

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

(Revised)

**Rendered to:
TUBELITE, INC.**

**SERIES/MODEL:
T24650/TU24650 Storefront System**

Report Number: F1416.02-116-45
Original Report Date: 12/09/15
Revised Report Date: 02/10/17



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

(Revised)

Rendered to:
TUBELITE, INC.
4878 Mackinaw Trail
Reed City, Michigan 49677

Report Number: F1416.02-116-45
Simulation Date: 12/09/15
Original Report Date: 12/09/15
Revised Report Date: 02/10/17

Project Summary:

Architectural Testing, Inc., an Intertek Company (Intertek-ATI) 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

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

Standards:

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

NFRC 500-2014: Procedure for Determining Fenestration Product Condensation Resistance Values

Software:

Frame and Edge Modeling: THERM 6.3.46
Center-of-Glass Modeling: WINDOW 6.3.74
Total Product Calculations: WINDOW 6.3.74
Spectral Data Library: IGDB 43.0

Simulations Specimen Description:

Series/Model: T24650/TU24650 Storefront System
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

Modeling Assumptions/Technical Interpretations:

- 1) To prevent air infiltration, tape was applied to all interior sash crack locations.
- 2) This product is available in either a painted or anodized finish. These two finish types can be grouped in accordance with ANSI/NFRC 100-2014, Section 4.2.1.L. The painted finish was simulated since it is the worst case (highest emissivity). The test sample was anodized aluminum.
- 3) The center-lin modeling approach was conducted using the vertical intermediate for the jambs. This procedure is outlined in the NFRC Simulation Manual, Section 8.9.

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 6.3.74. 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.

<i>TU24650 Storefront System</i>	No Dividers	Dividers < 1	Dividers > 1
SHGC0	0.006687	0.010111	0.013320
SHGC1	0.898434	0.797187	0.702258
VT0	0.000000	0.000000	0.000000
VT1	0.891747	0.787076	0.688938

<i>T24650 Storefront System</i>	No Dividers	Dividers < 1	Dividers > 1
SHGC0	0.005180	0.008603	0.011813
SHGC1	0.896927	0.795679	0.700751
VT0	0.000000	0.000000	0.000000
VT1	0.891747	0.787076	0.688938

$$SHGC = SHGC0 + SHGCc (SHGC1 - SHGC0)$$

$$VT = VT0 + VTc (VT1 - VT0)$$

Validation Matrix:

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

<i>Product Line</i>	<i>Report Number</i>
None	-

Spacer Option Description

<i>Spacer Type</i>	<i>Sealant</i>		<i>Code</i>
	<i>Primary</i>	<i>Secondary</i>	
Aluminum Dual Seal Spacer	Butyl Rubber	Butyl Rubber	A1-D

Gas Filling Technique Description

<i>Fill Type</i>	<i>Method</i>
84.48% Xenon	Single Probe Timed
76.14% Argon	Single Probe Timed
88.47% Argon	Single Probe Timed
78.55% Argon	Single Probe Timed
78.10% Krypton	Single Probe Timed
96.76% Argon	Single Probe Timed
64.98% Argon	Single Probe Timed
74.70% Argon	Single Probe Timed
60.78% Argon	Single Probe Timed
62.43% Argon	Single Probe Timed
86.02% Argon	Single Probe Timed
81.60% Xenon	Single Probe Timed
94.54% Xenon	Evacuated Chamber
76.87% Krypton	Single Probe Timed
71.53% Xenon	Single Probe Timed
76.42% Krypton	Single Probe Timed
66.65% Xenon	Single Probe Timed
82.13% Xenon	Single Probe Timed

Edge-of-Glass Construction

<i>Interior Condition</i>	EPDM Gasket Between Aluminum Frame and Glass
<i>Exterior Condition</i>	EPDM Gasket Between Aluminum Frame and Glass

Weatherstripping

<i>Type</i>	<i>Quantity</i>	<i>Location</i>
None	-	-

Frame/Sash Materials Finish

<i>Interior</i>	Painted Aluminum
<i>Exterior</i>	Painted Aluminum

**NFRC 100/200/500 Summary Sheet
T24650/TU24650 Storefront System**

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) Grids (None / <1 / >=1)				Visible Transmittance (VT) Grids (None / <1 / >=1)			Condensation Resistance	
1	TU24650 Storefront System: COG=0.4400											
	0.222	0.500	0.225					XEN84		CL	A1-D	N
	U-Factor 0.50			SHGC (N) 0.62				VT (N) 0.66			CR 42	
2	TU24650 Storefront System: COG=0.4200											
	0.236	0.500	0.225					ARG76	0.654(#2)	RC	A1-D	N
	U-Factor 0.49			SHGC (N) 0.31				VT (N) 0.29			CR 42	
3	TU24650 Storefront System: COG=0.4000											
	0.223	0.500	0.225					ARG88	0.571(#2)	CL	A1-D	N
	U-Factor 0.47			SHGC (N) 0.22				VT (N) 0.15			CR 43	
4	TU24650 Storefront System: COG=0.3800											
	0.236	0.500	0.225					ARG79	0.465(#2)	RC	A1-D	N
	U-Factor 0.45			SHGC (N) 0.19				VT (N) 0.13			CR 44	
5	TU24650 Storefront System: COG=0.3600											
	0.221	0.500	0.225					KRY78	0.406(#2)	SR	A1-D	N
	U-Factor 0.44			SHGC (N) 0.19				VT (N) 0.16			CR 45	
6	TU24650 Storefront System: COG=0.3400											
	0.230	0.500	0.225					ARG97	0.331(#2)	CL	A1-D	N
	U-Factor 0.42			SHGC (N) 0.16				VT (N) 0.11			CR 46	
7	TU24650 Storefront System: COG=0.3200											
	0.223	0.500	0.225					ARG65	0.215(#2)	CL	A1-D	N
	U-Factor 0.40			SHGC (N) 0.56				VT (N) 0.65			CR 47	
8	TU24650 Storefront System: COG=0.3000											
	0.233	0.500	0.225					ARG75	0.166(#2)	CL	A1-D	N
	U-Factor 0.39			SHGC (N) 0.40				VT (N) 0.48			CR 47	
9	TU24650 Storefront System: COG=0.2800											
	0.223	0.500	0.225					ARG61	0.087(#2)	CL	A1-D	N
	U-Factor 0.37			SHGC (N) 0.49				VT (N) 0.68			CR 48	
10	TU24650 Storefront System: COG=0.2600											
	0.223	0.500	0.225					ARG62	0.035(#2)	CL	A1-D	N
	U-Factor 0.36			SHGC (N) 0.35				VT (N) 0.63			CR 49	

**NFRC 100/200/500 Summary Sheet
T24650/TU24650 Storefront System**

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) <small>Grids (None / <1 / >=1)</small>				Visible Transmittance (VT) <small>Grids (None / <1 / >=1)</small>			Condensation Resistance		
11	TU24650 Storefront System: COG=0.2400											
	0.223	0.500	0.223					ARG86	0.035(#2) / 0.035(#3)	CL	A1-D	N
	U-Factor 0.34		SHGC (N) 0.33				VT (N) 0.56			CR 50		
12	TU24650 Storefront System: COG=0.2200											
	0.223	0.500	0.223					XEN82	0.018(#2) / 0.018(#3)	CL	A1-D	N
	U-Factor 0.32		SHGC (N) 0.23				VT (N) 0.46			CR 52		
13	TU24650 Storefront System: COG=0.2000											
	0.223	0.500	0.223					XEN95	0.018(#2) / 0.018(#3)	CL	A1-D	N
	U-Factor 0.31		SHGC (N) 0.23				VT (N) 0.46			CR 52		
14	TU24650 Storefront System: COG=0.1800											
	0.223	0.250	0.003	0.250	0.221			KRY77/AIR	0.018(#2) / 0.76(#3) / 0.11(#4) / 0.028(#5)	CL	A1-D	N
	U-Factor 0.28		SHGC (N) 0.22				VT (N) 0.39			CR 56		
15	TU24650 Storefront System: COG=0.1600											
	0.223	0.250	0.003	0.250	0.223			XEN72/AIR	0.018(#2) / 0.76(#3) / 0.11(#4) / 0.018(#5)	CL	A1-D	N
	U-Factor 0.27		SHGC (N) 0.22				VT (N) 0.41			CR 57		
16	TU24650 Storefront System: COG=0.1400											
	0.223	0.250	0.003	0.250	0.223			KRY76	0.018(#2) / 0.76(#3) / 0.11(#4) / 0.018(#5)	CL	A1-D	N
	U-Factor 0.25		SHGC (N) 0.21				VT (N) 0.41			CR 57		
17	TU24650 Storefront System: COG=0.1200											
	0.223	0.250	0.003	0.250	0.223			XEN67	0.018(#2) / 0.76(#3) / 0.11(#4) / 0.018(#5)	CL	A1-D	N
	U-Factor 0.24		SHGC (N) 0.21				VT (N) 0.41			CR 58		
18	TU24650 Storefront System: COG=0.1000											
	0.223	0.250	0.003	0.250	0.223			XEN82	0.018(#2) / 0.76(#3) / 0.11(#4) / 0.018(#5)	CL	A1-D	N
	U-Factor 0.22		SHGC (N) 0.21				VT (N) 0.41			CR 59		
19	T24650 Storefront System: COG=0.4400											
	0.222	0.500	0.225					XEN84		CL	A1-D	N
	U-Factor 0.53		SHGC (N) 0.61				VT (N) 0.66			CR 42		
20	T24650 Storefront System: COG=0.4200											
	0.236	0.500	0.225					ARG76	0.654(#2)	RC	A1-D	N
	U-Factor 0.51		SHGC (N) 0.31				VT (N) 0.29			CR 42		

**NFRC 100/200/500 Summary Sheet
T24650/TU24650 Storefront System**

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) Grids (None / <1 / >=1)				Visible Transmittance (VT) Grids (None / <1 / >=1)			Condensation Resistance	
21	T24650 Storefront System: COG=0.4000											
	0.223	0.500	0.225					ARG88	0.571(#2)	CL	A1-D	N
	U-Factor 0.50			SHGC (N) 0.21				VT (N) 0.15			CR 43	
22	Single Pocket Thermal Break: COG=0.3800											
	0.236	0.500	0.225					ARG79	0.465(#2)	RC	A1-D	N
	U-Factor 0.48			SHGC (N) 0.19				VT (N) 0.13			CR 44	
23	T24650 Storefront System: COG=0.3600											
	0.221	0.500	0.225					KRY78	0.406(#2)	SR	A1-D	N
	U-Factor 0.47			SHGC (N) 0.19				VT (N) 0.16			CR 46	
24	T24650 Storefront System: COG=0.3400											
	0.230	0.500	0.225					ARG97	0.331(#2)	CL	A1-D	N
	U-Factor 0.45			SHGC (N) 0.16				VT (N) 0.11			CR 46	
25	T24650 Storefront System: COG=0.3200											
	0.223	0.500	0.225					ARG65	0.215(#2)	CL	A1-D	N
	U-Factor 0.43			SHGC (N) 0.56				VT (N) 0.65			CR 47	
26	T24650 Storefront System: COG=0.3000											
	0.233	0.500	0.225					ARG75	0.166(#2)	CL	A1-D	N
	U-Factor 0.42			SHGC (N) 0.40				VT (N) 0.48			CR 48	
27	T24650 Storefront System: COG=0.2800											
	0.223	0.500	0.225					ARG61	0.087(#2)	CL	A1-D	N
	U-Factor 0.40			SHGC (N) 0.49				VT (N) 0.68			CR 48	
28	T24650 Storefront System: COG=0.2600											
	0.223	0.500	0.225					ARG62	0.035(#2)	CL	A1-D	N
	U-Factor 0.38			SHGC (N) 0.35				VT (N) 0.63			CR 49	
29	T24650 Storefront System: COG=0.2400											
	0.223	0.500	0.223					ARG86	0.035(#2) / 0.035(#3)	CL	A1-D	N
	U-Factor 0.37			SHGC (N) 0.33				VT (N) 0.56			CR 50	
30	T24650 Storefront System: COG=0.2200											
	0.223	0.500	0.223					XEN82	0.018(#2) / 0.018(#3)	CL	A1-D	N
	U-Factor 0.35			SHGC (N) 0.23				VT (N) 0.46			CR 52	

**NFRC 100/200/500 Summary Sheet
T24650/TU24650 Storefront System**

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) Grids (None / <1 / >=1)				Visible Transmittance (VT) Grids (None / <1 / >=1)			Condensation Resistance	
31	T24650 Storefront System: COG=0.2000											
	0.223	0.500	0.223					XEN95	0.018(#2) / 0.018(#3)	CL	A1-D	N
	U-Factor 0.34			SHGC (N) 0.23				VT (N) 0.46			CR 52	
32	T24650 Storefront System: COG=0.1800											
	0.223	0.250	0.003	0.250	0.221			KRY77/AIR	0.018(#2) / 0.76(#3) / 0.11(#4) / 0.028(#5)	CL	A1-D	N
	U-Factor 0.31			SHGC (N) 0.22				VT (N) 0.39			CR 54	
33	T24650 Storefront System: COG=0.1600											
	0.223	0.250	0.003	0.250	0.223			XEN72/AIR	0.018(#2) / 0.76(#3) / 0.11(#4) / 0.018(#5)	CL	A1-D	N
	U-Factor 0.30			SHGC (N) 0.22				VT (N) 0.41			CR 54	
34	T24650 Storefront System: COG=0.1400											
	0.223	0.250	0.003	0.250	0.223			KRY76	0.018(#2) / 0.76(#3) / 0.11(#4) / 0.018(#5)	CL	A1-D	N
	U-Factor 0.28			SHGC (N) 0.21				VT (N) 0.41			CR 54	
35	T24650 Storefront System: COG=0.1200											
	0.223	0.250	0.003	0.250	0.223			XEN67	0.018(#2) / 0.76(#3) / 0.11(#4) / 0.018(#5)	CL	A1-D	N
	U-Factor 0.27			SHGC (N) 0.21				VT (N) 0.41			CR 54	
36	T24650 Storefront System: COG=0.1000											
	0.223	0.250	0.003	0.250	0.223			XEN82	0.018(#2) / 0.76(#3) / 0.11(#4) / 0.018(#5)	CL	A1-D	N
	U-Factor 0.25			SHGC (N) 0.21				VT (N) 0.41			CR 54	

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.

