		CR	36
13	COG=	0.2000											
	0.223	0.500	0.223					XEN94.6	0.018(#2) / 0.0	)18(#3)	CL	A1-D	N
	U-Facto	r	0.38	SHGC (	(N)			0.24	VT (N)	0.46		CR	36





The Condensation Resistance results obtained from this procedure are for controlled laboratory conditions and do not include the effects of air movement through the specimen, solar radiation, and the thermal bridging that may occur due to the specific design and construction of the fenestration system opening.

Ratings values included in this report are for submittals to an NFRC-licensed IA and are not meant to be used directly for labeling purposes. Only those values identified on a valid Certification Authorization Report (CAR) by an NFRC accredited Inspection Agency (IA) are to be used for labeling purposes. The ratings values were rounded in accordance to NFRC 601, NFRC Unit and Measurement Policy.

Architectural Testing, Inc. is an NFRC accredited simulation laboratory and all simulations were conducted in full compliance with NFRC approved procedures and specifications. The NFRC procedure requires that the computational results be verified through actual test results.

Detailed drawings, simulation data files, 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 simulated 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 product simulated. This report may not be reproduced, except in full, without the written approval of Architectural Testing, Inc.

For ARCHITECTURAL TEST	ING, INC.:
SIMULATED BY:	REVIEWED BY:
Eric A. Barilar	Kristen L. Livelsberger
Simulation Technician	Senior Simulation Technician
	Simulator-In-Responsible-Charge
EAB:eab	
B8198.02-116-45	
Attachments (pages):	This report is complete only when all attachments listed are included.

Appendix A: Drawings and Bills of Material (10)



#### **Revision Log**

Rev. #	Date	Page(s)	Revision(s)
.01R0	4/2/2012	All	Original Report Issued to US Aluminum

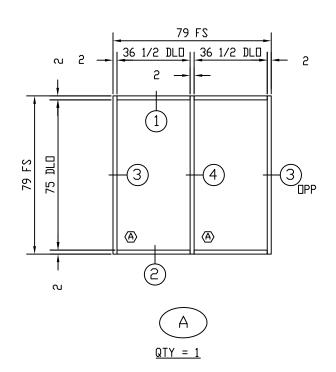
All drawings and Bills of Material used to simulate this product are enclosed in this Appendix
Appendix A
B8198.02-116-45

MU2012-001-01

Report #:

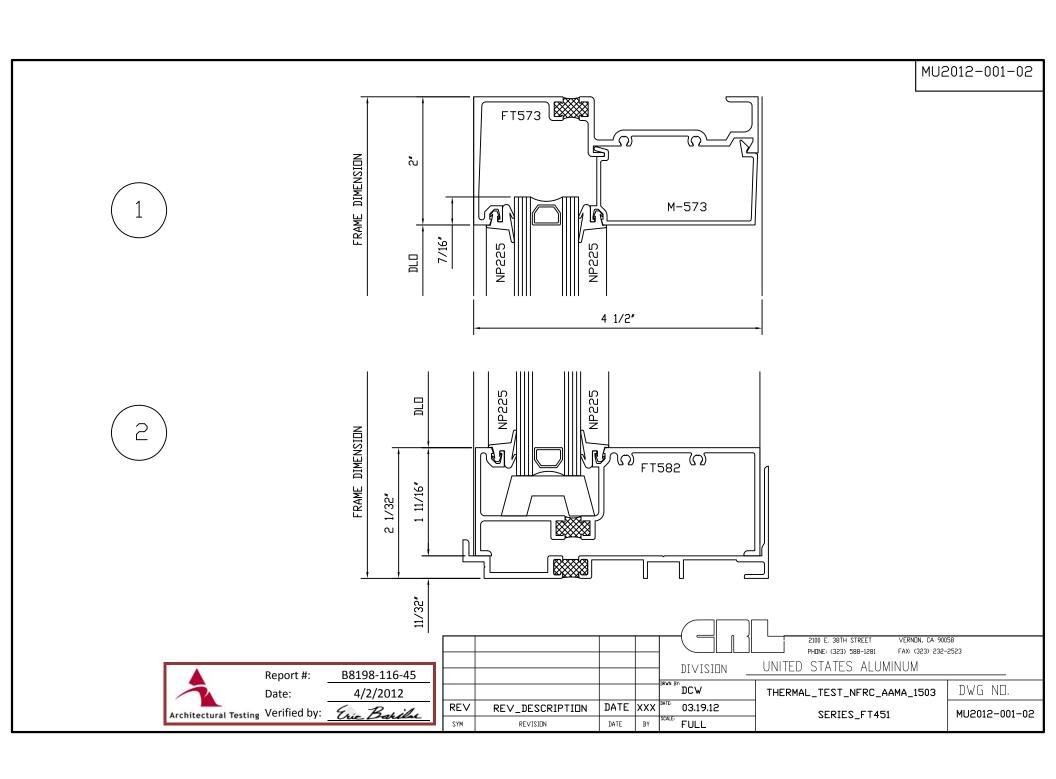
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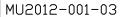
Architectural Testing Verified by: Eric Bakille

