



AAMA 507-15 THERMAL PERFORMANCE REPORT

Rendered to:

CMI ARCHITECTURAL PRODUCTS, INC.

SERIES/MODEL: 450 DT
TYPE: Glazed Wall System

Report No: G9578.02-201-45
Report Date: 4/3/2017



AAMA 507-15 THERMAL PERFORMANCE REPORT

Rendered to:

CMI ARCHITECTURAL PRODUCTS, INC.
1630 101st Avenue NE
Blaine, Minnesota 55449

Report No: G9578.02-201-45
Report Date: 4/3/2017
Simulation Date: 4/3/2017

Project Summary:

Architectural Testing, Inc., an Intertek company (Intertek-ATI), was contracted by CMI Architectural Products, Inc. to provide U-Factor and Solar Heat Gain Coefficient thermal performance ratings on the 450 DT Glazed Wall System. The thermal performance ratings were determined in accordance with AAMA 507-15, Standard Practice for Determining the Thermal Performance Characteristics of Fenestration Systems Installed in Commercial Buildings.

Reference Documents:

AAMA 507-15, Standard Practice for Determining the Thermal Performance Characteristics of Fenestration Systems Installed in Commercial Buildings

ANSI/NFRC 100-2014, Procedure for Determining Fenestration Product U-Factors

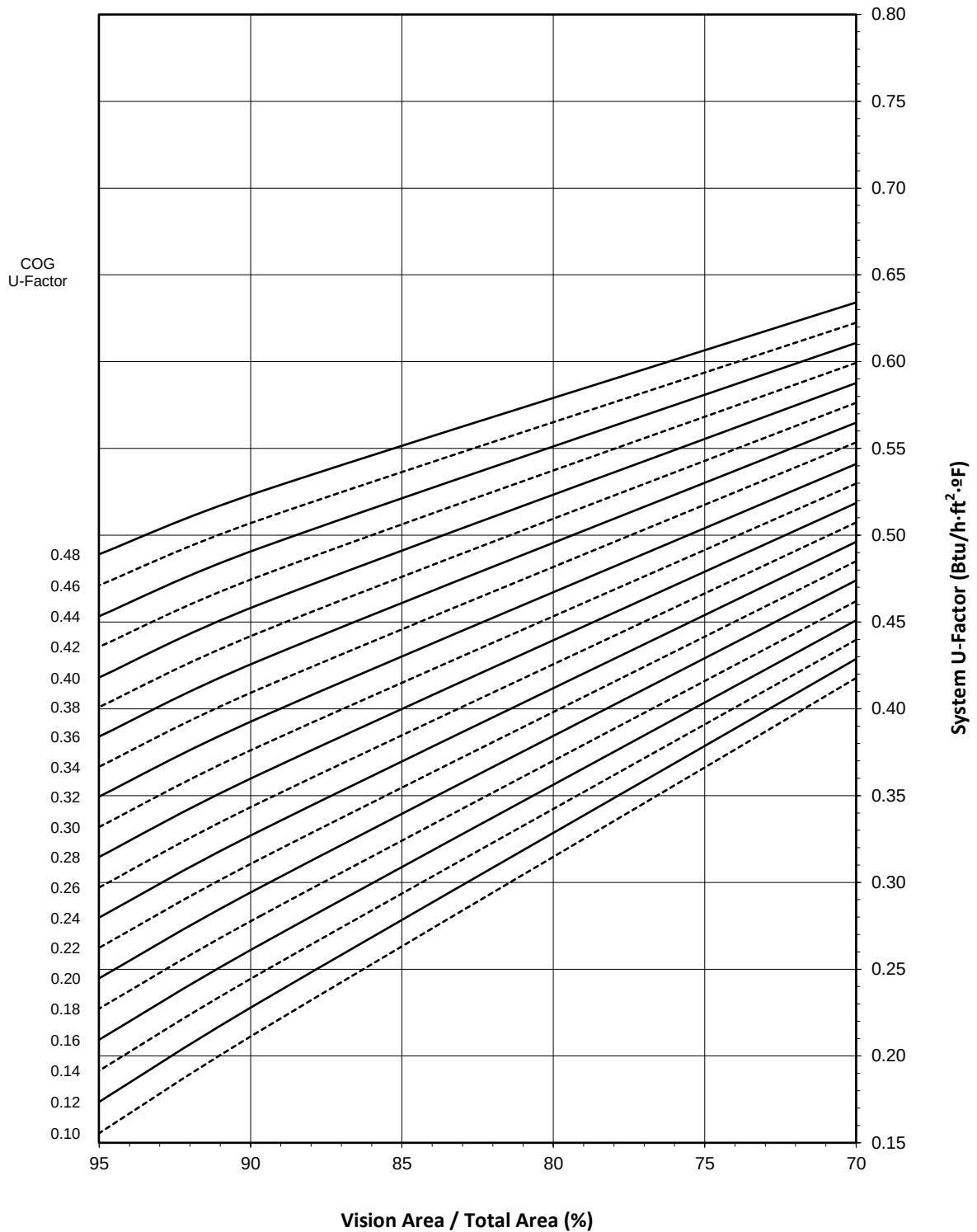
ANSI/NFRC 200-2014, Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence

Simulation Specimen Description:

Series/Model:	450 DT
Type:	Glazed Wall System
Frame Material:	Aluminum Thermally Broken Framing System
Material Finish:	Anodized Aluminum
Specimen Size:	2000mm wide by 2000mm high (78-3/4" by 78-3/4")
Configuration:	Two vision lites separated by one intermediate vertical
Drawing Reference:	CMI Drawing 450 DT NFRC 100-200-500, dated 3-13-2017

**CMI Architectural Products, Inc.
450 DT - Glazed Wall System**

System U-Factor vs. Percentage of Vision Area

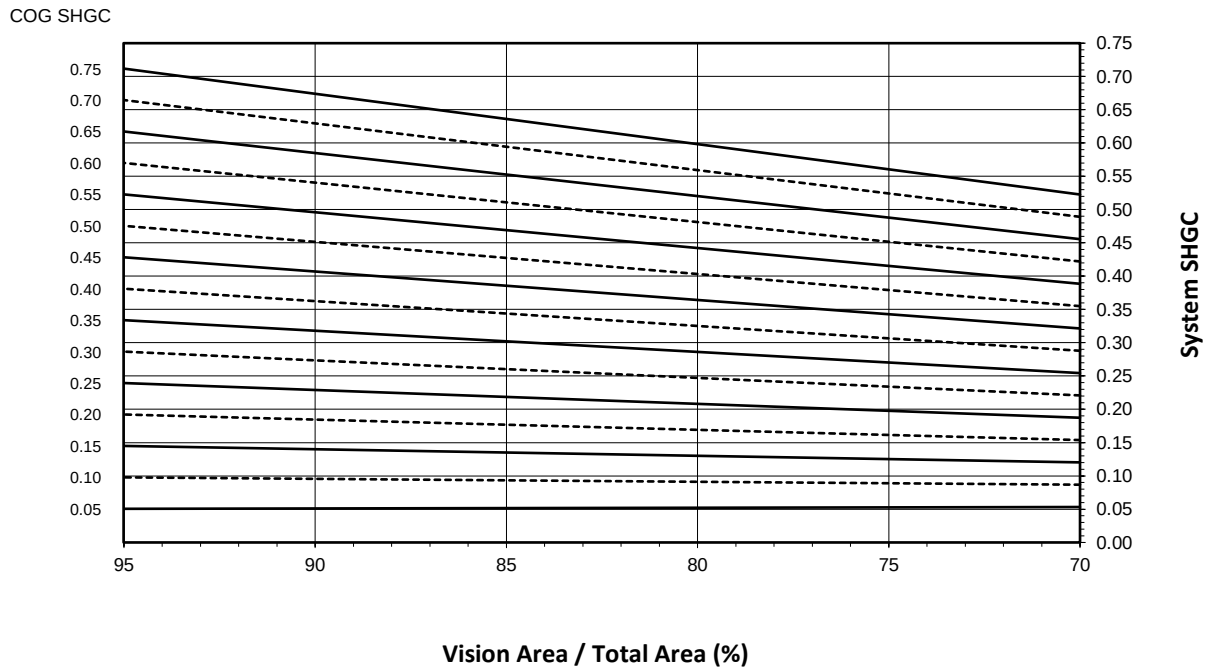


Note: 1 inch Overall - Dual Glazed Glass (0.48-0.20 COG) with Aluminum Spacer, Dual Glazed Glass with Heat Mirror (0.18-0.10 COG) with Aluminum Spacer