Intertek-ATI is an NFRC accredited simulation laboratory and all simulations were conducted in full compliance with NFRC approved procedures and specifications. The values included in this report are not considered in compliance with ANSI/NFRC 100, ANSI/NFRC 200, and/or NFRC 500 unless the associated validation test requirements have been satisfied, as applicable.

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 December 9, 2020.

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:

Allison M. Ford
Simulation Technician

Kristen L. Louder
Senior Simulation Technician
Simulator-In-Responsible-Charge

AMF:amf

F1416.02-116-45

Attachments (pages): This report is complete only when all attachments listed are included.
Appendix A: Drawings and Bills of Material (23)

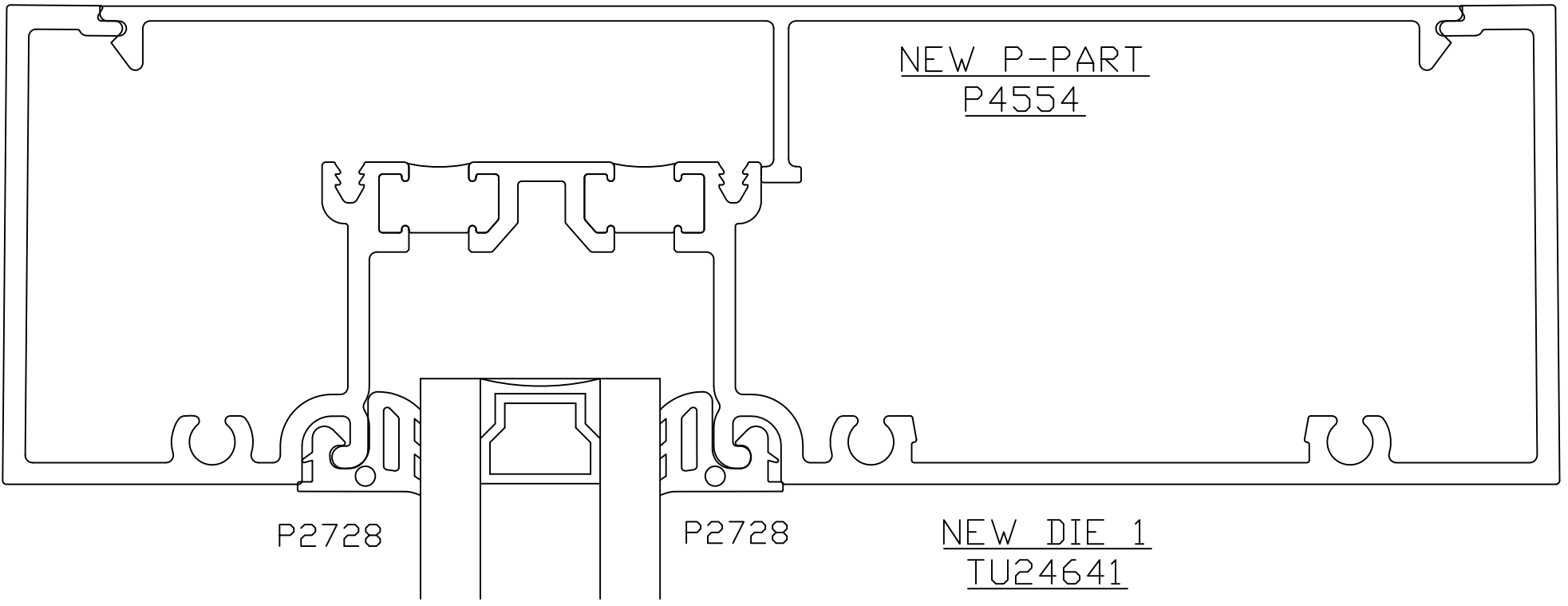
Revision Log

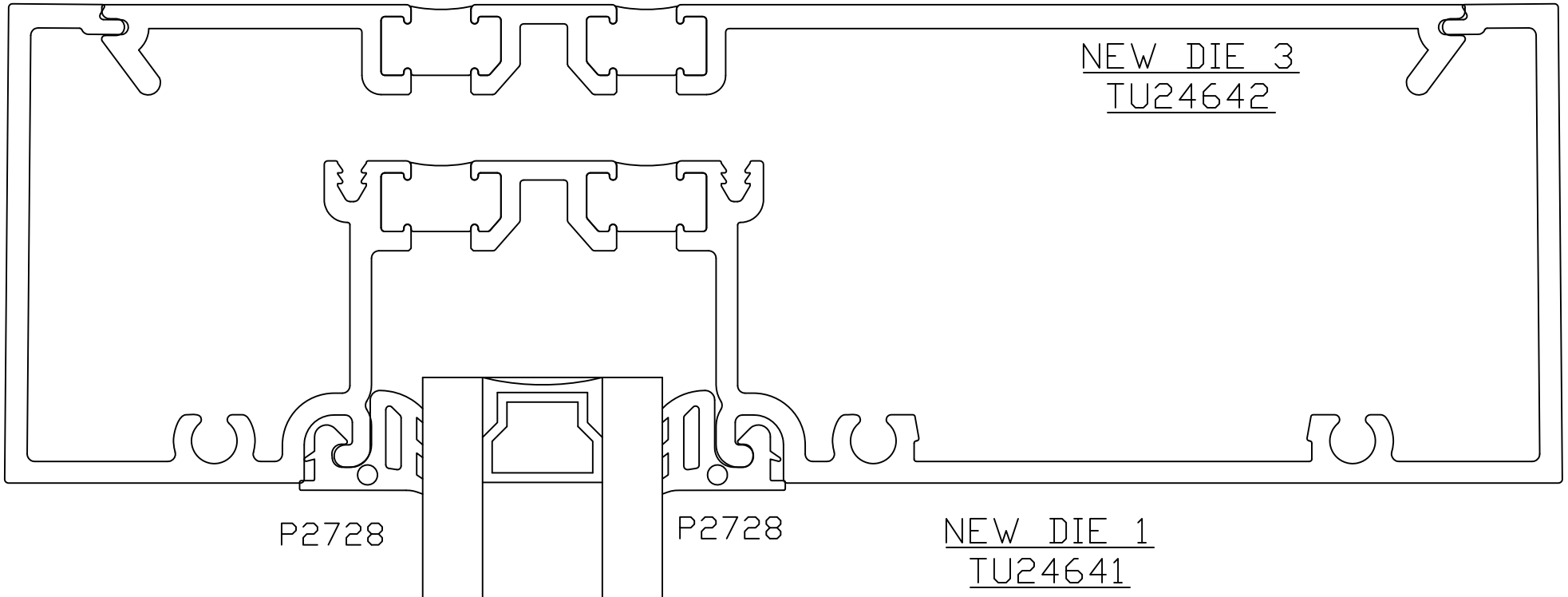
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.02R0	12/09/15	All	Original Report Issued to Tubelite, Inc..
.02R1	02/10/17	All	Updated Series/Model name.

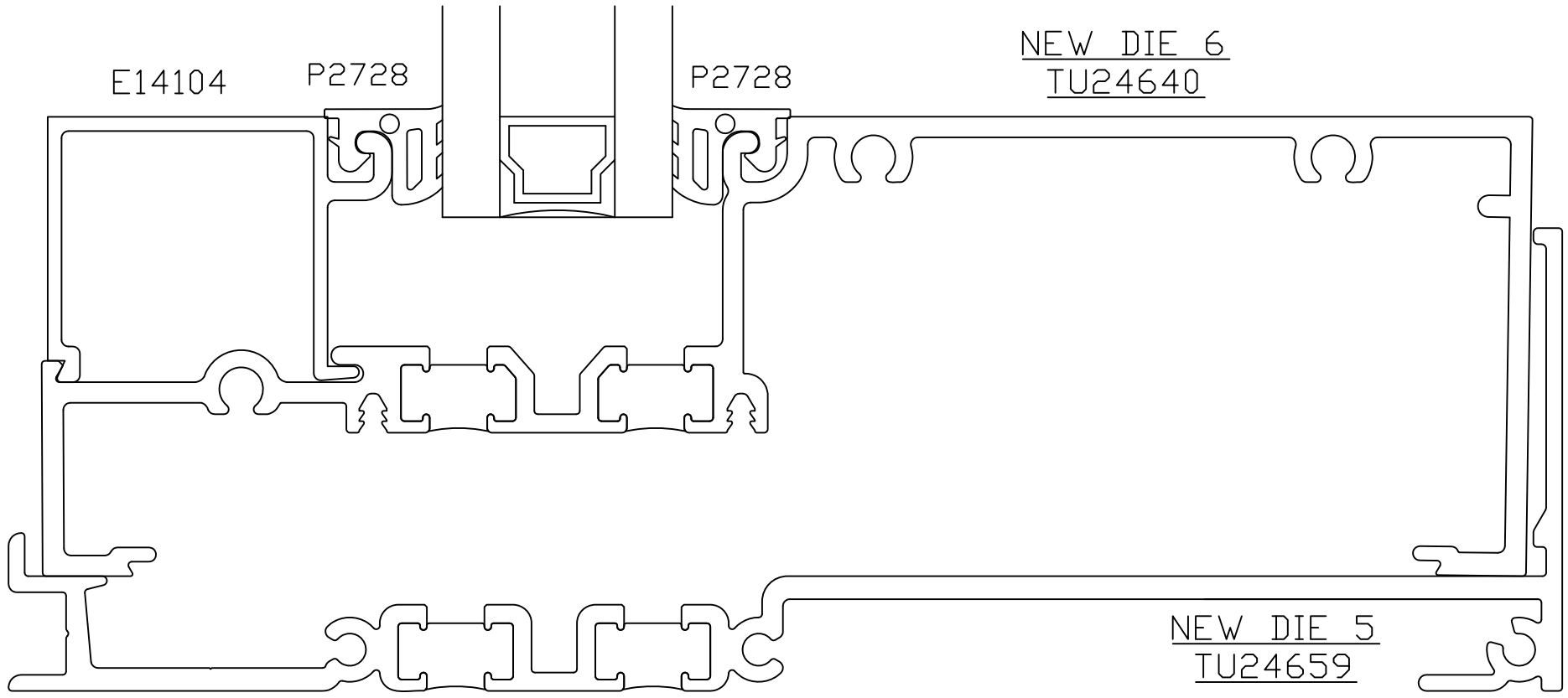
All drawings and Bills of Material used to simulate this product are enclosed in this Appendix