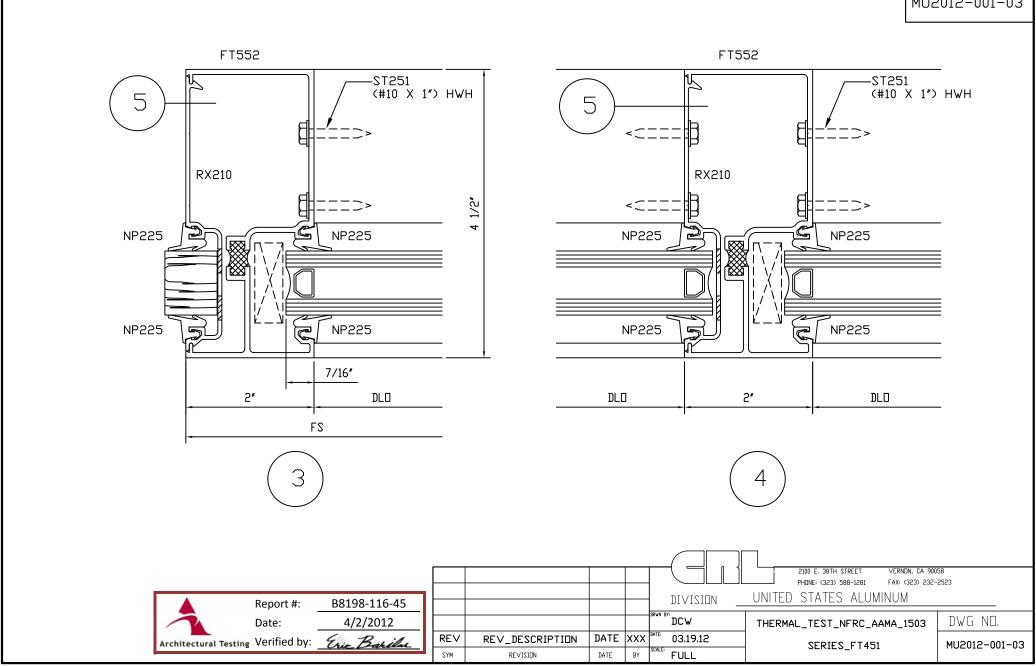


SYMBOL KEY							
SYMBOL	DESCRIPTION	QTY	COMMENTS				
A	37.375 X 75.875	2	1 INS = INSULATED GLASS				

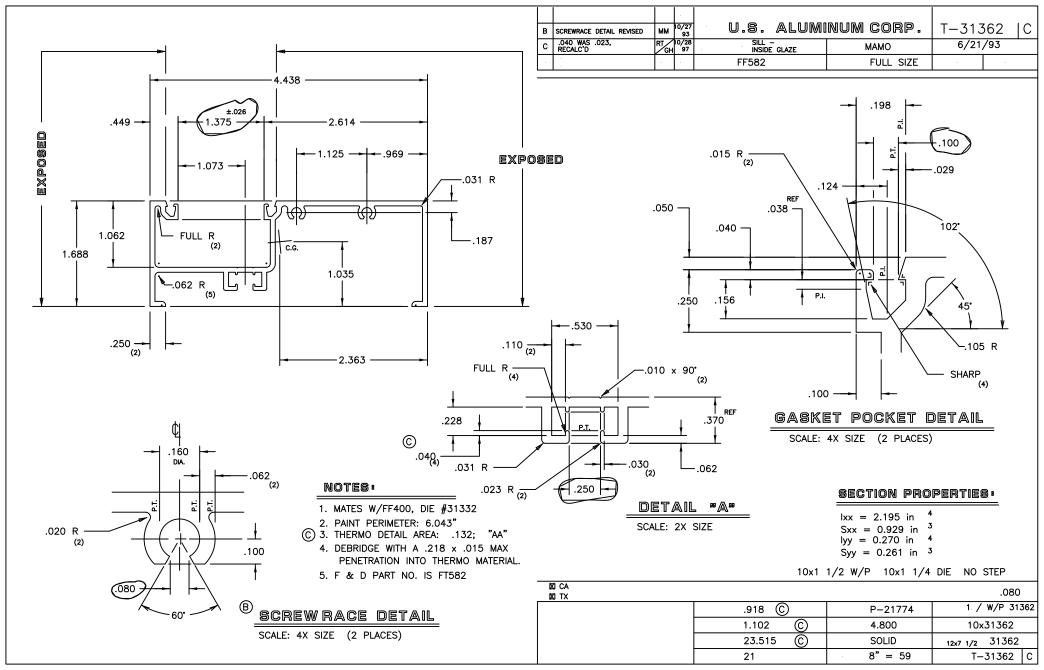
					DIVISION _	2100 E. 38TH STREET VERNON, CA 90058 PHONE: (323) 588-1281 FAX: (323) 232-2523 UNITED STATES ALUMINUM
				DRWN I	DCW	THERMAL_TEST_NFRC_AAMA_1503 DWG NO.
RE∨	RE∨_DESCRIPTION	DATE			03.19.12	SERIES_FT451 MU2012-001-01
MY2	REVISION	DATE	BY	SCALE:	3/8"=1"	MO2012-001-01