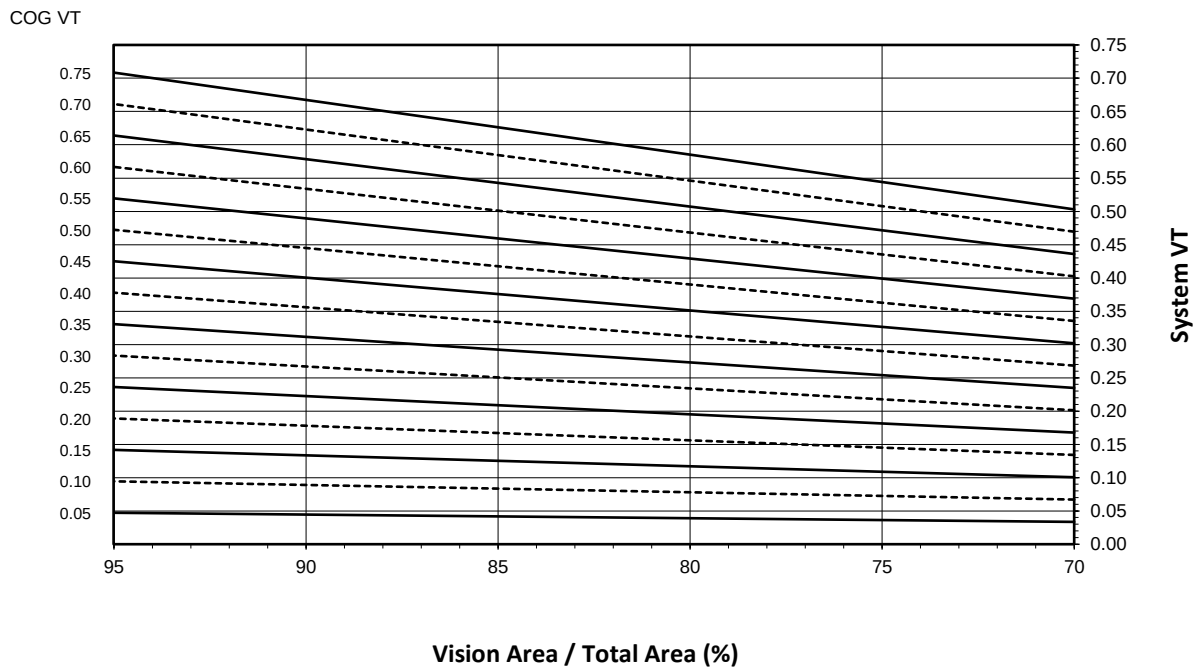
CMI Architectural Products, Inc.

450 DT - Glazed Wall System

System SHGC vs. Percentage of Vision Area



System VT vs. Percentage of Vision Area



CMI Architectural Products, Inc.
450 DT - Glazed Wall System

Size Specific U-Factor Matrix*

Glazing Option	Center of Glass U-Factor	Overall U-Factor
1	0.48	0.53
2	0.46	0.51
3	0.44	0.49
4	0.42	0.48
5	0.40	0.46
6	0.38	0.44
7	0.36	0.43
8	0.34	0.41
9	0.32	0.40
10	0.30	0.38
11	0.28	0.36
12	0.26	0.35
13	0.24	0.33
14	0.22	0.31
15	0.20	0.30
16	0.18	0.28
17	0.16	0.26
18	0.14	0.25
19	0.12	0.23
20	0.10	0.21

Note: 1 inch Overall - Dual Glazed Glass (0.48-0.20 COG) with Aluminum Spacer, Dual Glazed Glass with Heat Mirror (0.18-0.10 COG) with Aluminum Spacer

**CMI Architectural Products, Inc.
450 DT - Glazed Wall System**

Size Specific SHGC Matrix*

Center of Glass SHGC	Overall SHGC
0.75	0.67
0.70	0.63
0.65	0.58
0.60	0.54
0.55	0.49
0.50	0.45
0.45	0.41
0.40	0.36
0.35	0.32
0.30	0.27
0.25	0.23
0.20	0.18
0.15	0.14
0.10	0.10
0.05	0.05

Size Specific VT Matrix*

Center of Glass VT	Overall VT
0.75	0.66
0.70	0.62
0.65	0.58
0.60	0.53
0.55	0.49
0.50	0.44
0.45	0.40
0.40	0.35
0.35	0.31
0.30	0.27
0.25	0.22
0.20	0.18
0.15	0.13
0.10	0.09
0.05	0.04

*Size Specific U-Factor, SHGC, and VT Matrices are based on the standard Glazed Wall System specimen size of 2000mm wide by 2000mm high (78-3/4" by 78-3/4"). This represents 89.6% Vision Area / Total Area.

Vision Area Data

Option No.	COG U-Factor	COG Temperature	Cross Section	Frame Height	Frame U-Factor	Edge U-Factor	Total Product U-Factor		
							70% Vision Area	NFRC 100-2014	95% Vision Area
							25.65" by 25.65"	78.74" by 78.74"	165.35" by 165.35"
1	0.48	43.7	Head	2.1530	0.8393	0.5045	0.6341	0.5253	0.4891
			L. Jamb	1.1531	0.9929	0.5033			
			R. Jamb	1.1530	1.0134	0.5029			
			Mullion	2.3061	1.0032	0.5031			
			Sill	2.5278	0.8240	0.5055			
2	0.46	44.8	Head	2.1530	0.8383	0.4906	0.6224	0.5091	0.4712
			L. Jamb	1.1531	0.9905	0.4893			
			R. Jamb	1.1530	1.0110	0.4889			
			Mullion	2.3061	1.0008	0.4891			
			Sill	2.5278	0.8231	0.4916			
3	0.44	45.8	Head	2.1530	0.8373	0.4767	0.6107	0.4929	0.4534
			L. Jamb	1.1531	0.9881	0.4753			
			R. Jamb	1.1530	1.0087	0.4749			
			Mullion	2.3061	0.9984	0.4751			
			Sill	2.5278	0.8223	0.4778			
4	0.42	46.8	Head	2.1530	0.8364	0.4632	0.5992	0.4768	0.4357
			L. Jamb	1.1531	0.9859	0.4616			
			R. Jamb	1.1530	1.0065	0.4613			
			Mullion	2.3061	0.9962	0.4614			
			Sill	2.5278	0.8216	0.4643			
5	0.40	47.9	Head	2.1530	0.8354	0.4494	0.5876	0.4605	0.4181
			L. Jamb	1.1531	0.9836	0.4476			
			R. Jamb	1.1530	1.0042	0.4472			
			Mullion	2.3061	0.9939	0.4474			
			Sill	2.5278	0.8208	0.4505			
6	0.38	48.9	Head	2.1530	0.8345	0.4360	0.5762	0.4443	0.4011
			L. Jamb	1.1531	0.9815	0.4341			
			R. Jamb	1.1530	1.0021	0.4337			
			Mullion	2.3061	0.9918	0.4339			
			Sill	2.5278	0.8201	0.4372			
7	0.36	50.0	Head	2.1530	0.8337	0.4225	0.5648	0.4282	0.3841
			L. Jamb	1.1531	0.9793	0.4204			
			R. Jamb	1.1530	1.0000	0.4201			
			Mullion	2.3061	0.9897	0.4203			
			Sill	2.5278	0.8194	0.4237			
8	0.34	51.0	Head	2.1530	0.8329	0.4090	0.5534	0.4119	0.3667
			L. Jamb	1.1531	0.9773	0.4068			
			R. Jamb	1.1530	0.9980	0.4065			
			Mullion	2.3061	0.9877	0.4066			
			Sill	2.5278	0.8187	0.4103			
9	0.32	52.0	Head	2.1530	0.8321	0.3957	0.5410	0.3953	0.3495
			L. Jamb	1.1531	0.9693	0.3927			
			R. Jamb	1.1530	0.9900	0.3924			
			Mullion	2.3061	0.9796	0.3926			
			Sill	2.5278	0.8181	0.3970			

Vision Area Data

Option No.	COG U-Factor	COG Temperature	Cross Section	Frame Height	Frame U-Factor	Edge U-Factor	Total Product U-Factor		
							70% Vision Area	NFRC 100-2014	95% Vision Area
							25.65" by 25.65"	78.74" by 78.74"	165.35" by 165.35"
10	0.30	53.1	Head	2.1530	0.8313	0.3824	0.5297	0.3789	0.3319
			L. Jamb	1.1531	0.9673	0.3793			
			R. Jamb	1.1530	0.9880	0.3790			
			Mullion	2.3061	0.9776	0.3792			
			Sill	2.5278	0.8174	0.3837			
11	0.28	54.2	Head	2.1530	0.8306	0.3692	0.5185	0.3627	0.3147
			L. Jamb	1.1531	0.9654	0.3659			
			R. Jamb	1.1530	0.9861	0.3657			
			Mullion	2.3061	0.9757	0.3658			
			Sill	2.5278	0.8168	0.3705			
12	0.26	55.2	Head	2.1530	0.8298	0.3560	0.5073	0.3463	0.2971
			L. Jamb	1.1531	0.9635	0.3525			
			R. Jamb	1.1530	0.9843	0.3523			
			Mullion	2.3061	0.9739	0.3524			
			Sill	2.5278	0.8162	0.3574			
13	0.24	56.3	Head	2.1530	0.8292	0.3429	0.4961	0.3301	0.2798
			L. Jamb	1.1531	0.9617	0.3393			
			R. Jamb	1.1530	0.9825	0.3390			
			Mullion	2.3061	0.9721	0.3391			
			Sill	2.5278	0.8157	0.3443			
14	0.22	57.3	Head	2.1530	0.8286	0.3297	0.4850	0.3138	0.2624
			L. Jamb	1.1531	0.9602	0.3259			
			R. Jamb	1.1530	0.9810	0.3257			
			Mullion	2.3061	0.9706	0.3258			
			Sill	2.5278	0.8152	0.3311			
15	0.20	58.4	Head	2.1530	0.8280	0.3167	0.4739	0.2975	0.2448
			L. Jamb	1.1531	0.9585	0.3127			
			R. Jamb	1.1530	0.9794	0.3125			
			Mullion	2.3061	0.9690	0.3126			
			Sill	2.5278	0.8148	0.3181			
16	0.18	59.5	Head	2.1490	0.8262	0.3040	0.4620	0.2809	0.2273
			L. Jamb	1.1533	0.9528	0.2995			
			R. Jamb	1.1533	0.9737	0.2994			
			Mullion	2.3058	0.9635	0.2995			
			Sill	2.5281	0.8126	0.3053			
17	0.16	60.6	Head	2.1490	0.8258	0.2908	0.4509	0.2645	0.2094
			L. Jamb	1.1533	0.9515	0.2862			
			R. Jamb	1.1533	0.9724	0.2861			
			Mullion	2.3058	0.9622	0.2861			
			Sill	2.5281	0.8122	0.2921			
18	0.14	61.7	Head	2.1490	0.8258	0.2765	0.4396	0.2480	0.1916
			L. Jamb	1.1533	0.9511	0.2717			
			R. Jamb	1.1533	0.9720	0.2716			
			Mullion	2.3058	0.9618	0.2717			
			Sill	2.5281	0.8122	0.2778			