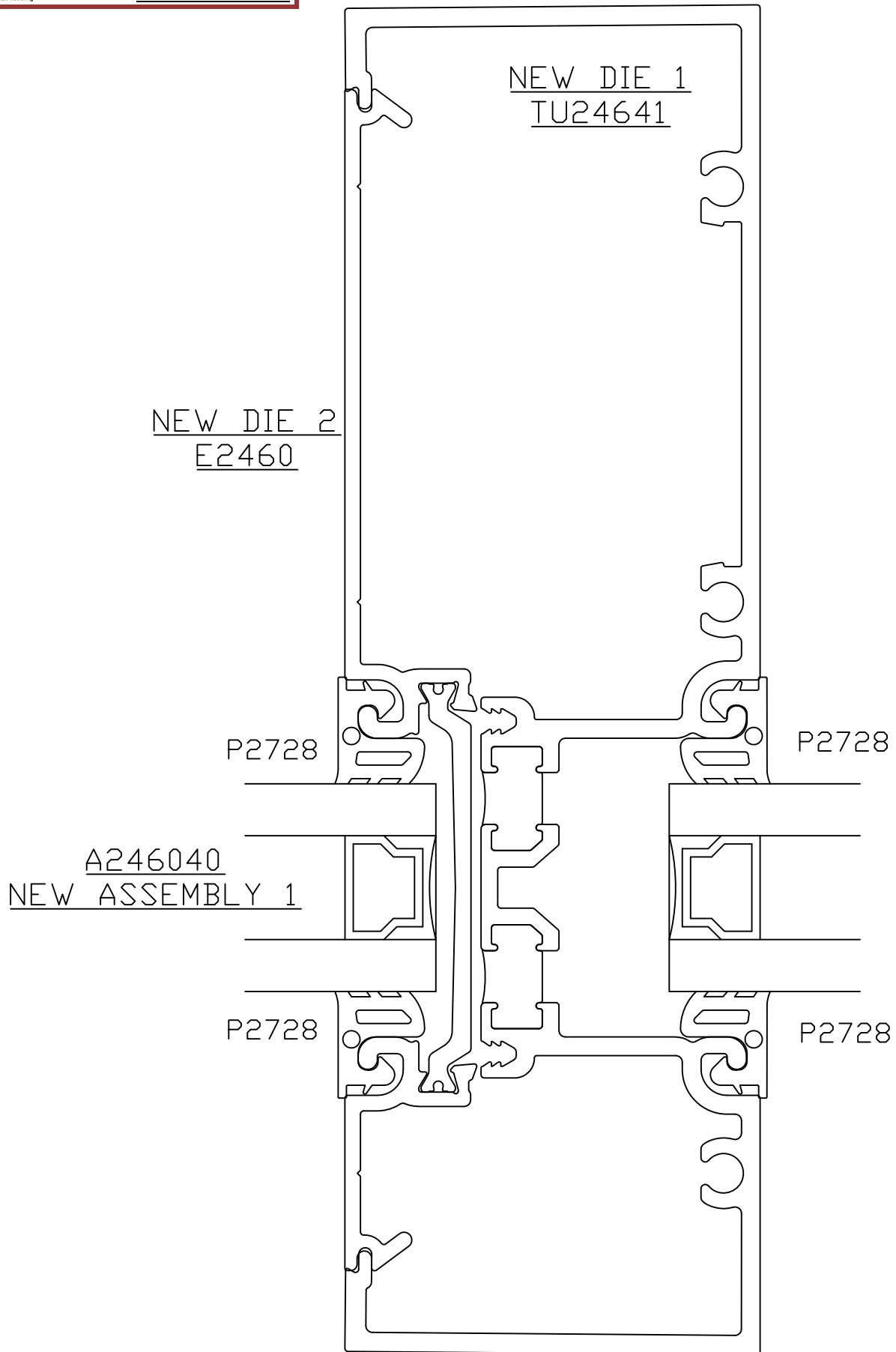
Appendix A

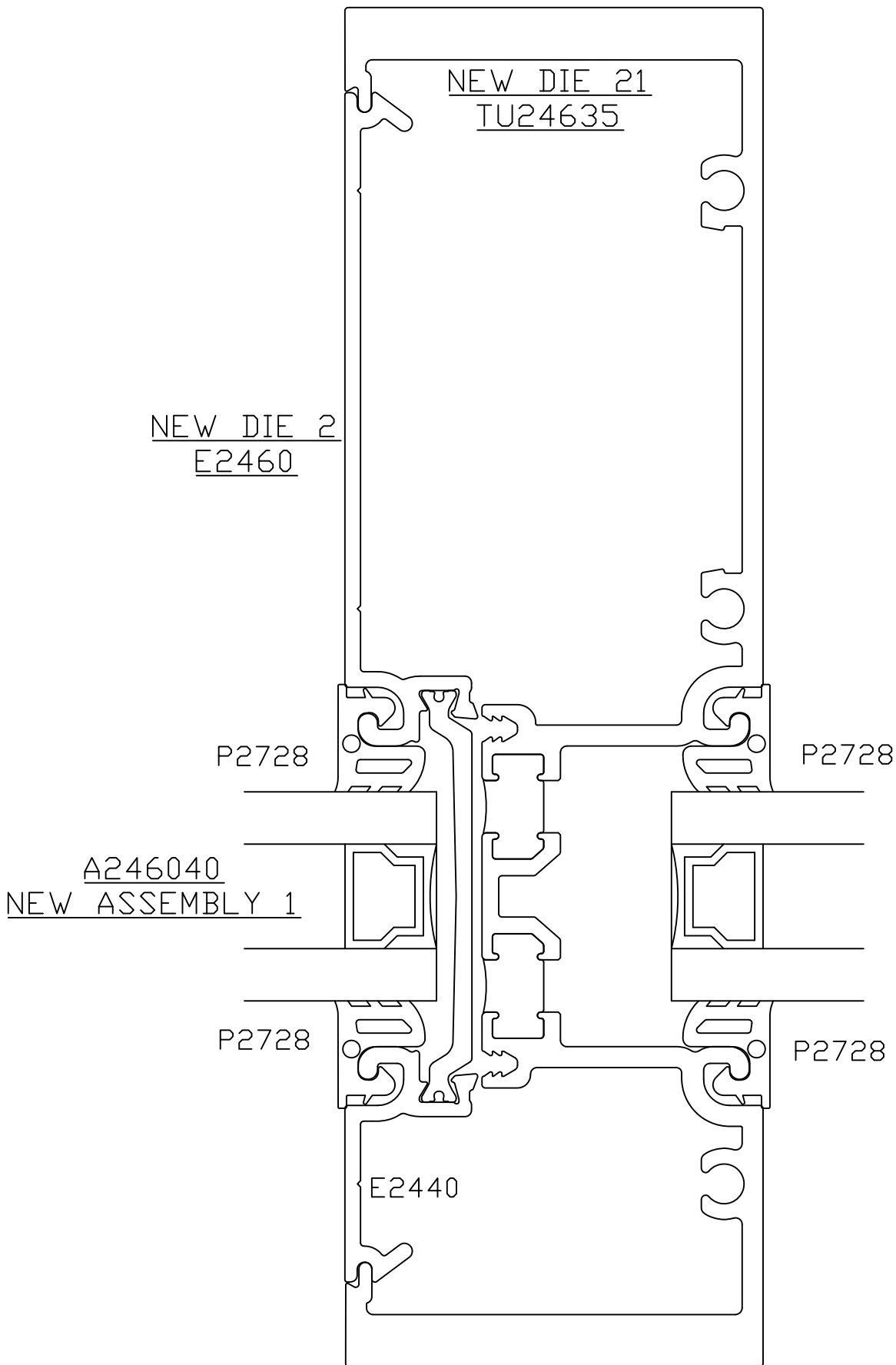
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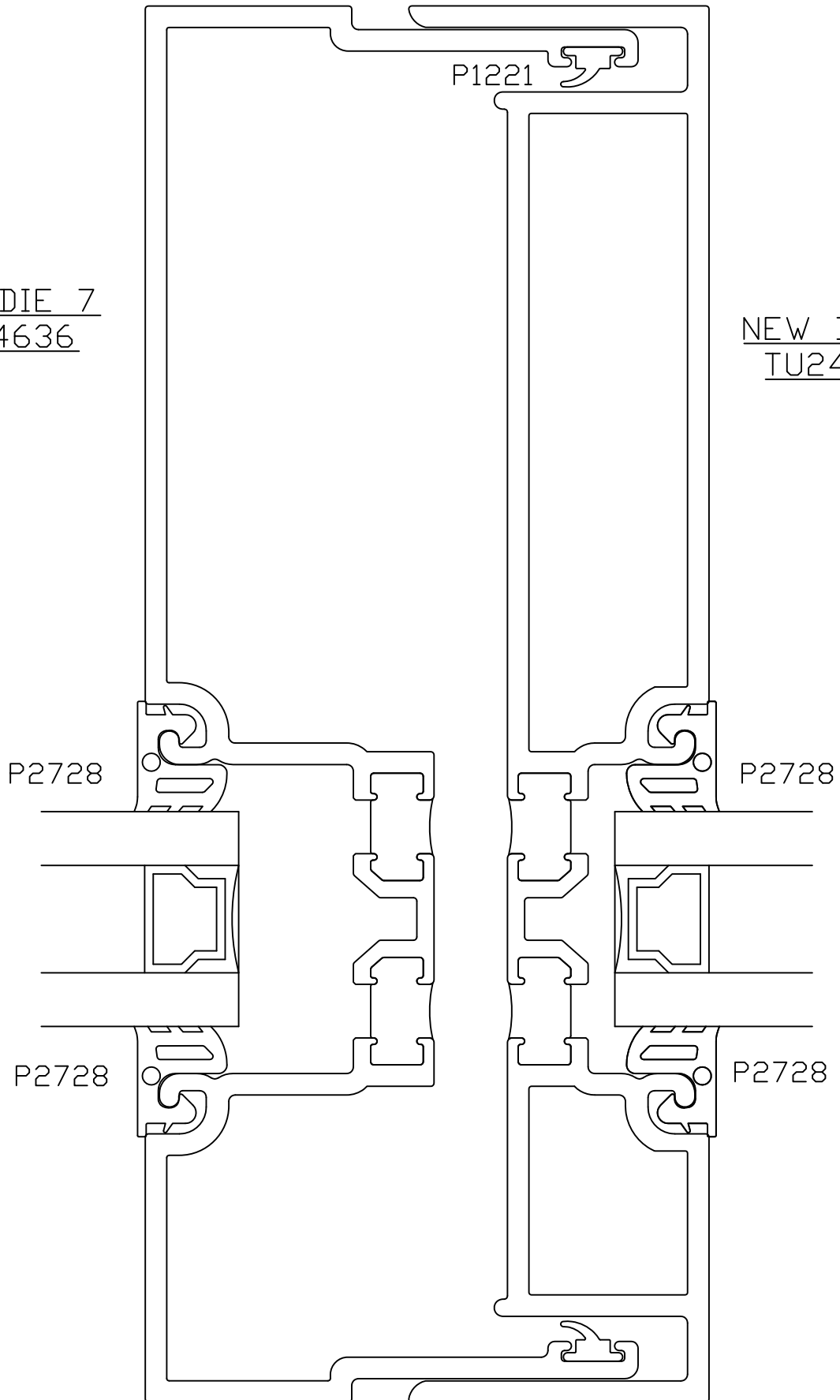






NEW DIE 7
TU24636

NEW DIE 8
TU24646



Bill of materials

Part Description	Part Number	Material
Glass stop	E14104	anodized aluminum
Open Back Sill	TU24640	anodized aluminum
Sub-Sill	TU24659	anodized aluminum
Exterior and Interior Gasket	P2728	EPDM
Sill Baffle	P6598	Rigid PVC
Thermal Barrier	N/A	Polyurethane
Vertical / Head	TU24641	anodized aluminum
Intermed Heavy Vertical	TU24635	anodized aluminum
Intermed Expansion Vert	TU24636	anodized aluminum
Intermed Expansion Vert	TU24646	anodized aluminum
Snap in Filler	A246040	anodized aluminum
Child extrusion	E2460	anodized aluminum
Child extrusion	E2440	anodized aluminum
Wiper Gasket	P1221	Dense Neoprene 70 dur
Flat Filler	P4554	Rigid PVC
Flat Filler	TU24642	anodized aluminum

A246040

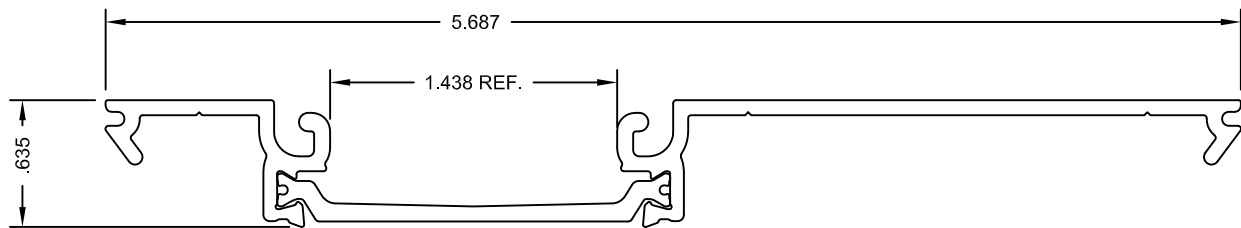
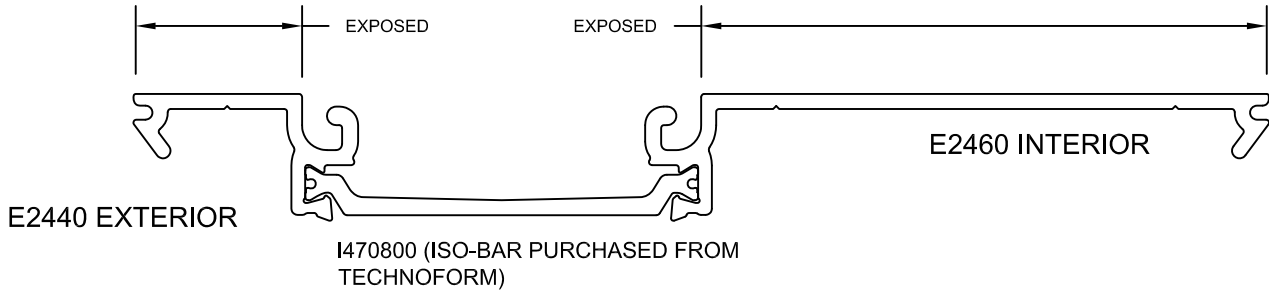
Intertek



Report #: F1416-116-45

Date: 11/25/15

Verified by: *Allison M. Hooper*



A246040 IS 290"