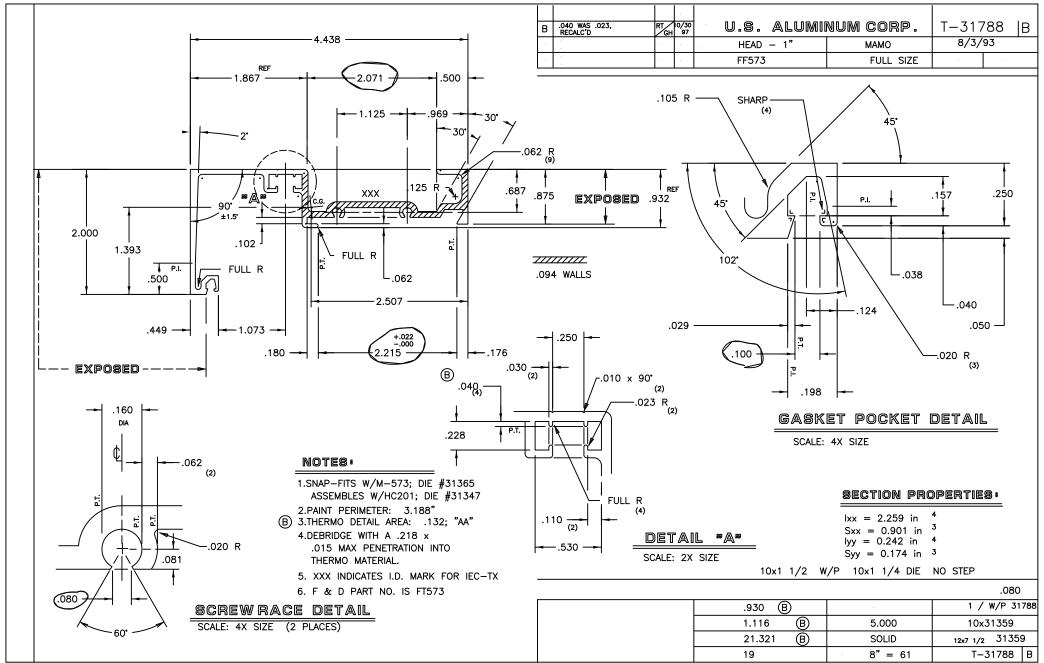




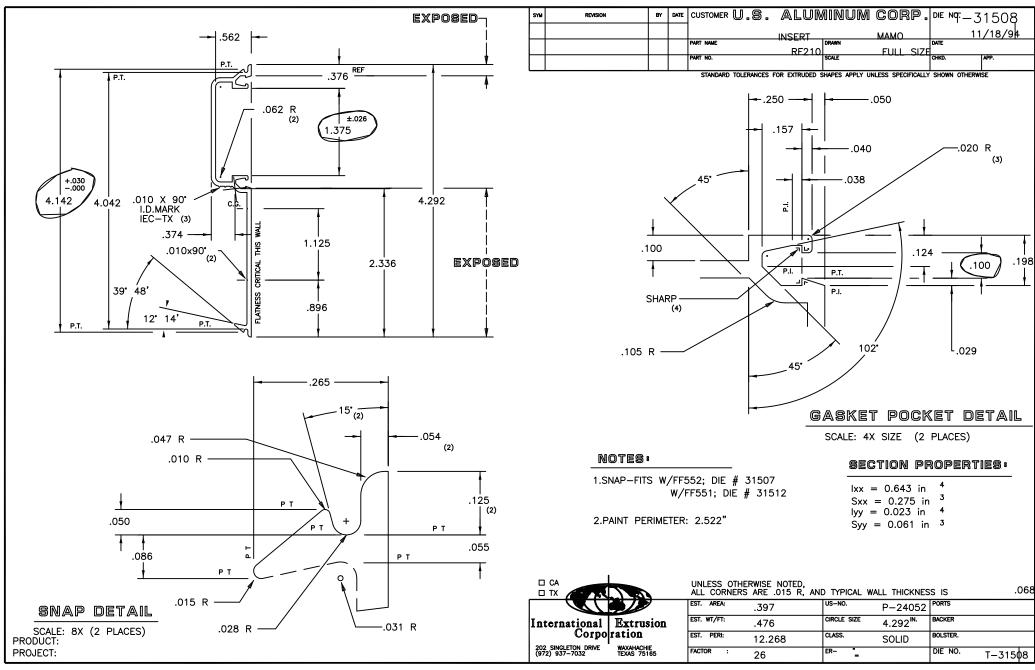




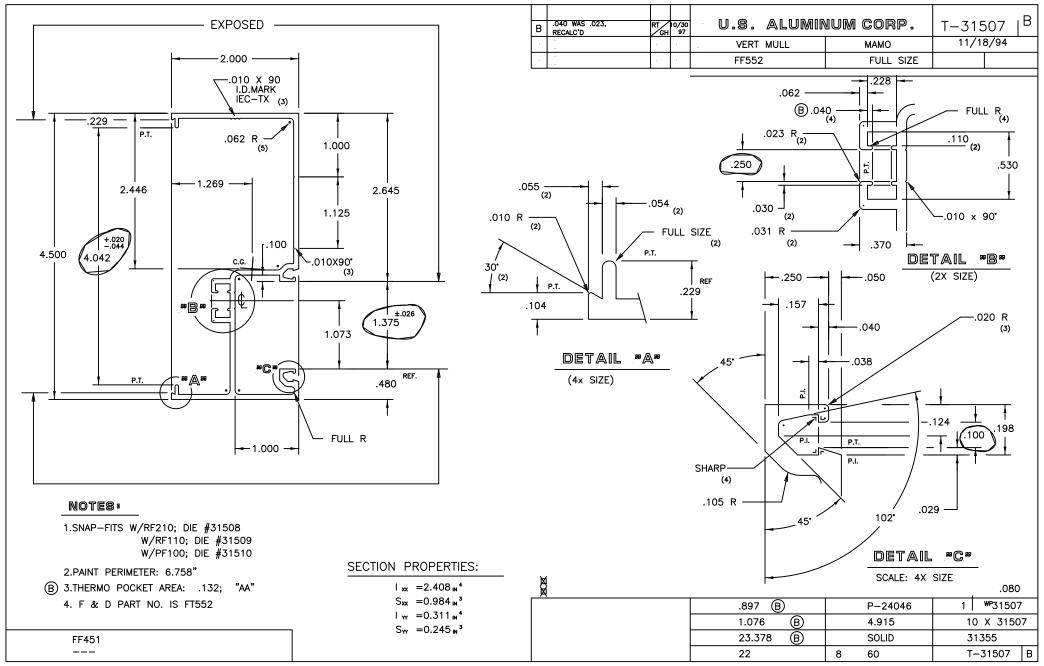