Vision Area Data

Option No.	COG U-Factor	COG Temperature	Cross Section	Frame Height	Frame U-Factor	Edge U-Factor	Total Product U-Factor		
							70% Vision Area	NFRC 100-2014	95% Vision Area
							25.65" by 25.65"	78.74" by 78.74"	165.35" by 165.35"
19	0.12	62.8	Head	2.1490	0.8254	0.2633	0.4287	0.2315	0.1736
			L. Jamb	1.1533	0.9497	0.2585			
			R. Jamb	1.1533	0.9707	0.2583			
			Mullion	2.3058	0.9605	0.2584			
			Sill	2.5281	0.8119	0.2647			
20	0.10	63.9	Head	2.1490	0.8250	0.2501	0.4177	0.2149	0.1555
			L. Jamb	1.1533	0.9485	0.2451			
			R. Jamb	1.1533	0.9695	0.2450			
			Mullion	2.3058	0.9593	0.2451			
			Sill	2.5281	0.8116	0.2515			

Intertek-ATI will service this report for the entire test record retention period. Test records that are retained such as detailed drawings, datasheets, representative samples of test specimens, or other pertinent project documentation will be retained by Intertek-ATI for the entire test record retention period. The test record retention end date for this report is April 3, 2022.

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 Intertek-ATI.

For INTERTEK-ATI:

SIMULATED BY:

REVIEWED BY:

Emmett T. Houlihan
NFRC Certified Simulator
Simulator-In-Responsible-Charge

Andrew C. Walczak
Simulations Project Manager
Simulator-In-Responsible-Charge

ETH: acw/wmr
G9578.02-201-45

Attachments (pages): This report is complete only when all attachments listed are included.
Appendix A: Drawings and Bills of Material (10)

Revision Log

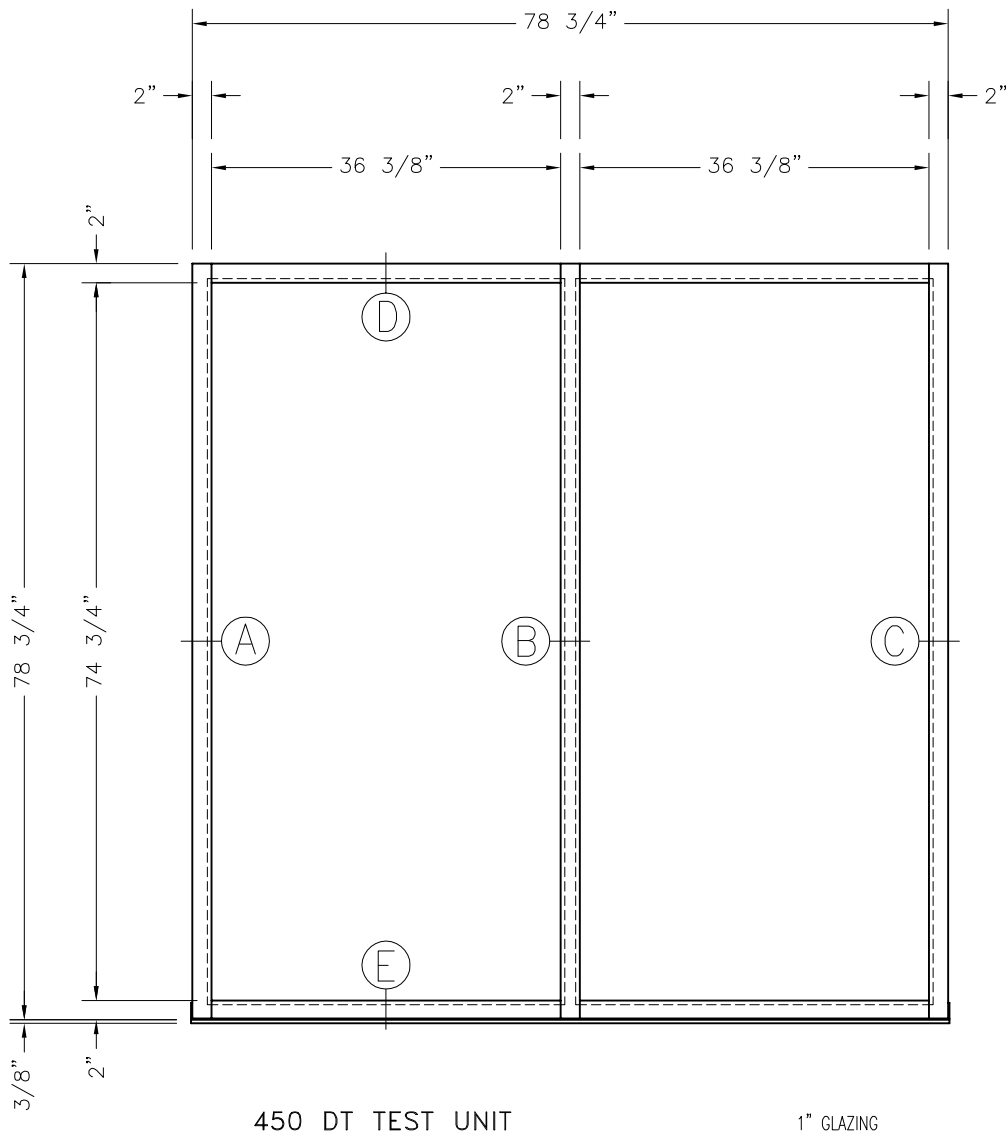
<u>Rev. #</u>	<u>Date</u>	<u>Page(s)</u>	<u>Revision(s)</u>
02-R0	04/03/17	All	Original Report Issued to CMI Architectural Products, Inc.



All drawings and Bills of Material used in simulating this product are enclosed in this Appendix.

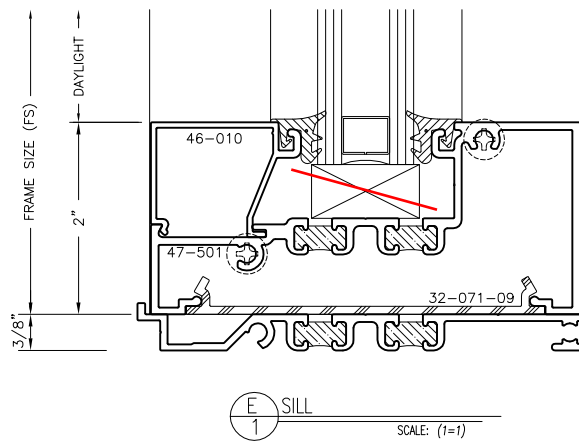
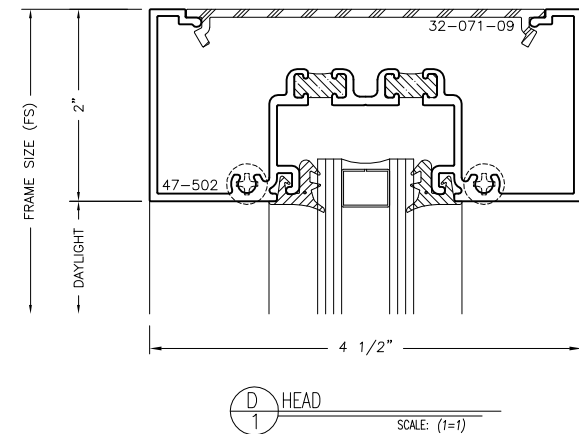
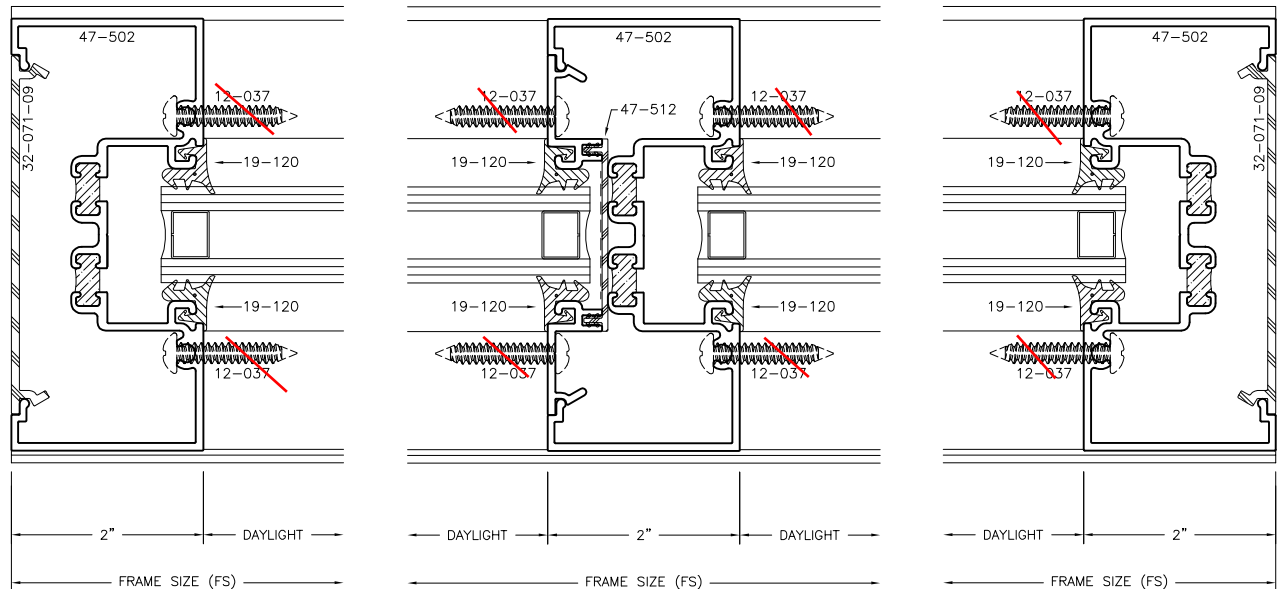
Appendix A