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ALL UNSPECIFIED RADII .015

* INDICATES .031 RADIUS

DENOTES CRITICAL DIMENSION

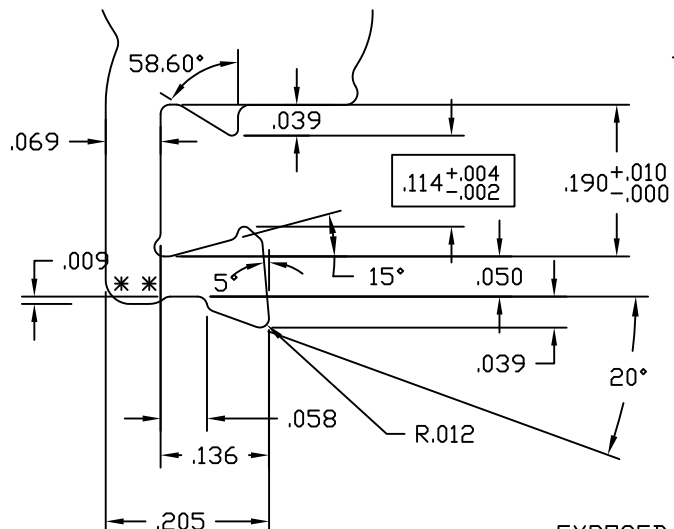
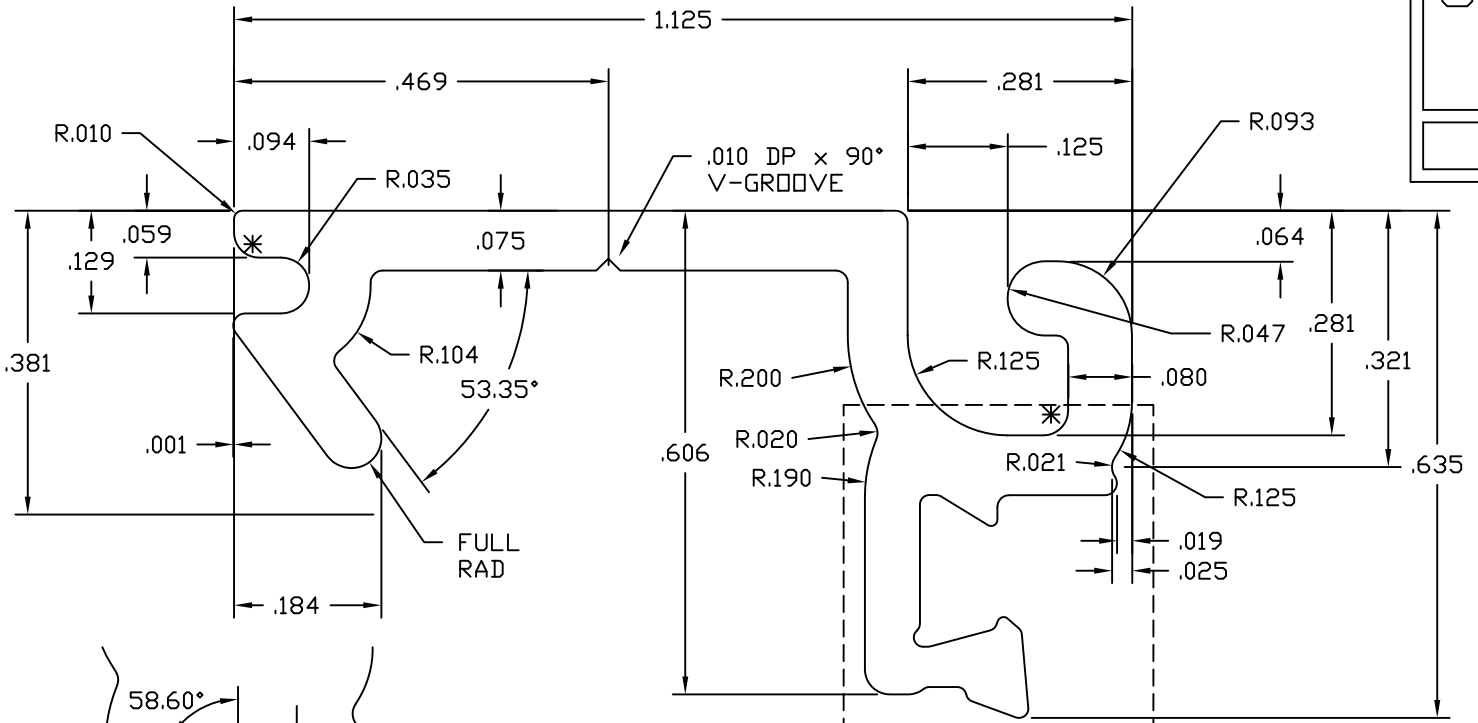
TUBELITE®
DEPENDABLE

3056 WALKER RIDGE NW, SUITE G
WALKER, MICHIGAN 49544

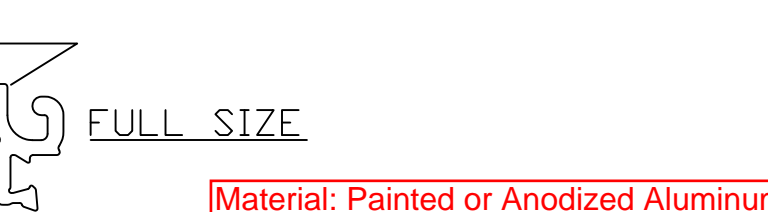
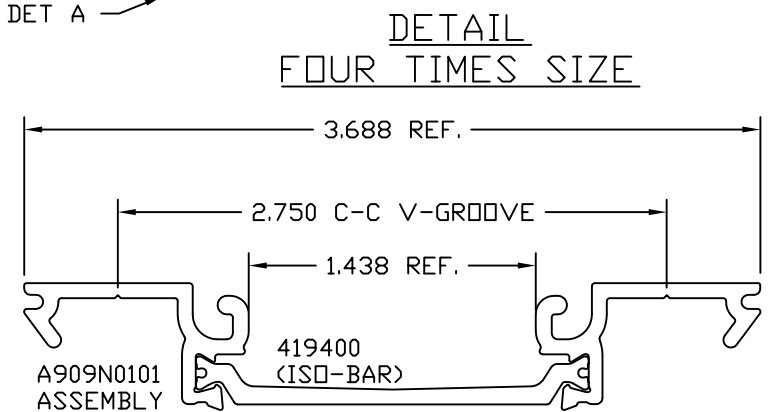
REV	DATE	DESCRIPTION	INTL

24650 CLOSURE POCKET

DRAWN BY BS	DRWG DATE 07/29/15	APPV,D BY	DATE APPVD
DRWG SCALE FULL	PRODUCT CODE 550	A246040	
			REV



DETAIL "A"
FOUR TIMES SIZE



FULL SIZE

Material: Painted or Anodized Aluminum

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ALUMINUM ASSOCIATION STANDARD TOLERANCES APPLY UNLESS NOTED
ALL UNSPECIFIED RADII .015
* INDICATES .031 RADIUS
□ DENOTES CRITICAL DIMENSION
ALL DIES PROPERTY OF TUBELITE



3056 WALKER RIDGE NW, SUITE G
WALKER, MICHIGAN 49544

WALL THK.	.075	SECTION CLASS	S	MAT'L	6063-T5	RATIO	311:1
PERIMETER OUT (TOTAL)	4.795	AREA	.177	WGT/FT	.208		
FACTOR	23	CIRCLE SIZE	1.156	INFILL VOLUME	NA		

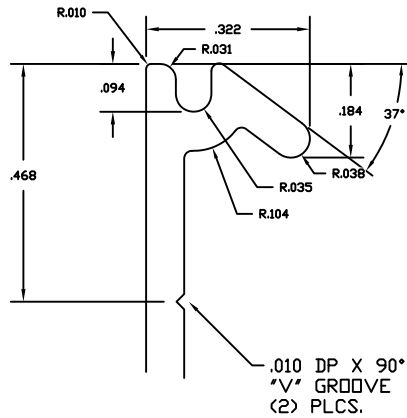
RXX	.350	SXX	.034	IXX	.022	CXX	.161
RYY	.172	SYX	.012	IYY	.005	CYY	.108

CLOSURE POCKET
E24000

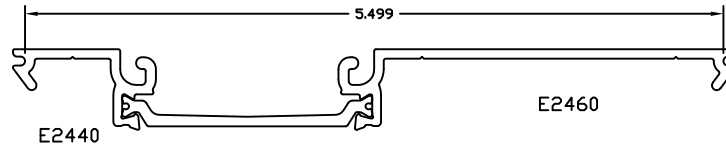
REV	DATE	DESCRIPTION	INTL
	09/04/2013	WAS E2445 REV B	CRH
	01/07/14	WAS E909N01	DRK

DRAWN BY	HLP	DRWG DATE	12-04-12	APPV'D BY		DATE APPV'D	
DWG SCALE	NOTED	PRODUCT CODE		E2440		REV	

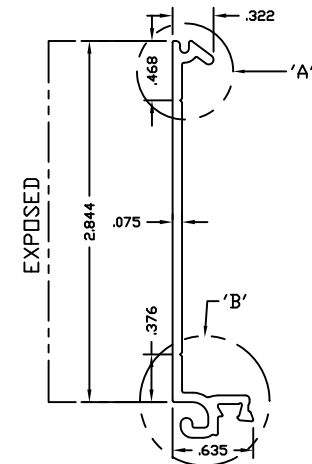
E2460



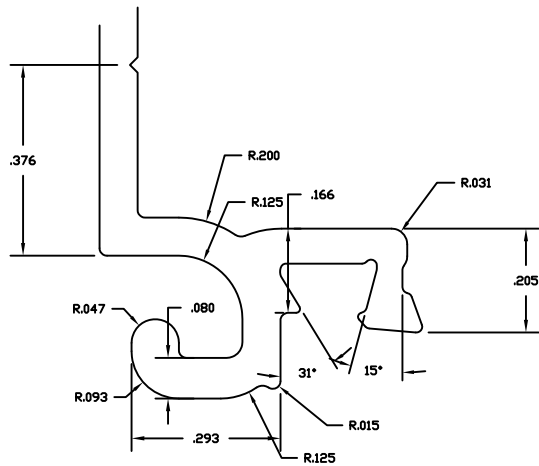
DETAIL 'A'
FOUR TIMES SIZE



FULL SIZE ASSEMBLY



ACTUAL SIZE



DETAIL 'B'
FOUR TIMES SIZE

Material: Painted or Anodized Aluminum

ASSEMBLY WITH E2440

INDICATES CRITICAL DIMENSION

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TOLERANCES APPLY UNLESS NOTED

ALL UNSPECIFIED CORNERS .015R

* INDICATES .031 RADIUS

TUBELITE
DEPENDABLE

4878 MACKINAW TRAIL
REED CITY, MICHIGAN 49677

WALL THK	0.075	SECTION	S	MAT'L	6063-T5	RATIO	54:1
PERIMETER OUT (TOTAL)	8.807	AREA	0.327	WGT/FT	0.384		
FACTOR	23	CIRCLE SIZE	3.190	INFILL VOLUME	N/A		

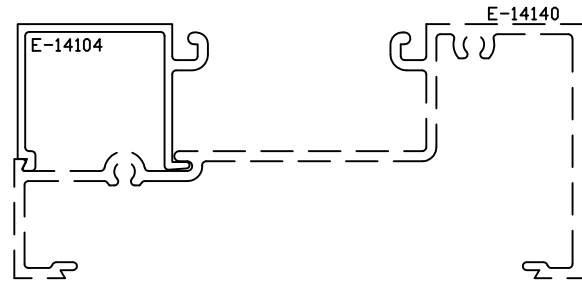
RXX	1.041	SXX	0.202	IXX	0.354	CXX	.508
RYY	0.152	SYY	0.015	IYY	0.008	CYY	1.755

REV	DATE	DESCRIPTION	INTL
	08/31/15	RELEASED FOR TOOLING, ACCT #4827300000.7020.770	CRH

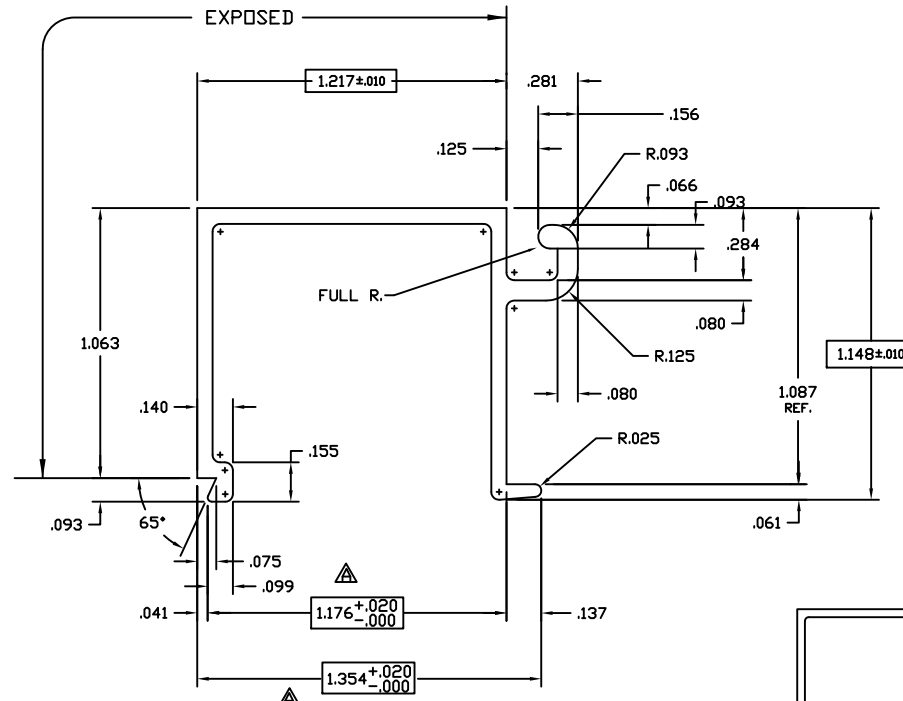
STRUTTED SNAP IN GLASS POCKET
TU24650 THERMAL STOREFRONT

DRAWN BY	BMS	DRWG DATE	07/17/15	APPV'D BY		DATE APPV'D	
DWG SCALE	NOTED	PRODUCT CODE	550	E2460		REV	

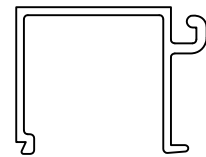
E14104
B



ASSEMBLY
NOTE: MATES WITH E-14140 AND E-14103



TWO TIMES SCALE



SCALE: FULL

Material: Painted or Anodized Aluminum

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TOLERANCES APPLY UNLESS NOTED