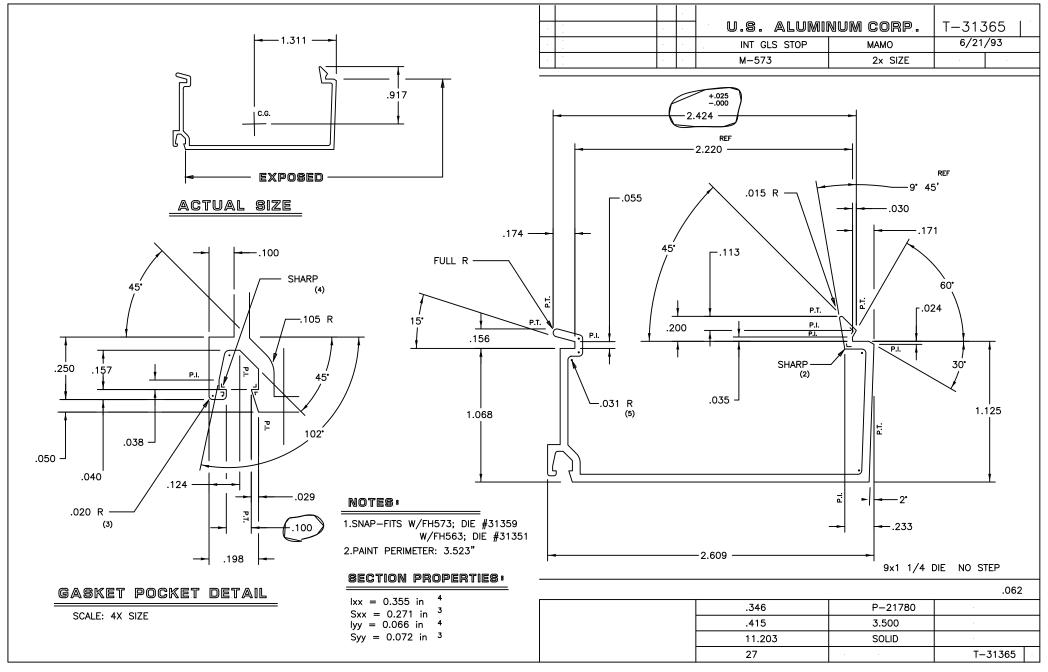




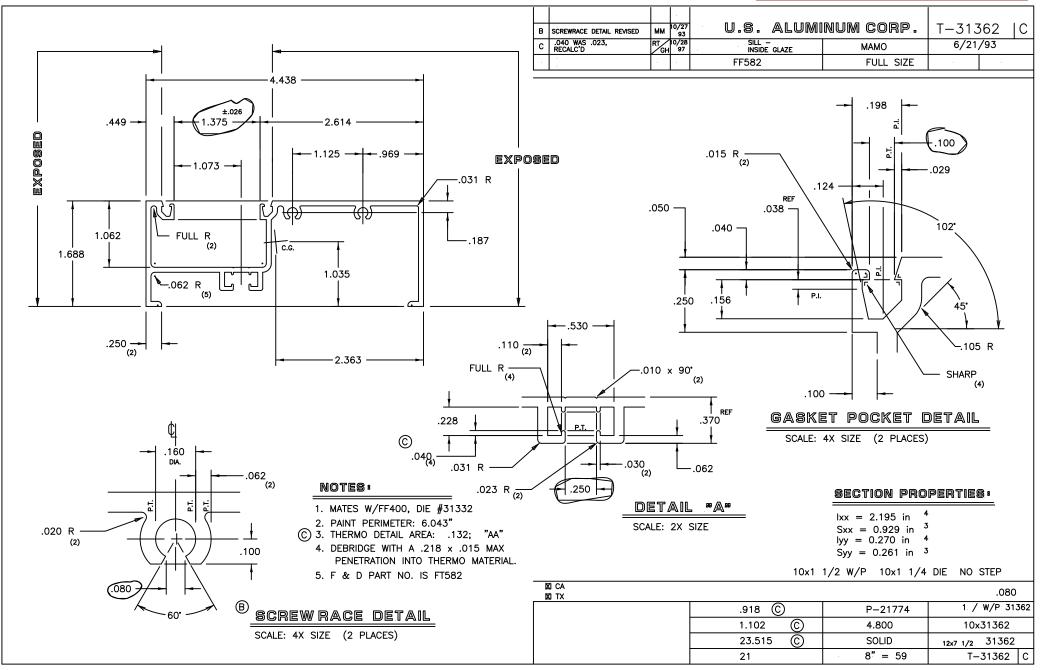