G9578.02-201-45



PARTS LIST:

#	USE	DESCRIPTION
46-010	GLASS STOP	6063-T6 ALUMINUM
47-501	SILL	6063-T6 ALUMINUM DUAL POLYURETHANE THERMAL BREAK
47-502	HEAD/JAMB/VERTICAL	6063-T6 ALUMINUM DUAL POLYURETHANE THERMAL BREAK
47-512	VERTICAL FILLER	6063-T6 ALUMINUM DUAL DUROMETER PVC THERMAL BREAK
47-535	SUB-SILL	6063-T6 ALUMINUM DUAL POLYURETHANE THERMAL BREAK
32-071-09	PERIMETER FILLER	PVC
19-120	GLAZING GASKET	EPDM 70 ± 5 DUROMETER
12-037	FASTENERS	12-14 X 1 1/4" PPH TYPE AB, THREAD TAPPING SCREW, CLEAR ZINC PLATED



Report #: G9578-201-45

Date: 03/24/17

Verified by: *[Signature]*

CMI Architectural

CMI-ARCHITECTURAL PRODUCTS, INC.

20621 HWY 25 N.
DeSmet, South Dakota 57231

TELEPHONE (605)854-3326
FAX (605)854-3620

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PROJECT: 450 DT NFRC 100/200/500

TESTING AGENCY: INTERTEK - ST. PAUL, MINNESOTA

REVISIONS

REV	INT'L	DATE
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

DATE DRAWN:

3-13-2017

DRAWN BY:

GLH

SCALE:

AS NOTED

SHEET:

1 OF 1

Aluminum Alloy - Anodized

SCALE 1.5:1



= DE-BRIDGE FOR THERMAL BARRIER

BREAK UNSPECIFIED CORNER: .010 R. TYPICAL WALL UNLESS OTHERWISE NOTED: _____

ESTIMATED DIE DATA			
ALLOY/TEMPER:		6063-T6	
AREA	1.179	WT/FT	1.386
PERIMETER	24.818	CIRCLE SIZE	5-6
OUTSIDE PERIMETER	24.818	FACTOR	
EXPOSED PERIMETER	4.970	SOLID	

 **Crown Extrusions, Inc.**
122 Columbia Court N.
Chaska, MN 55318
 952-448-3533 Fax: 952-448-5328

DIE #	7835
SCALE	ACTUAL & NOTED
DATE	1-16-17
LAST REVISION	
DRAWN	GLH
CUSTOMER NUMBER	47-501

PRESS SIZE	EXPOSED PERIMETER	4.970	SOLID
LEGEND	DIE REVISIONS		DATE
• = .031 R.			
◦ = .062 R.			
x = .125 R.			
⊗ = .250 R.			
* =			

PART NAME: 450 DT SILL

** POCKETS TO BE AZO-BRADED PRIOR TO FILLING WITH POLYURETHANE POLYMER THERMAL BARRIER.

STANDARD TOLERANCES APPLY UNLESS OTHERWISE NOTED

Report #: G9578-201-45

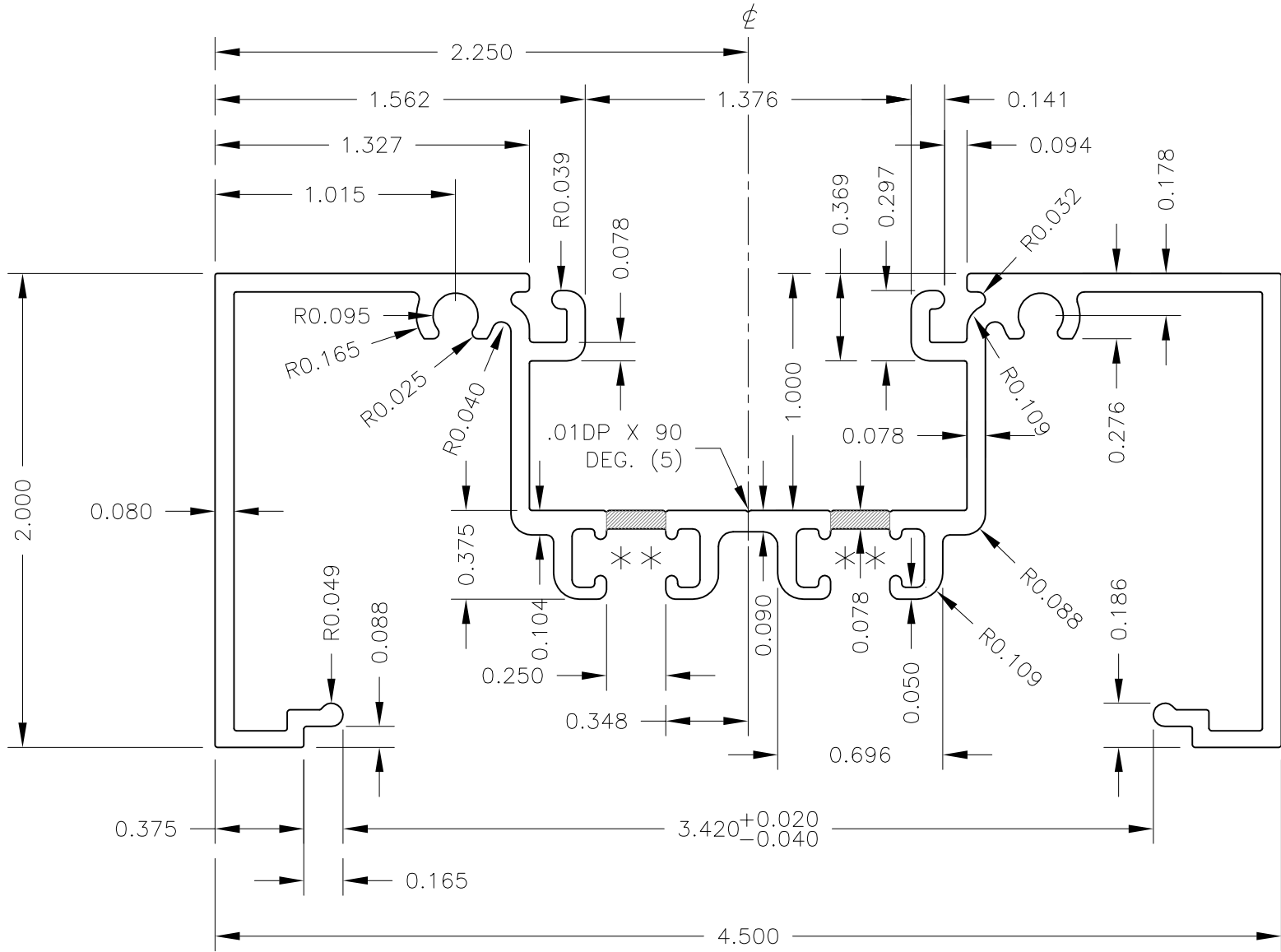
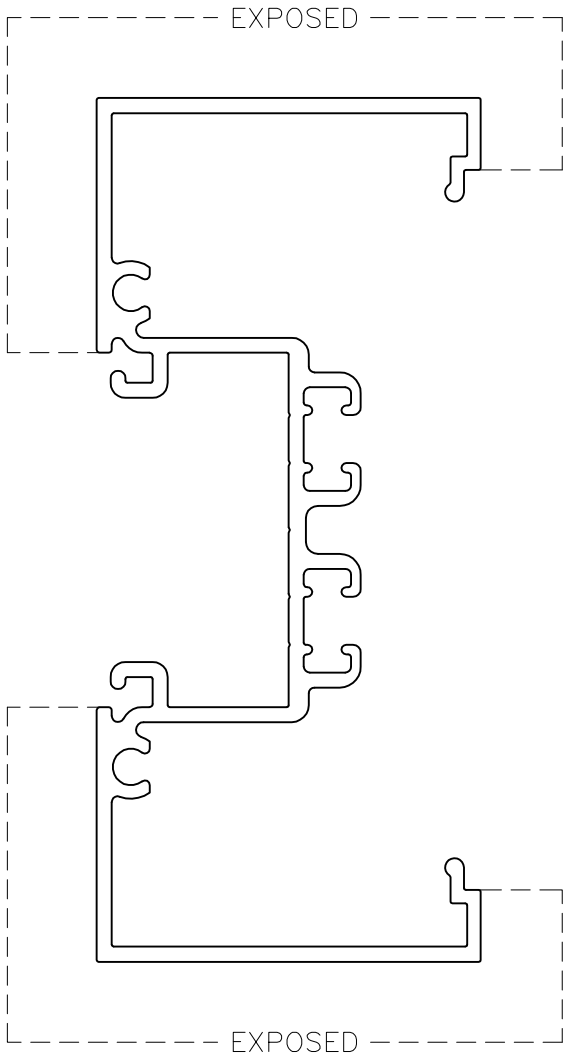
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Verified by:



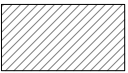
PRINT REVISIONS		DATE

7836
Die Number
47-502
Customer Number



Aluminum Alloy - Anodized

SCALE 1.5:1



= DE-BRIDGE FOR THERMAL BARRIER

ACTUAL SIZE

** POCKETS TO BE AZO-BRADED PRIOR TO FILLING WITH POLYURETHANE POLYMER THERMAL BARRIER.

BREAK UNSPECIFIED CORNER: .010 R. TYPICAL WALL UNLESS OTHERWISE NOTED:

ESTIMATED DIE DATA			
ALLOY/TEMPER:		6063-T6	
AREA	0.997	WT/FT	1.172
PERIMETER	29.285	CIRCLE SIZE	5-6
OUTSIDE PERIMETER	29.285	FACTOR	
EXPOSED PERIMETER	7.404	SOLID	

PRESS SIZE	LEGEND
	• = .031 R.
	o = .062 R.
	x = .125 R.
	⊗ = .250 R.
	* =

DIE REVISIONS		DATE



Crown Extrusions, Inc.
122 Columbia Court N.
Chaska, MN 55318
952-448-3533 Fax: 952-448-5328

CUSTOMER
CMI Architectural
CMI Architectural Products, Inc.
20621 SD Highway 25
DeSmet, SD 57231-5827
605-854-3326 Fax: 605-854-3620

PART NAME:
450 DT HEAD / JAMB

DIE #	7836
SCALE	ACTUAL & NOTED
DATE	1-16-17
LAST REVISION	
DRAWN	GLH
CUSTOMER NUMBER	47-502

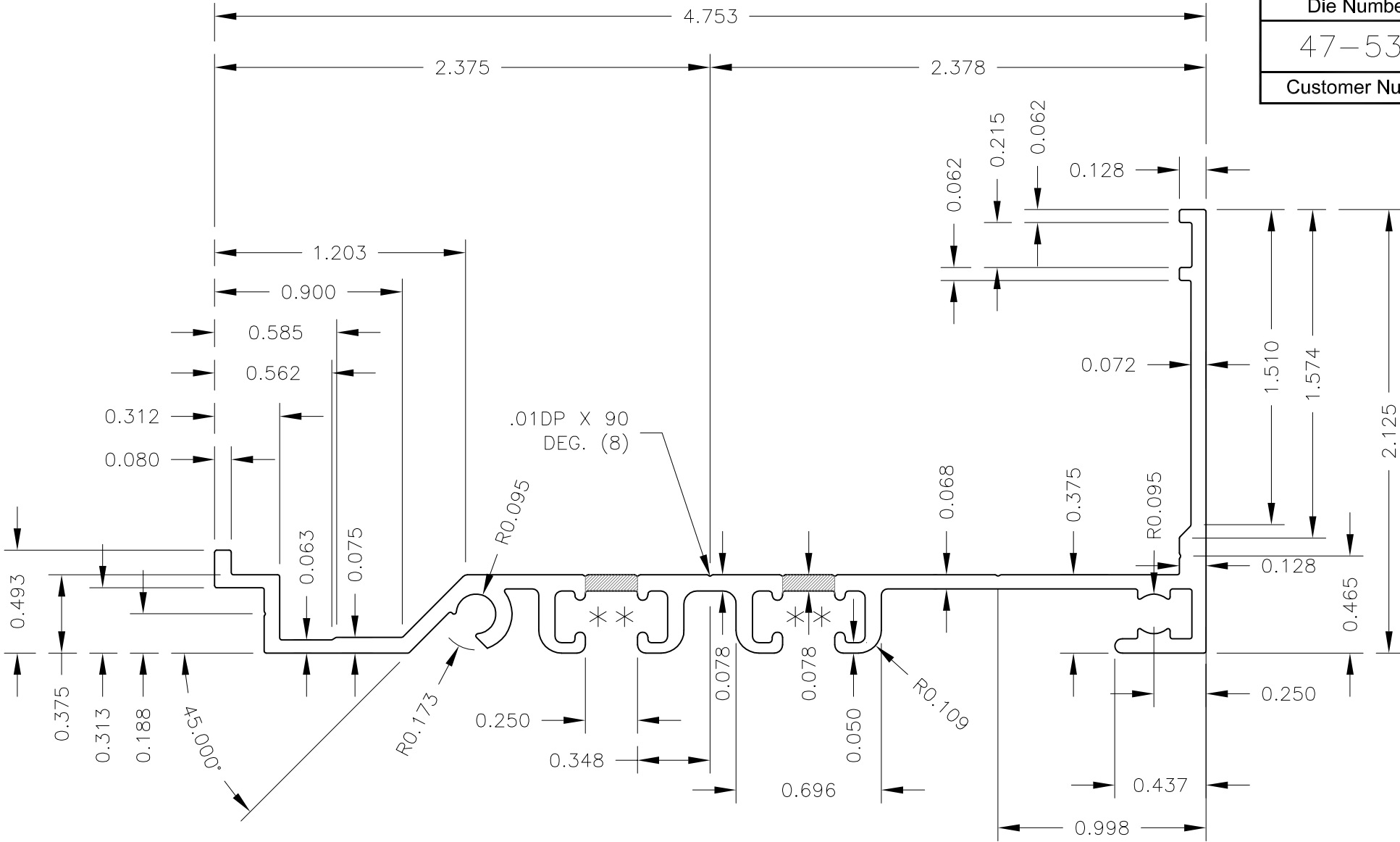
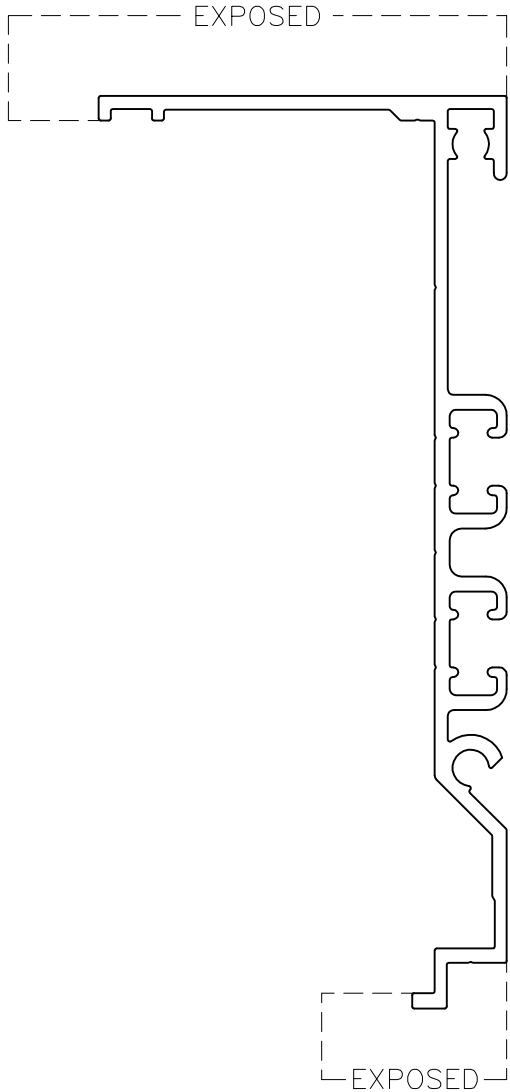
STANDARD TOLERANCES APPLY UNLESS OTHERWISE NOTED



Report #: **G9578-201-45**
Date: **03/24/17**
Verified by:

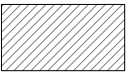
PRINT REVISIONS		DATE

7838
Die Number
47-535
Customer Number



Aluminum Alloy - Anodized

SCALE 1.5:1



= DE-BRIDGE FOR THERMAL BARRIER

ACTUAL SIZE

** POCKETS TO BE AZO-BRADED PRIOR TO FILLING WITH POLYURETHANE POLYMER THERMAL BARRIER.

BREAK UNSPECIFIED CORNER: .010 R. TYPICAL WALL UNLESS OTHERWISE NOTED: _____

ESTIMATED DIE DATA			
ALLOY/TEMPER: 6063-T6			
AREA	0.742	WT/FT	0.873
PERIMETER	20.116	CIRCLE SIZE	5-6
OUTSIDE PERIMETER	20.116	FACTOR	
EXPOSED PERIMETER	3.063	SOLID	

PRESS SIZE	LEGEND
	• = .031 R.
	o = .062 R.
	x = .125 R.
	⊗ = .250 R.
	* =

DIE REVISIONS		DATE



Crown Extrusions, Inc.
122 Columbia Court N.
Chaska, MN 55318
952-448-3533 Fax: 952-448-5328

CUSTOMER
CMI Architectural
CMI Architectural Products, Inc.
20621 SD Highway 25
DeSmet, SD 57231-5827
605-854-3326 Fax: 605-854-3620

PART NAME: 450 DT SUB-SILL

DIE #	7838
SCALE	ACTUAL & NOTED
DATE	1-16-17
LAST REVISION	
DRAWN	GLH
CUSTOMER NUMBER	47-535

STANDARD TOLERANCES APPLY UNLESS OTHERWISE NOTED



Report #: G9578-201-45
Date: 03/24/17
Verified by:

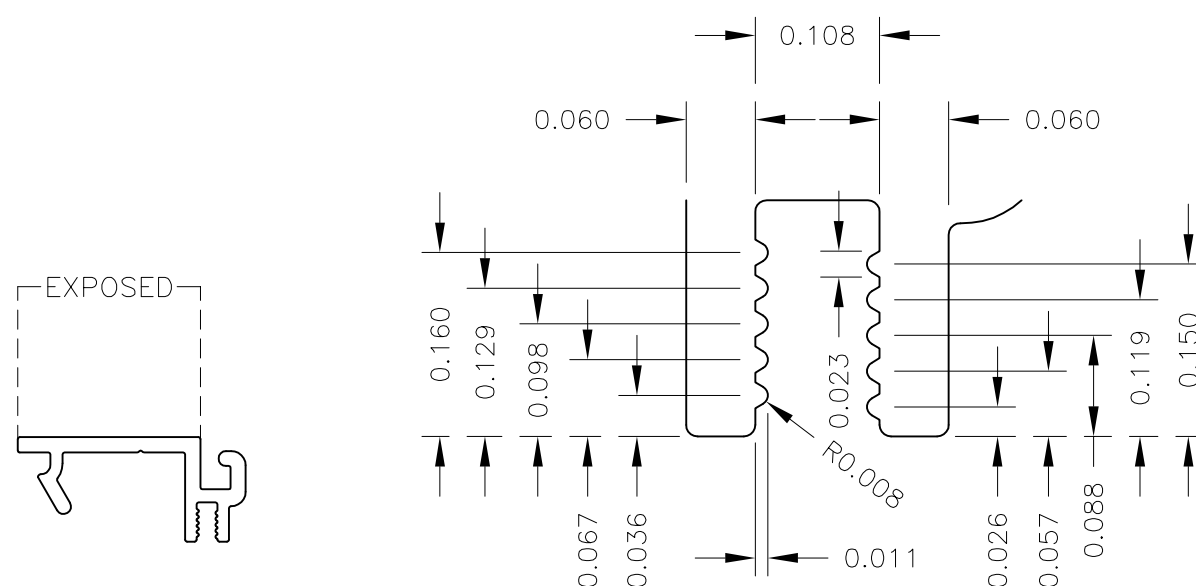
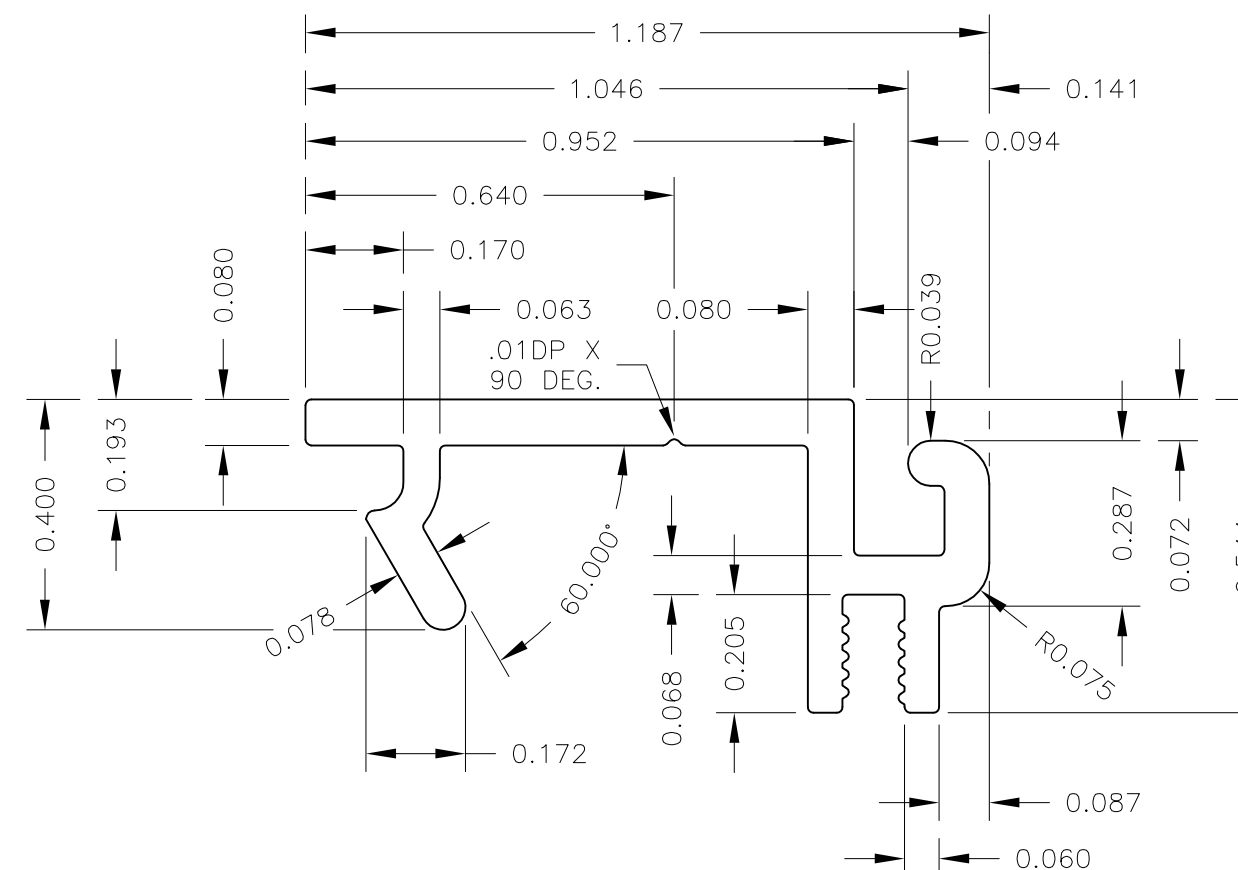
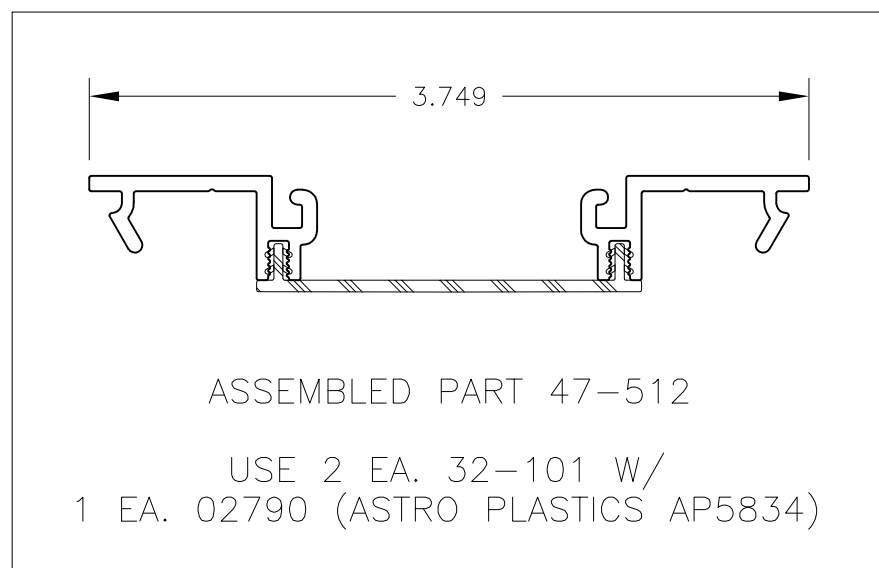
PRINT REVISIONS		DATE