ALL UNSPECIFIED RADII .015
* INDICATES .031 RADIUS

□ DENOTES CRITICAL DIMENSION
ALL DIES PROPERTY OF TUBELITE

TUBELITE
SUPERDUAL™
LEADING IN ECO-FRIENDLY OPERATING
CURTAINWALL AND ENTRANCE SYSTEMS

3056 WALKER RIDGE NW, SUITE G
WALKER, MICHIGAN 49544

WALL THK. .060	SECTION CLASS S	MAT'L 6063-T5	RATIO 70
PERIMETER BUT (TOTAL) 8.270	AREA .264	WGT/FT .310	
FACTOR 27	CIRCLE SIZE 1.784	INFILL VOL/INE N/A	

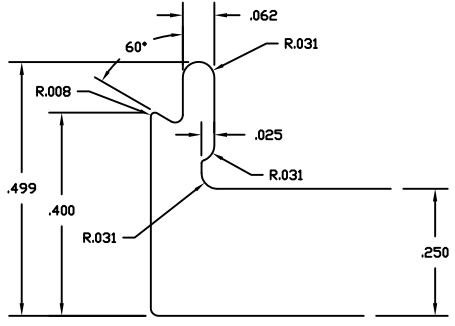
RXX .550	SXX .106	IXX .080	CXX .757
RYY .374	SYX .049	IYY .037	CYY .749

REV	DATE	DESCRIPTION	INTL
	4/1/93	RELEASE TO TOOLING	REV
	5/18/93	RELEASE TO PRODUCTION	KMH
	7/7/93	REVISE EXTR. Ø WAS E-14003	KMH
A	12/2/97	REVISE TOLERANCES	KMH
B	3/18/98	REV. & REL. TO PROD./TOL. CHANGE NOTED AS	SHF

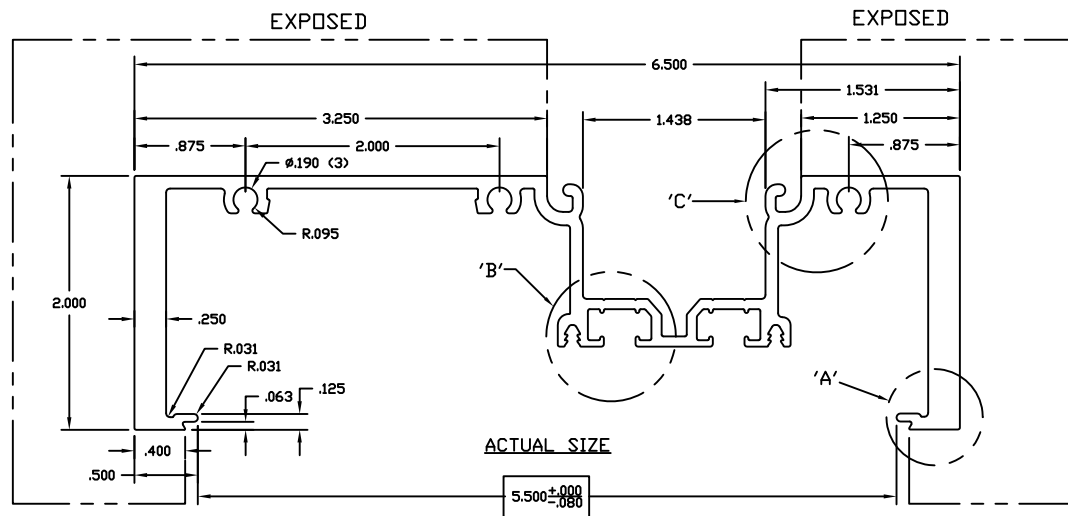
GLASS STOP FOR 1" GLASS
E14000 NON THERMAL STOREFRONT

DRAWN BY: KMH	DRWG DATE: 03/11/93	APPV'D BY:	DATE APPV'D:
DWG SCALE: NOTED	PRODUCT CODE: 190	E14104	REV: B

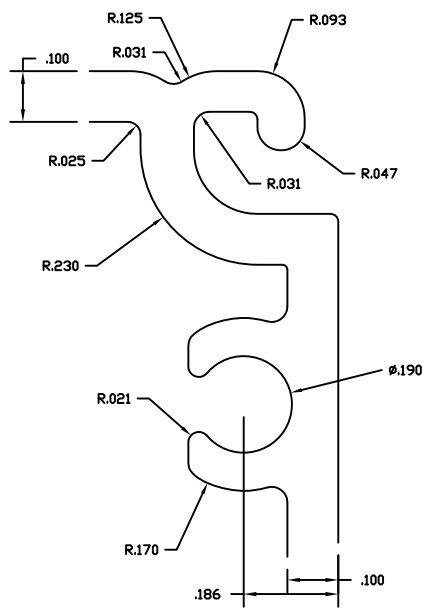
E24635



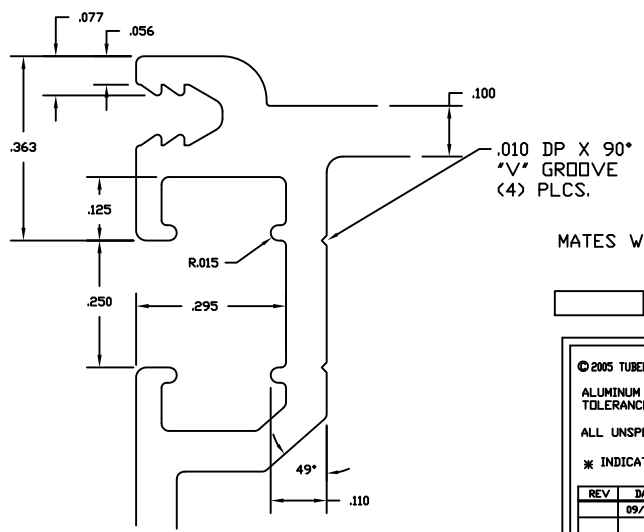
DETAIL 'A'
FOUR TIMES SIZE



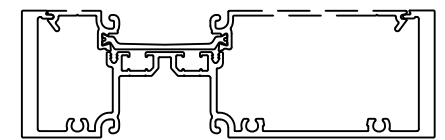
ACTUAL SIZE



DETAIL 'C'
FOUR TIMES SIZE



DETAIL 'B'
FOUR TIMES SIZE



HALF SIZE ASSEMBLY

MATES WITH A246040, E24642, P4554

 INDICATES CRITICAL DIMENSION

LANCED AND FULLY DEBRIDGE

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 ALUMINUM ASSOCIATION STANDARD TOLERANCES APPLY UNLESS NOTED
 ALL UNSPECIFIED CORNERS .01SR
 * INDICATES .031 RADIUS
 4878 MACKINAW TRAIL
 REED CITY, MICHIGAN 49677

TUBELITE
DEPENDABLE

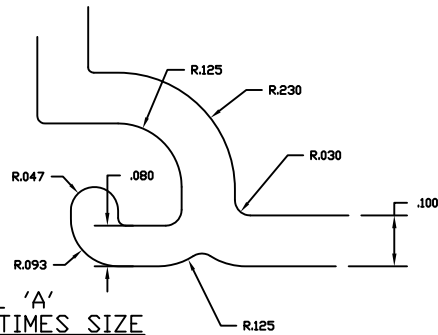
WALL THK	0.100	SECTION CLASS	S	MAT'L	6063-T5	RATIO	54:1
PERIMETER OUT (TOTAL)	32.970	AREA	2.102	WGT/FT	2.472		
FACTOR	13	CIRCLE SIZE	6.802	INFILL VOLUME	0.261		
RXX	2.472	SXX	3.770	IXX	12.844	CXX	3.408
RYY	.608	SYY	0.622	IYY	.777	CYY	0.751

OPEN BACK HEAVY VERTICAL 2" X 6 1/2" TU24650 THERMAL STOREFRONT

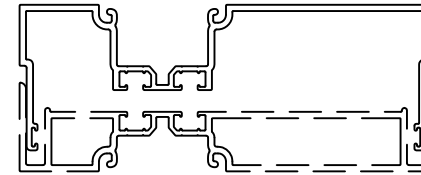
DRAWN BY	BMS	DRWG DATE	07/17/15	APPV'D BY		DATE APPV'D	
DWG SCALE	NOTED	PRODUCT CODE	550		E24635	REV	

Material: Painted or Anodized Aluminum

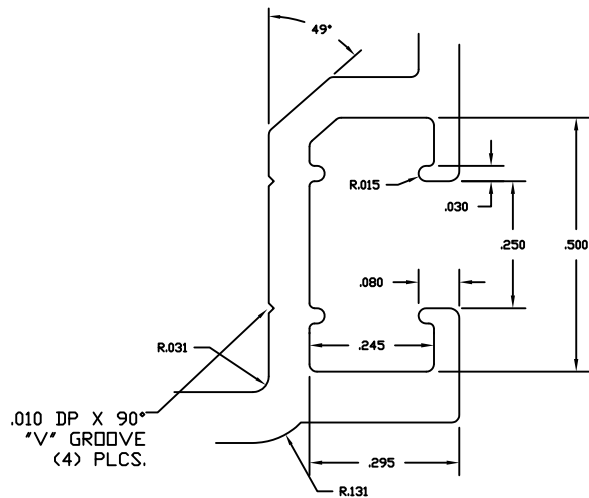
E24636



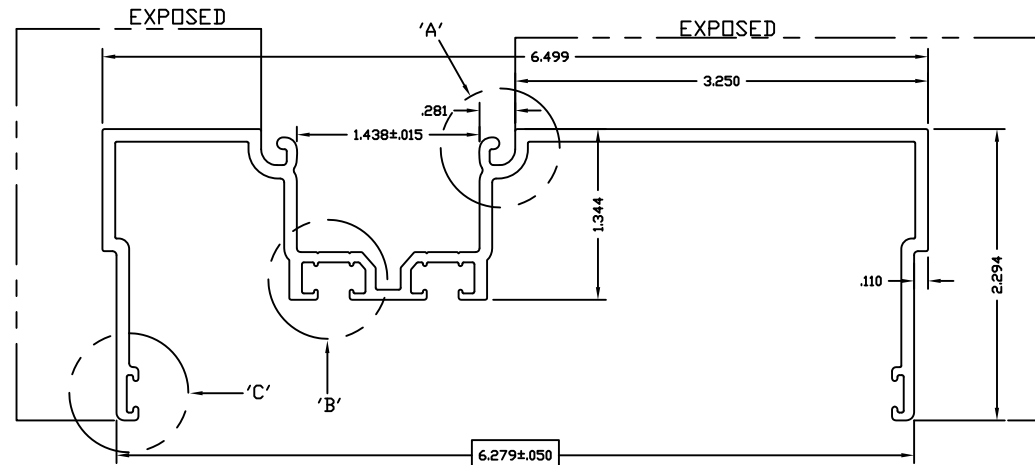
DETAIL 'A'
FOUR TIMES SIZE



E24646
HALF SIZE ASSEMBLY



DETAIL 'B'
FOUR TIMES SIZE



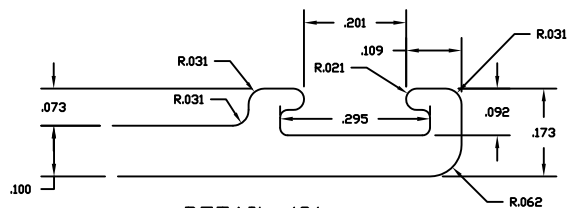
ACTUAL SIZE

MATES WITH E24646

INDICATES CRITICAL DIMENSION

LANCED AND FULLY DEBRIDGE

.010 DP X 90°
"V" GROOVE
(4) PLCS.