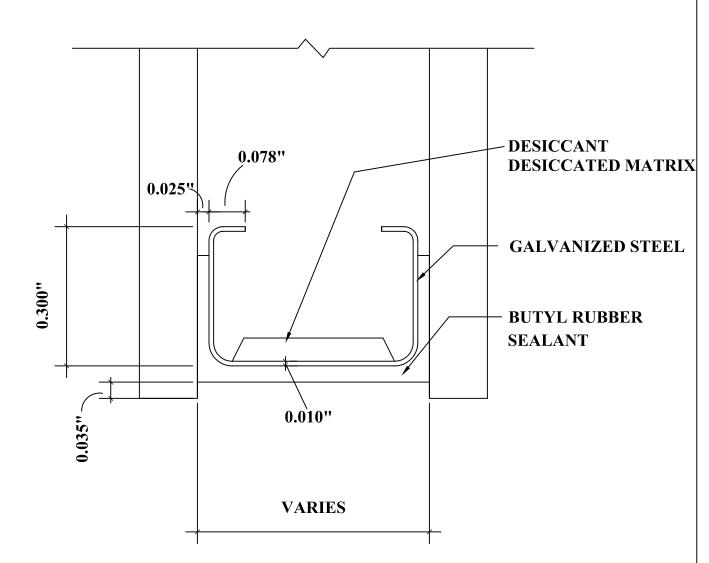












DETAIL FOR THERMAL MODELING OF
GED INTERCEPT SPACER - STANDARD (CU-D)