7839

Die Number

32-101

Customer Number



Aluminum Alloy - Anodized

SCALE 3:1

ACTUAL SIZE

SCALE 6:1

BREAK UNSPECIFIED CORNER: .010 R. TYPICAL WALL UNLESS OTHERWISE NOTED: _____

ESTIMATED DIE DATA			
ALLOY/TEMPER:		6063-T6	
AREA	0.185	WT/FT	0.218
PERIMETER	5.206	CIRCLE SIZE	5-6
OUTSIDE PERIMETER	5.206	FACTOR	
EXPOSED PERIMETER	0.952	SOLID	

PRESS SIZE	EXPOSED PERIMETER	0.952	SOLID
LEGEND	DIE REVISIONS		DATE
• = .031 R.	NEW DIE		3/13/17
◦ = .062 R.			
× = .125 R.			
⊗ = .250 R.			
* =			



Crown Extrusions, Inc.
122 Columbia Court N.
Chaska, MN 55318
 952-448-3533 Fax: 952-448-5328

CUSTOMER

CMI Architectural
CMI Architectural Products, Inc.
20621 SD Highway 25
DeSmet, SD 57231-5827
605-854-3326 Fax: 605-854-3620

PART NAME:

450 DT VERTICAL FILLER

DIE #	7839
SCALE	ACTUAL & NOTED
DATE	1-16-17
LAST REVISION	
DRAWN	GLH
CUSTOMER NUMBER	32-101

Report #: G9578-201-45

Date: 03/24/17

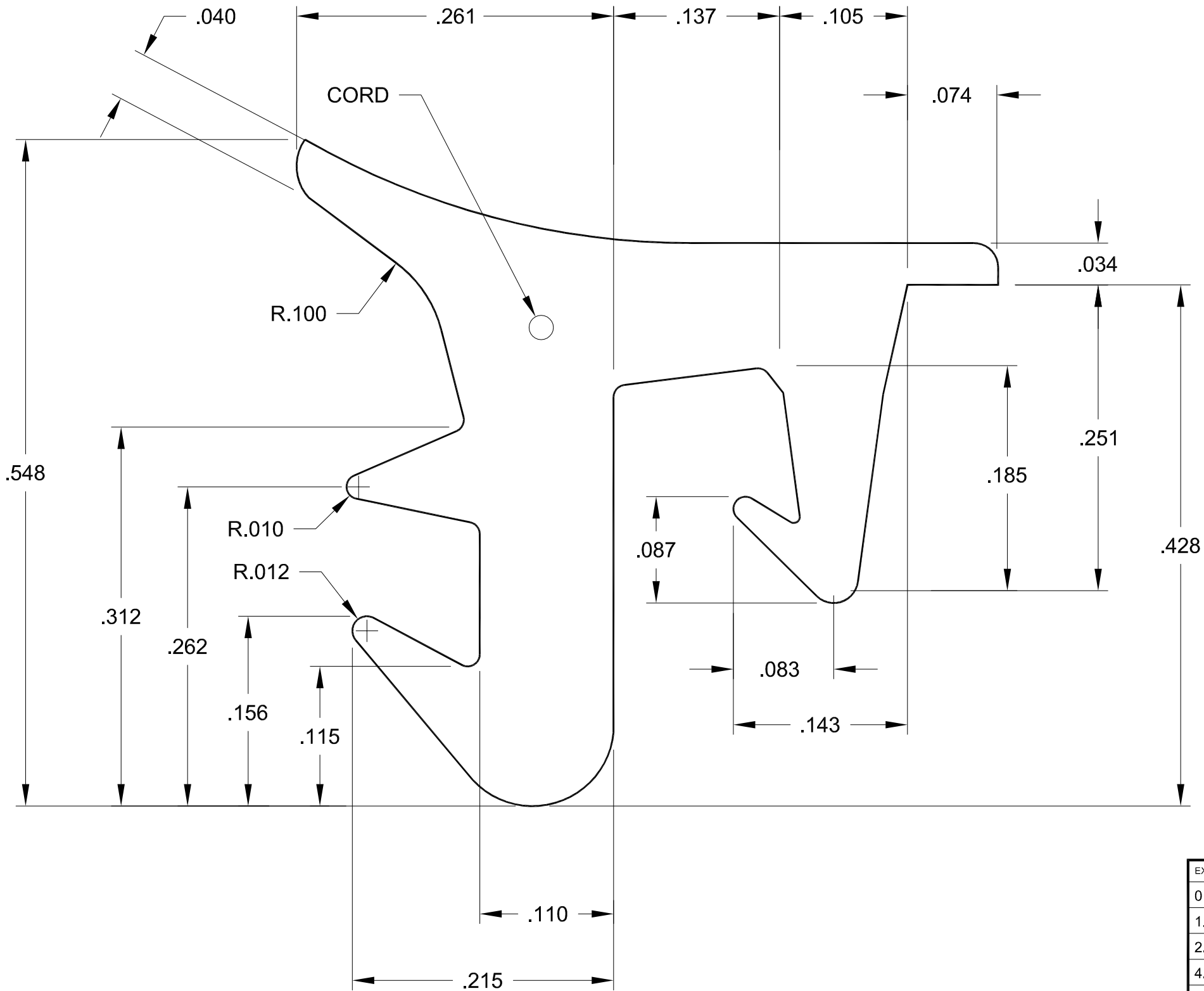
Verified by:

STANDARD TOLERANCES APPLY UNLESS OTHERWISE NOTED





FULL SCALE



EPDM

THIS PROFILE TO BE SILICONE COATED.

EXTRUSION CUT LENGTH TOLERANCE		2	3-11-11	ADDED CORD	DLS
0 - 1.6"	±.060"	1	12-20-07	ADDED NOTE RE: SILICONE COATING	DLS
1.6" - 2.5"	±.080"	No.	Date	Description	By
2.5" - 4.0"	±.100"	TREMCO SEALANT / WEATHERPROOFING DIVISION			1451 Jacobson Ave Ashland, Ohio 44805 U.S.A. Phone : 800-321-6357 Fax : 419-289-6645
4.0" - 6.3"	±.130"	Customer:			Customer Part No.
6.3" - 10.0"	±.160"	CMI			19-120
10.0" - 16.0"	±.200"	Project:			
16.0" - 25.0"	±.250"	Drawn by: E. TANGO			
25.0" - 40.0"	±.400"	Compound: EPDM		Scale: 10X	Date: 6/13/2005
40.0" - 63.0"	±.500"	Durometer: 70 ±5		Designed F.C. *.188	Drawing No.
63.0" - 100.0"	±.630"			Area:	TR-13919E
100.0" - 160.0"	±.800"				
+160.0"	±.50%				

Intertek

Report #:
Date:
Verified by:

G9578-201-45
03/24/17

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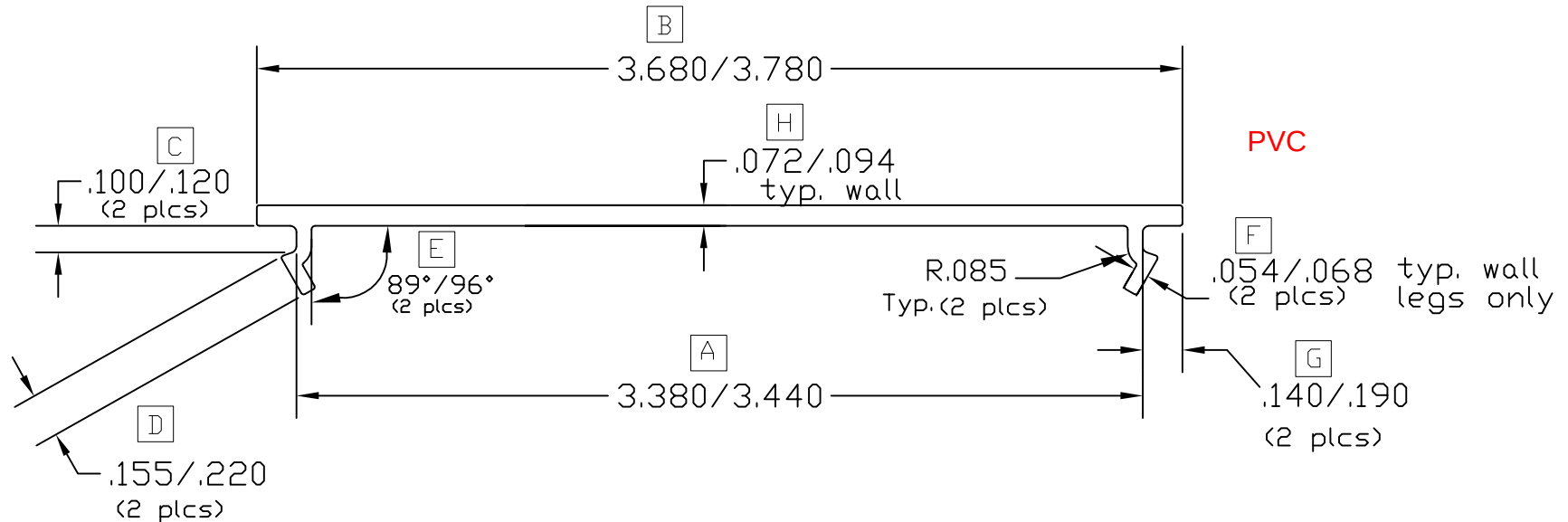
REGRIND DIE

Your signature on this print indicates your approval of design and dimensions as shown. Please sign and return as soon as possible. Die construction cannot proceed until approval is received.