DETAIL 'C'
FOUR TIMES SIZE

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TUBELITE
DEPENDABLE

4878 MACKINAW TRAIL
REED CITY, MICHIGAN 49677

WALL THK	0.100	SECTION CLASS	S	MAT'L	6063-T5	RATIO	54:1
PERIMETER OUT (TOTAL)	30.876	AREA	1.433	WGT/FT	1.685		
FACTOR	18	CIRCLE SIZE	6.892	INFILL VOLUME	0.261		

RXX	2.259	SXX	2.109	IXX	7.314	CXX	3.470
RYY	0.639	SYY	0.366	IYY	0.586	CYY	1.601

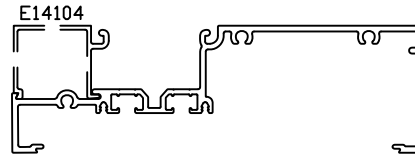
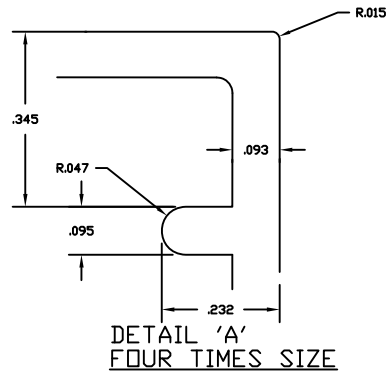
REV	DATE	DESCRIPTION	INTL
	09/01/15	RELEASED FOR TOOLING, ACCT #4827300000.7020.770	CRH

EXPANSION MULLION MALE 2' X 6 1/2'
TU24650 THERMAL STOREFRONT

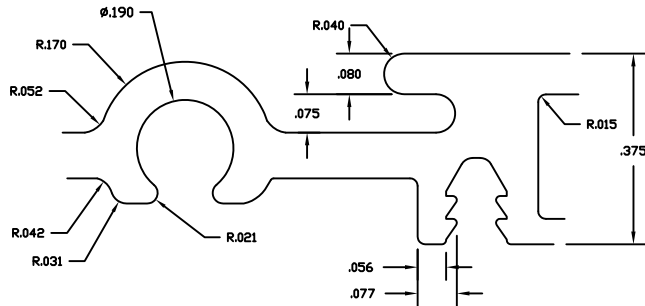
DRAWN BY	BMS	DRWG DATE	07/17/15	APPV'D BY		DATE APPV'D	
DWG SCALE	NOTED	PRODUCT CODE	550		E24636		REV

Material: Painted or Anodized Aluminum

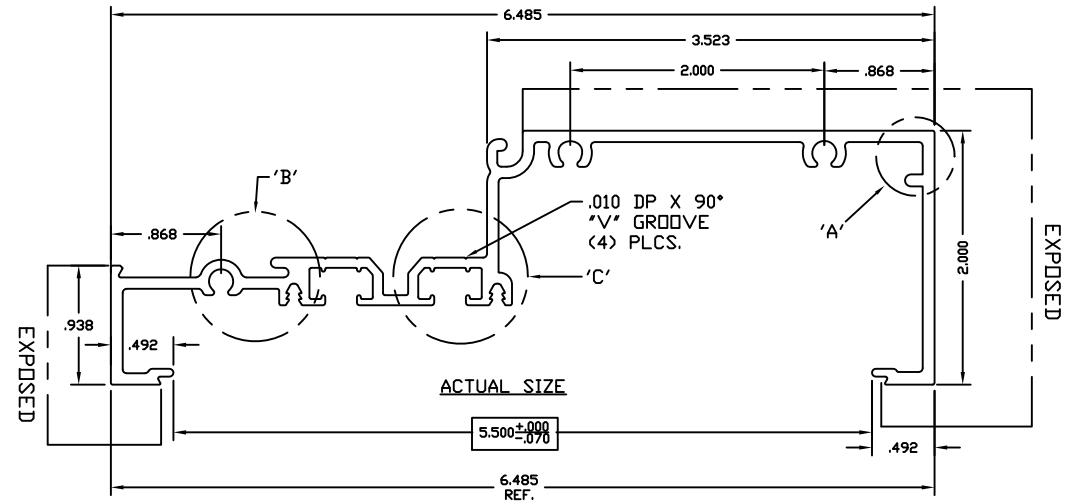
E24640



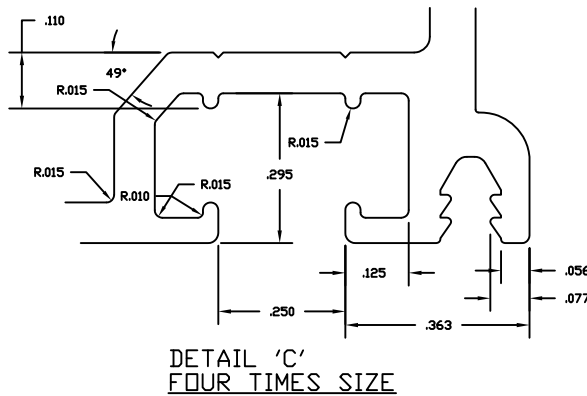
HALF SIZE ASSEMBLY



DETAIL 'B' FOUR TIMES SIZE



ACTUAL SIZE



DETAIL 'C' FOUR TIMES SIZE

USE WITH E14104 GLASS STOP

 INDICATES CRITICAL DIMENSION

LANCED AND FULLY DEBRIDGE

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ALL UNSPECIFIED CORNERS .01SR

* INDICATES .031 RADIUS

TUBELITE
DEPENDABLE

4878 MACKINAW TRAIL
REED CITY, MICHIGAN 49677

WALL THK	0.090	SECTION CLASS	S	MAT'L	6063-T5	RATIO	54:1
PERIMETER OUT (TOTAL)	29.363	AREA	1.266	WGT/FT	1.489		
FACTOR	20	CIRCLE SIZE	6.782	INFILL VOLUME	0.261		

RXX	2.159	SXX	1.723	IXX	5.901	CXX	3.423
RYY	0.625	SYY	0.424	IYY	0.494	CYY	1.164

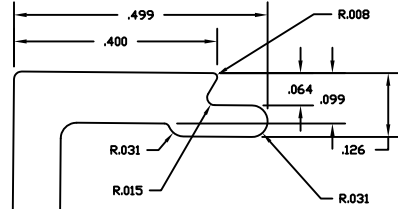
REV	DATE	DESCRIPTION	INTL
	09/01/15	RELEASED FOR TOOLING, ACCT #4827300000.7020.770	CRH

OPEN BACK SILL 2" X 6 1/2"
TU24650 THERMAL STOREFRONT

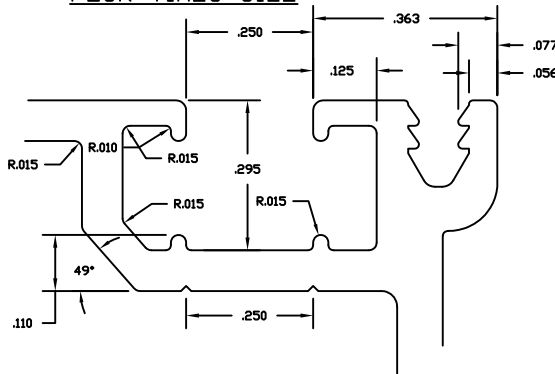
DRAWN BY	BMS	DRWG DATE	07/17/15	APP'D BY		DATE APP'D	
DWG SCALE	NOTED	PRODUCT CODE	550	E24640			

Material: Painted or Anodized Aluminum

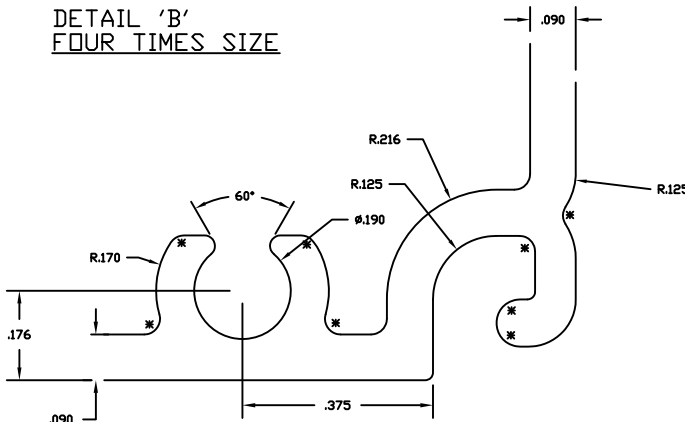
E24641



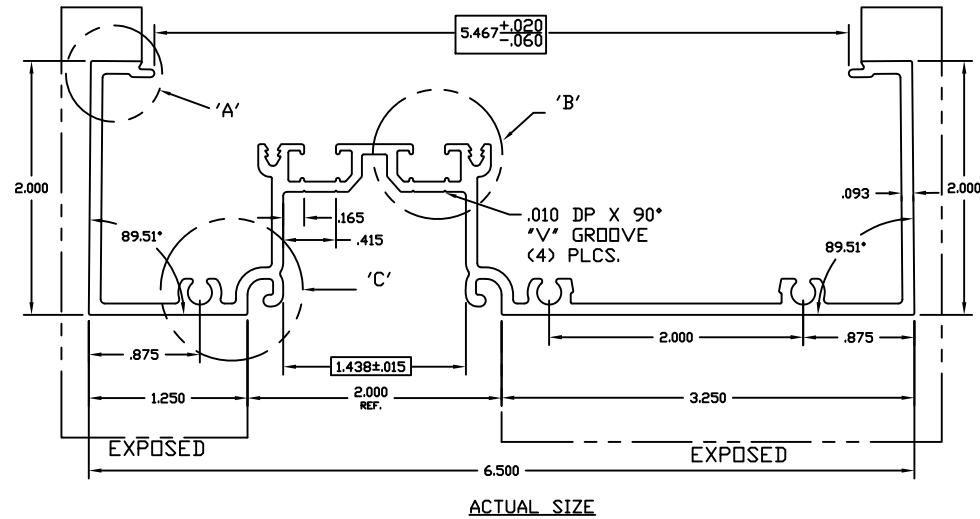
DETAIL 'A'
FOUR TIMES SIZE



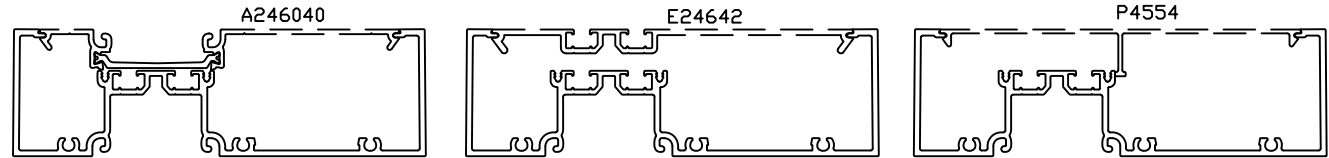
DETAIL 'B'
FOUR TIMES SIZE



DETAIL 'C'
FOUR TIMES SIZE



ACTUAL SIZE



HALF SIZE ASSEMBLY

MATES WITH A246040, E24642, P4554

 INDICATES CRITICAL DIMENSION

LANCED AND FULLY DEBRIDGE

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* INDICATES .031 RADIUS

TUBELITE
DEPENDABLE

4878 MACKINAW TRAIL
REED CITY, MICHIGAN 49677

WALL THK	0.090	SECTION CLASS	S	MAT'L	6063-T5	RATIO	54:1
PERIMETER OUT (TOTAL)	33.656	AREA	1.473	WGT/FT	1.732		
FACTOR	19	CIRCLE SIZE	6.802	INFILL VOLUME	0.261		

RXX	2.215	SXX	2.083	IXX	7.230	CXX	3.473
RYY	0.618	SYY	0.426	IYY	0.563	CYY	1.323

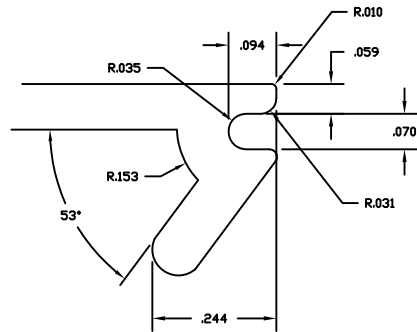
REV	DATE	DESCRIPTION	INTL
	08/31/15	RELEASED FOR TOOLING, ACCT #4827300000.7020.770	CRH

HEAD/JAMB/VERTICAL 2" X 6 1/2"
TU24650 THERMAL STOREFRONT

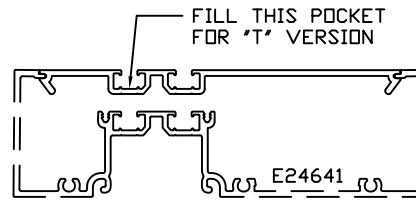
DRAWN BY	BMS	DRWG DATE	07/17/15	APPV'D BY		DATE APPV'D	
DWG SCALE	NOTED	PRODUCT CODE	550		E24641		

Material: Painted or Anodized Aluminum

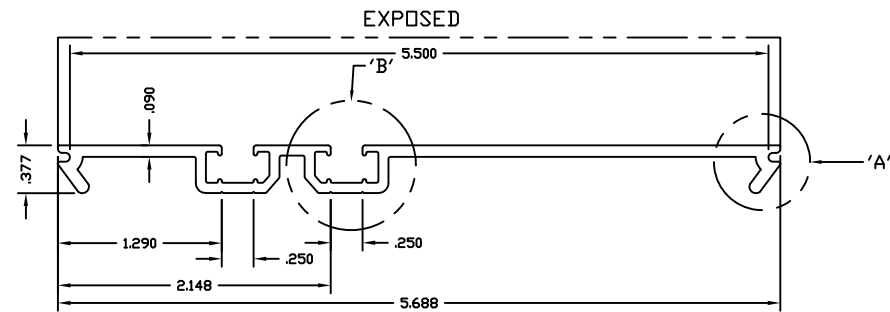
E24642



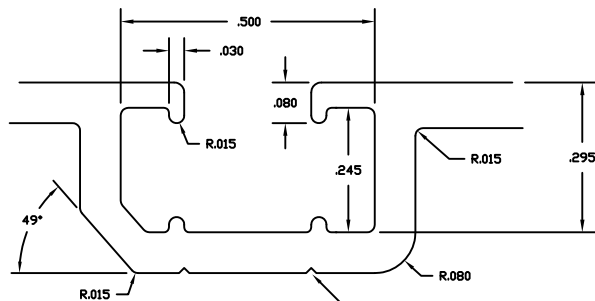
DETAIL 'A'
FOUR TIMES SIZE



HALF SIZE ASSEMBLY



ACTUAL SIZE



DETAIL 'B'
FOUR TIMES SIZE

.010 DP X 90°
"V" GROOVE
(4) PLCS.

MATES WITH 24641, 24640, 24645
FOR 'T' VERSION FILL 'EXTERIOR POCKET' (SEE DRAWING)
FOR 'TU' VERSION FILL BOTH POCKETS

INDICATES CRITICAL DIMENSION

LANCED AND FULLY DEBRIDGE

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TOLERANCES APPLY UNLESS NOTED

ALL UNSPECIFIED CORNERS .015R

* INDICATES .031 RADIUS

TUBELITE
DEPENDABLE

4878 MACKINAW TRAIL
REED CITY, MICHIGAN 49677

WALL THK	0.090	SECTION CLASS	S	MAT'L	6063-T5	RATIO	54:1
PERIMETER OUT (TOTAL)	16.205	AREA	0.674	WGT/FT	0.793		
FACTOR	20	CIRCLE SIZE	5.700	INFILL VOLUME	0.261/0.131		

RXX	1.706	SXX	0.657	IXX	1.963	CXX	.258
RYY	0.115	SYY	0.034	IYY	0.009	CYY	2.991

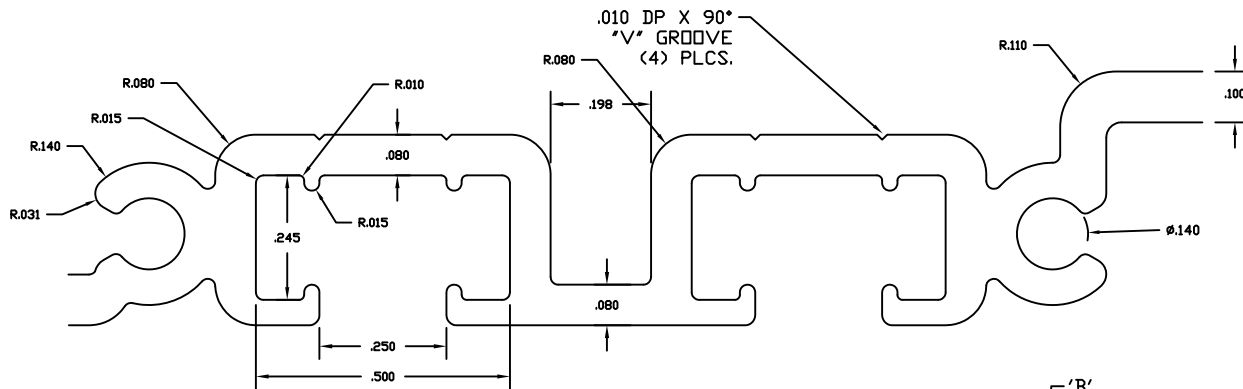
REV	DATE	DESCRIPTION	INTL
	09/01/15	RELEASED FOR TOOLING, ACCT #4827300000.7020.770	CRH

P&D SNAP IN FLAT FILLER
TU24650 THERMAL STOREFRONT

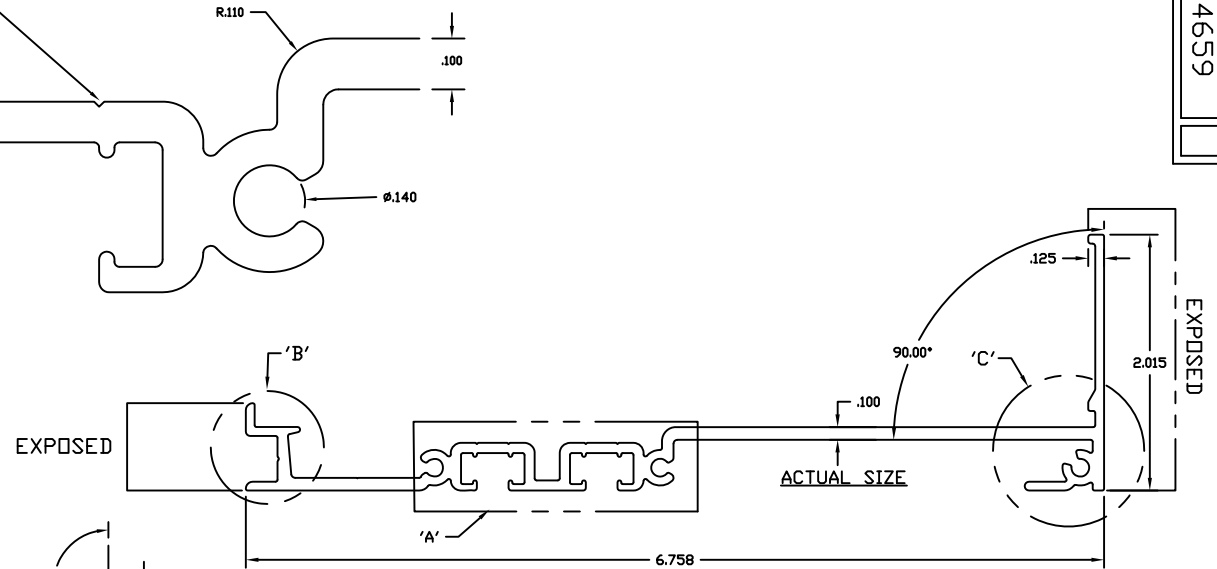
DRAWN BY	BMS	DRWG DATE	07/17/15	APPV'D BY		DATE APPV'D	
DWG SCALE	NOTED	PRODUCT CODE	550		E24642		REV

Material: Painted or Anodized Aluminum

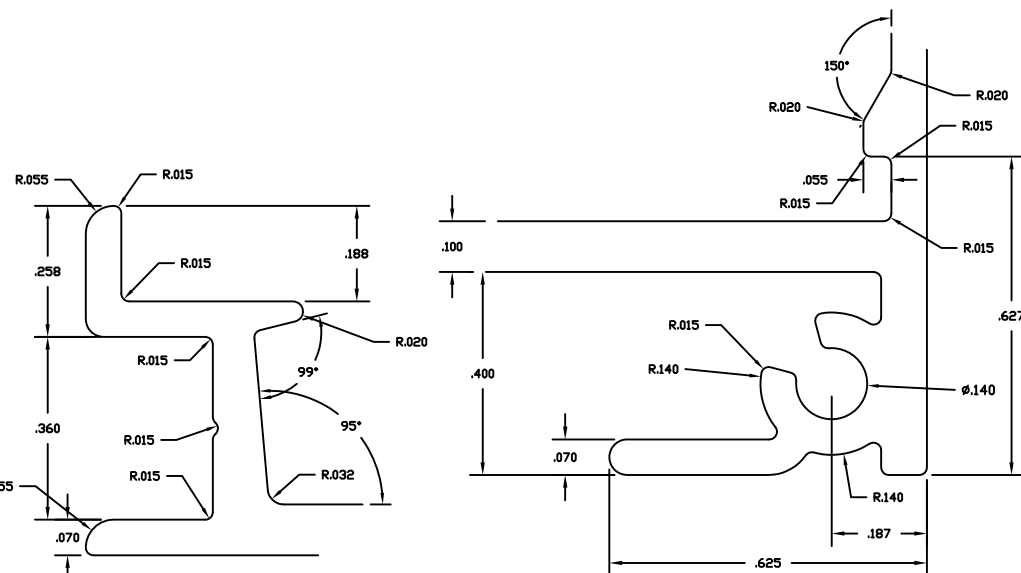
E24659



DETAIL 'A'
FOUR TIMES SIZE



EXPOSED



DETAIL 'B'
FOUR TIMES SIZE

DETAIL 'C'
FOUR TIMES SIZE

INDICATES CRITICAL DIMENSION

LANCED AND FULLY DEBRIDGE

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ALUMINUM ASSOCIATION STANDARD TOLERANCES APPLY UNLESS NOTED

ALL UNSPECIFIED CORNERS .015R

* INDICATES .031 RADIUS

TUBELITE
DEPENDABLE

4878 MACKINAW TRAIL
REED CITY, MICHIGAN 49677

WALL THK.	0.100	SECTION CLASS	S	MAT'L	6063-T5	RATIO	54:1
PERIMETER OUT (TOTAL)	25.354	AREA	1.085	WGT/FT	1.275		
FACTOR	20	CIRCLE SIZE	7.052	INFILL VOLUME	0.263		

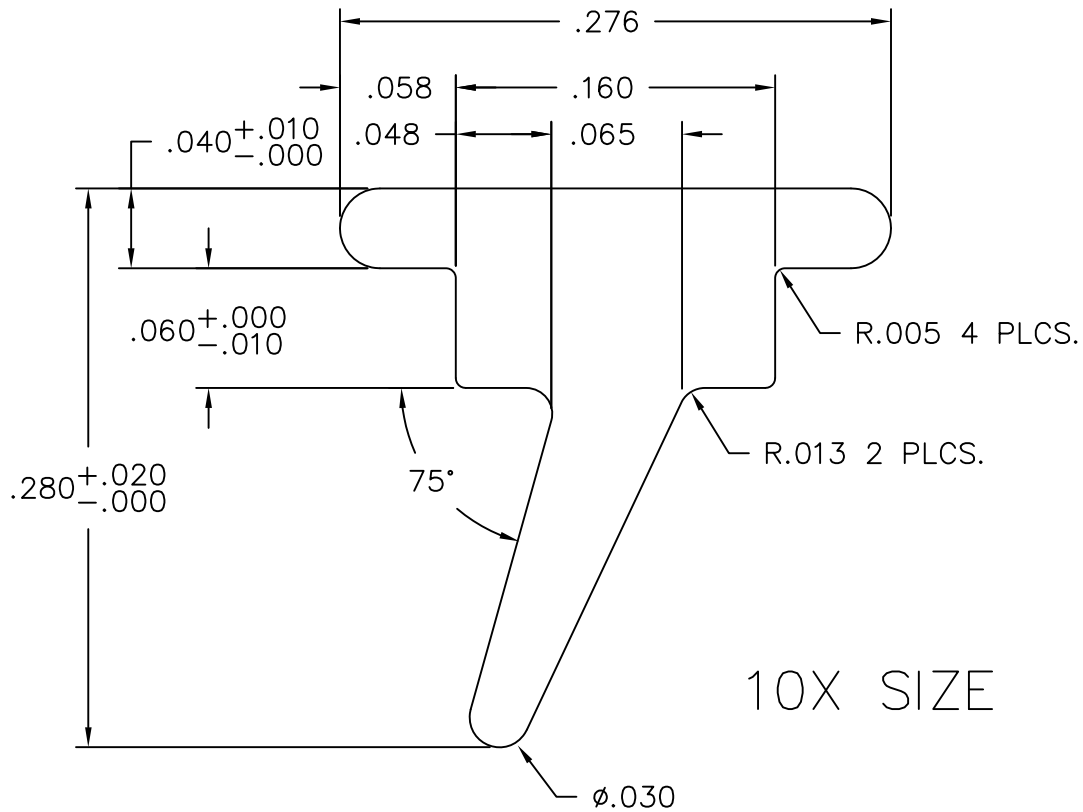
RXX	2.253	SXX	1.482	IXX	5.504	CXX	3.713
RYY	0.374	SYY	0.093	IYY	0.151	CYY	1.631