Approved DECEMBER 20 09

Customer CMI

Per _____



REVISIONS

NO.	DESCRIPTION	DATE	BY
1	C WAS .100/.117	4/18/02	JB
1	E WAS 88°/92°	4/18/02	JB
1	G WAS .150/.170	4/18/02	JB
1	H WAS .075/.088	4/18/02	JB
2	C WAS .100/.120	12/15/09	JB
2	D WAS .160/.190	12/15/09	JB
2	F WAS .055/.065	12/15/09	JB
2	G WAS .150/.180	12/15/09	JB
2	H WAS .075/.092	12/15/09	JB



Report #: G9578-201-45

Date: 03/24/17

Verified by: [Signature]

ASTRO PLASTICS
COVINGTON, GA ROSEMOUNT, MN

CMI
Open Back Filler

DATE 3/21/02

SCALE nts

DRAWN BY JB

DRAWING NO.

MATERIAL PVC Color: Black

APPRD. BY JB

AP 4588

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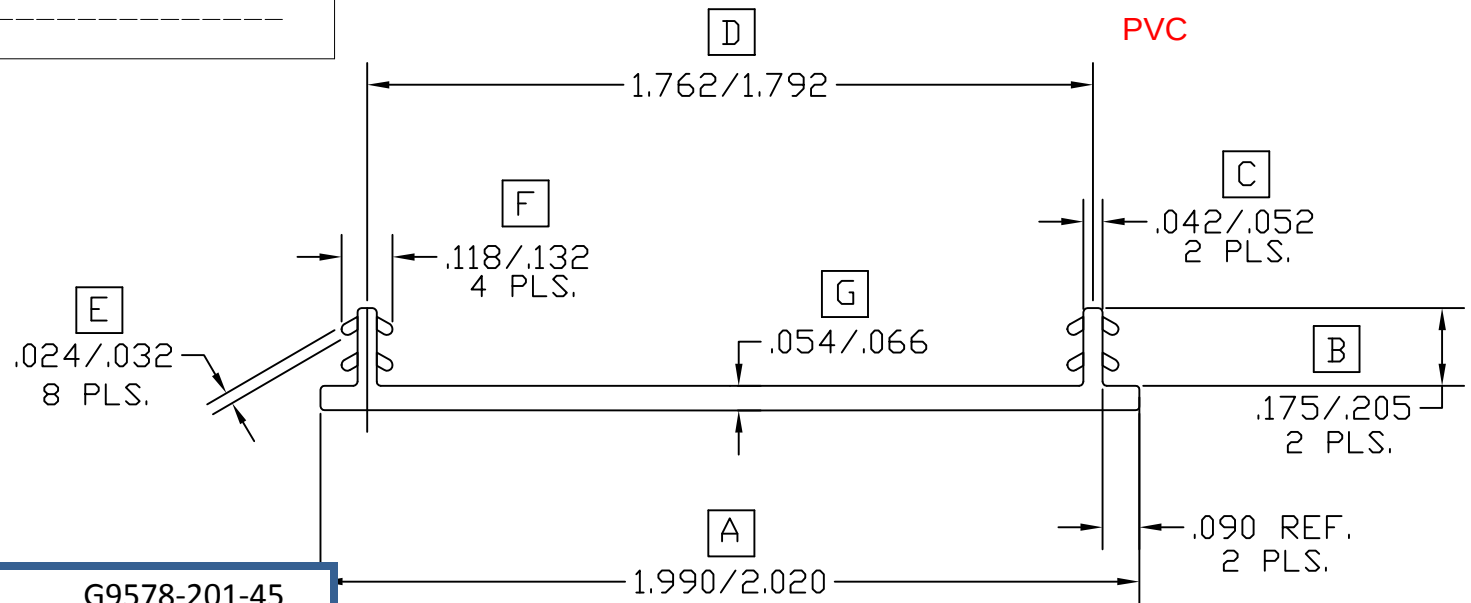
Your signature on this print indicates your approval of design and dimensions as shown. Please sign and return as soon as possible. Die construction cannot proceed until approval is received.

Approved _____ 20 ____

Customer _____

Per _____

NOTE: TRY TO HOLD DIMENSION F AT .125.



Report #: G9578-201-45

Date: 03/24/17

Verified by: *[Signature]*

REVISIONS

NO.	DESCRIPTION	DATE	BY
F	WAS .135/.149	3/13/17	ML

1. BOND IS CRITICAL
2. FIT GAUGE IS CRITICAL.

QUOTE # R-16610

CUSTOMER PART # 02790

TRACKING / X #

ASTRO PLASTICS
COVINGTON, GA ROSEMOUNT, MN

CMI ARCHITECTURAL
450 DT VERTICAL FILLER

DATE 1/25/17

SCALE NONE

DRAWN BY ML

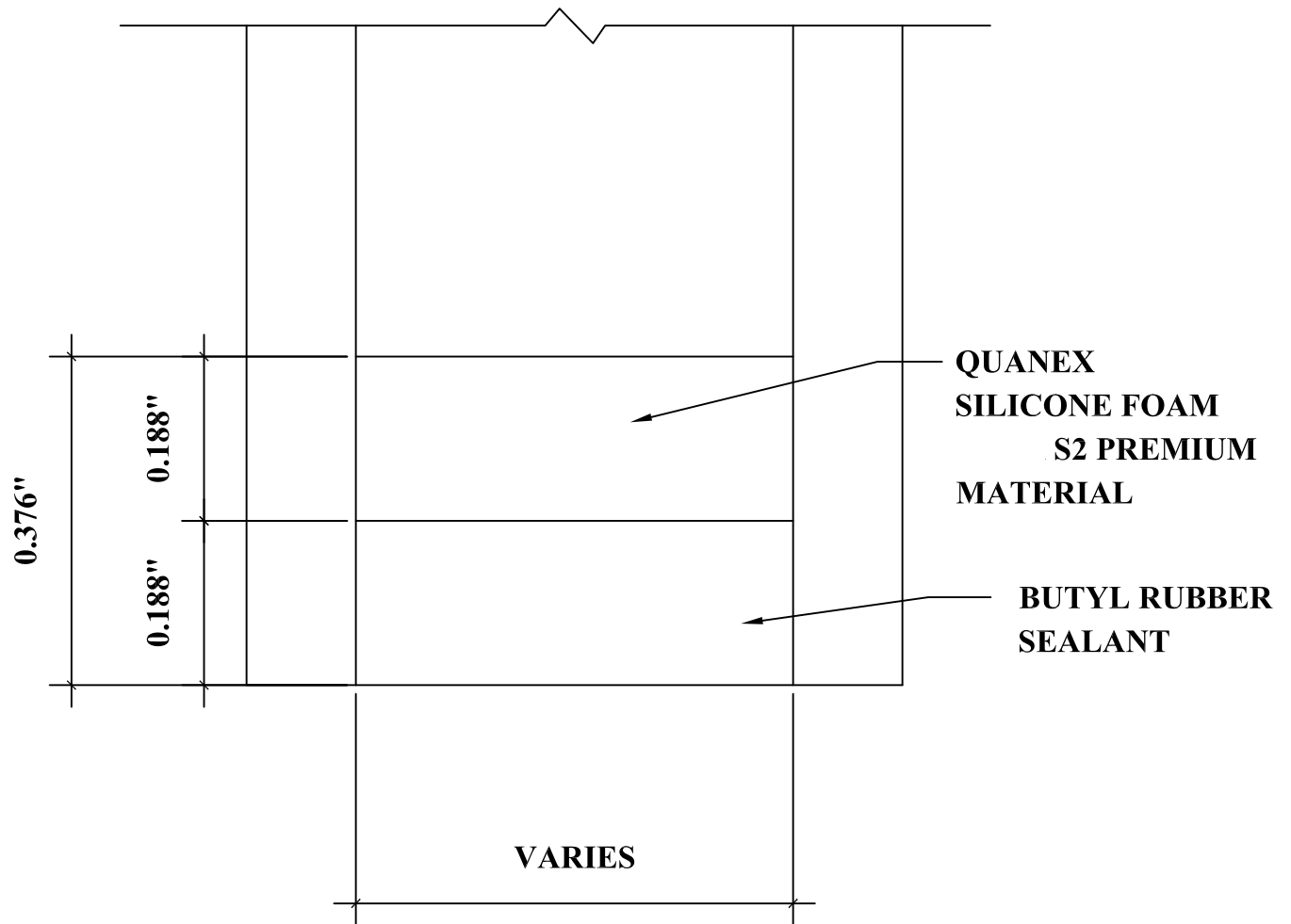
DRAWING NO.

MATERIAL DUAL PVC

APPRD. BY JN

AP5834

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DETAIL FOR THERMAL MODELING OF
QUANEX SUPER SPACER PREMIUM (ZF-S)



Report #: G9578-201-45

Date: 03/24/17

Verified by: *[Signature]*