REV	DATE	DESCRIPTION	INTL
	09/01/15	RELEASED FOR TOOLING, ACCT #4827300000.7020.770	CRH

THERM. SUBSILL 2" X 6 1/2"
TU24650 THERMAL STOREFRONT

DRAWN BY	BMS	DRWG DATE	07/17/15	APPV'D BY		DATE APPV'D	
DWG SCALE	NOTED	PRODUCT CODE	550		E24659		

Material: Painted or Anodized Aluminum



Actual Size

Material: EPDM

Material: Dense Neoprene 70 Durometer

Use with Head Receptor E45116

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ALL UNSPECIFIED RADII .015

* INDICATES .031 RADIUS

□ DENOTES CRITICAL DIMENSION

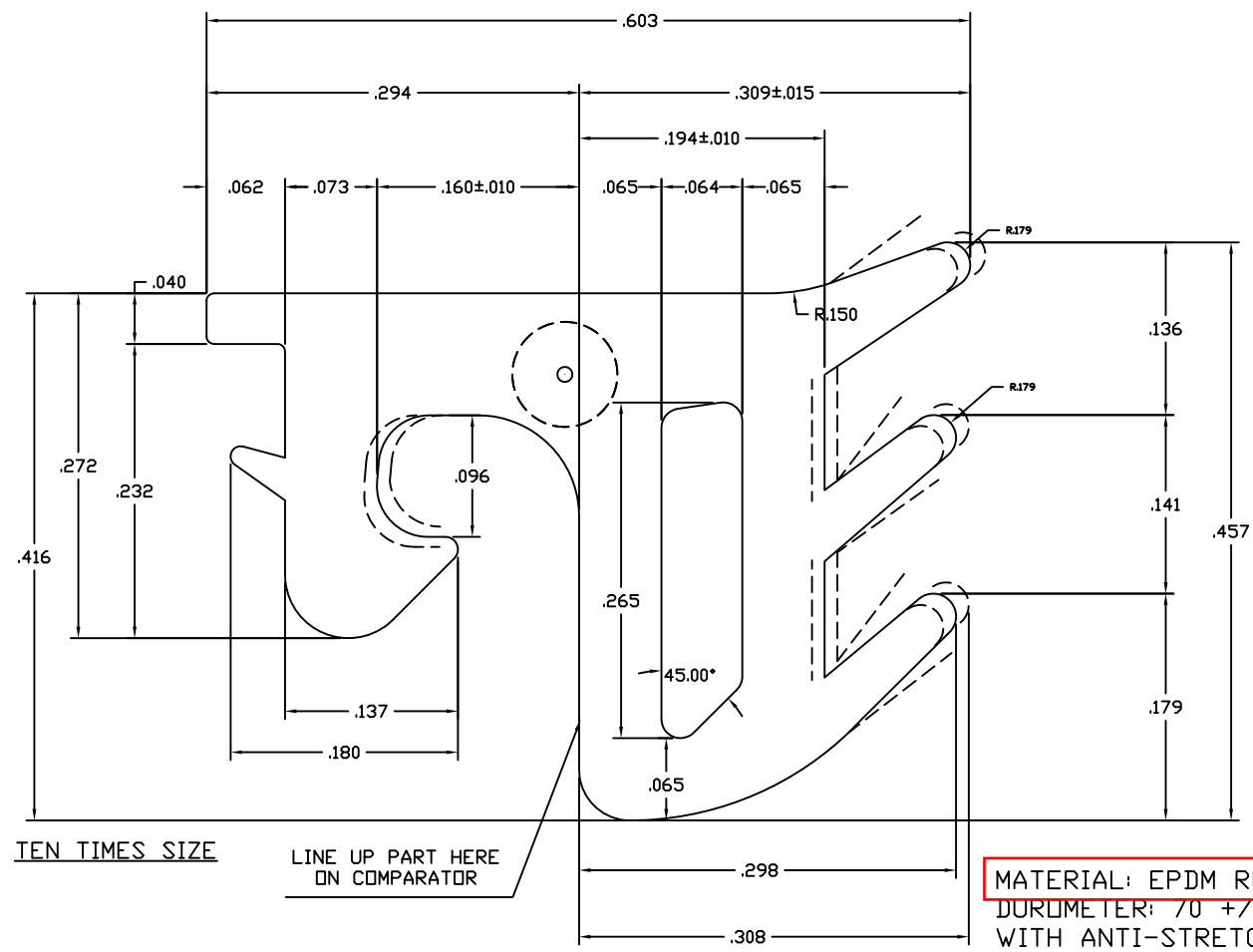
TUBELITE
 DEPENDABLE
 LEADERS IN ECO-EFFICIENT STOREFRONT,
 CURTAINWALL AND ENTRANCE SYSTEMS

3056 WALKER RIDGE NW, SUITE G
 WALKER, MICHIGAN 49544

REV	DATE	DESCRIPTION	INTL
A	03/09/82	Release for Tooling	
B	7/28/82	Release for Production per ED 12	
C	08/21/01	Redrawn for CAD	DMT

Wiper Gasket use with 4500 Series header (E2035 & E2036)			
DRAWN BY	T. Walte	DRWG DATE	03/05/82
APPV,D BY		DATE APPV'D	
DRWG SCALE	Noted	PRODUCT CODE	380
		P1221	REV C

P2728

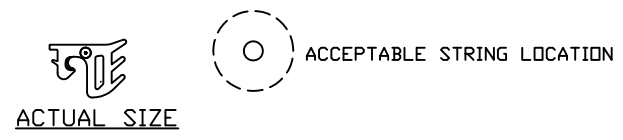


FACE PRESSURE:
 0.950 GLASS, 3.4#/IN
 0.970 GLASS, 4.0#/IN
 1.00 GLASS, 5.0/IN

TEN TIMES SIZE

LINE UP PART HERE ON COMPARATOR

MATERIAL: EPDM RUBBER WITH ANTI-STRETCH CORD
 DURUMETER: 70 +/- 5
 WITH ANTI-STRETCH CORD
 WITH LUBRICANT



ALL TOLERANCES ARE
 RMA CLASS II UNLESS
 OTHERWISE NOTED

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 ALL UNSPECIFIED RADII .015
 * INDICATES .031 RADIUS
 □ DENOTES CRITICAL DIMENSION

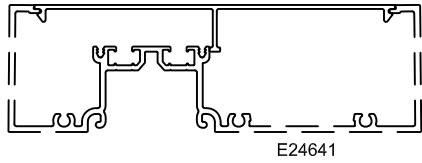
TUBELITE
 LEADING IN HIGH EFFICIENT OPERATING WINDOW, CURTAINWALL AND ENTRANCE SYSTEMS
 3056 WALKER RIDGE NW, SUITE G
 WALKER, MICHIGAN 49544

REV	DATE	DESCRIPTION	INTL
	08/20/09	RELEASE FOR PRODUCTION	NSJ

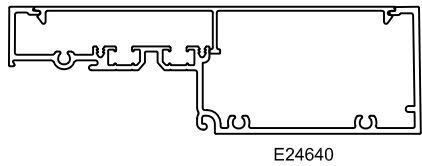
ROLL-IN GLAZING GASKET
 14000 AND 4500 STOREFRONT SYSTEMS

DRAWN BY	JEM	DRWG DATE	08/14/09	APPV'D BY		DATE APPV'D	
DRWG SCALE	NOTED	PRODUCT CODE	190			P2728	

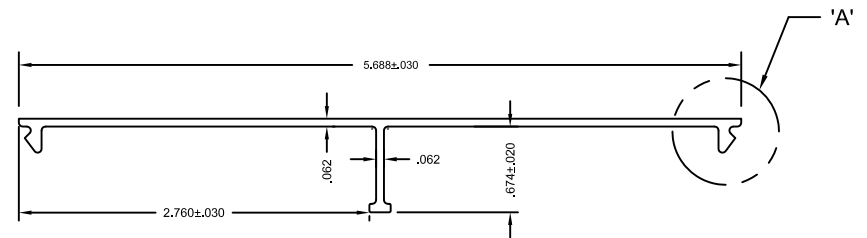
P4554



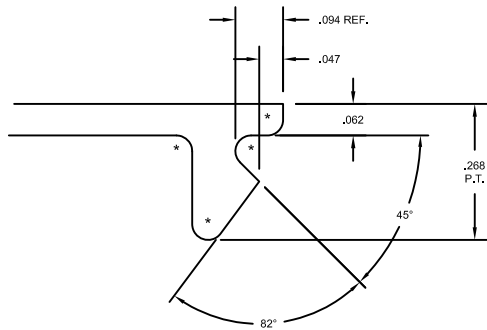
1/2 SIZE ASSEMBLY



1/2 SIZE ASSEMBLY



ACTUAL SIZE



DETAIL 'A'
4X SIZE

MATERIAL = RIGID PVC
 * = .031 RADIUS
 .062 TYPICAL WALL THICKNESS

LENGTH - 10FT

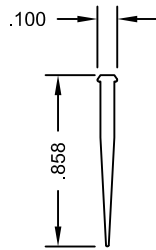
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 ALL UNSPECIFIED RADII .015
 * INDICATES .031 RADIUS
 □ DENOTES CRITICAL DIMENSION

TUBELITE
 LEADING IN HIGH EFFICIENT STOREFRONTS,
 CLIMATEWALL AND ENTRANCE SYSTEMS

3056 WALKER RIDGE NW, SUITE G
 WALKER, MICHIGAN 49544

REV	DATE	DESCRIPTION	INTL
B	09/09/13	Added tolerances for new supplier - Amesbury	TT

FLAT SNAP IN FILLER TU24650 STOREFRONT			
DRAWN BY: BMS DRWG SCALE: NOTED	DRWG DATE: 07/21/15 PRODUCT CODE: 550	APPV'D BY: DATE APPVD: P4554	REV:



P6598
BAFFLE, PLASTIC
MATERIAL: RIGID PVC
EXTRUDED LENGTH: 12 FEET

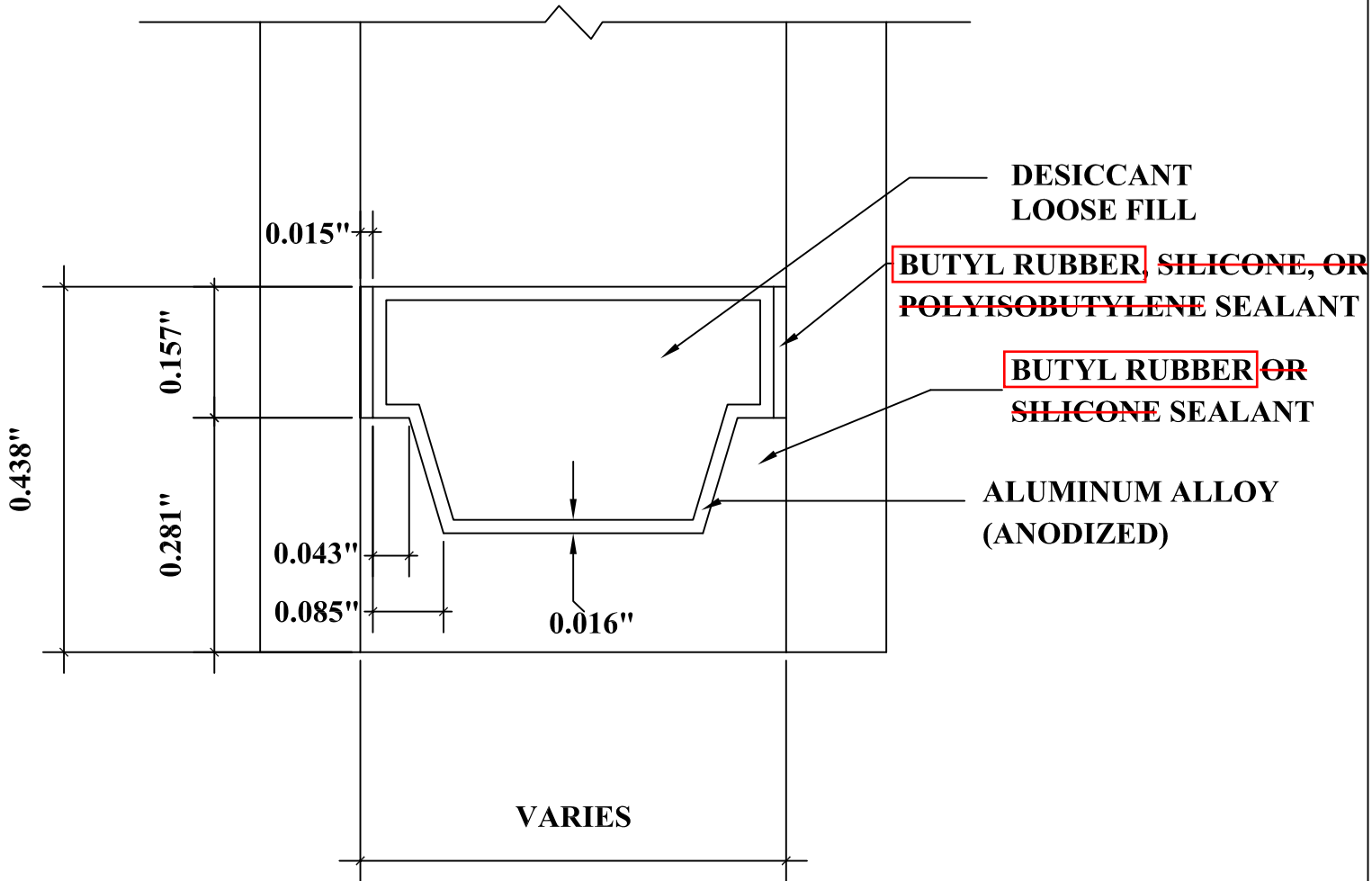
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 DENOTES CRITICAL DIMENSION



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WALKER, MICHIGAN 49544

REV	DATE	DESCRIPTION	INTL
-	-	-	-

BAFFLE, PLASTIC T24000/TU24650 THERMAL NON-IMPACT STOREFRONT			
DRAWN BY	BS	DRWG DATE	08/17/15
APPV,D BY	-	DATE APPVD	-
DRWG SCALE	FULL	PRODUCT CODE	-
P6598			REV -



DETAIL FOR THERMAL MODELING OF
ALUMINUM SPACER (A1-D)