

**NFRC 102-2004 THERMAL PERFORMANCE  
TEST REPORT**

**Rendered to:**

**TUBELITE, INC.**

**SERIES/MODEL: 300ES Curtainwall System with Insulation in Frame**

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

Summary of Results	
Standardized Thermal Transmittance (U-Factor)	
0.33	
Unit Size	80" x 80" (2032 mm x 2032 mm)
Layer 1	1/4" Viracon VUE1-50 Low-E (e=0.030*, #2) Heat Strengthened
Gap 1	0.50" Gap, Stainless Steel Spacer (SS-D), 90% Argon Filled
Layer 2	1/4" Clear Heat Strengthened

Reference must be made to Report No. 92324.03-116-46, dated 06/19/12 for complete test specimen description and data.



## **NFRC 102-2004 THERMAL PERFORMANCE TEST REPORT**

Rendered to:

TUBELITE, INC.  
4878 Mackinaw Trail  
Reed City, Michigan 49677

Report Number: 92324.03-116-46  
Test Date: 07/10/09  
Report Date: 06/19/12  
Test Retention Date: 07/10/13

### **Test Sample Identification:**

**Series/Model:** 300ES Curtainwall System with Insulation in Frame

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

**Overall Size:** 80" x 80" (2032 mm x 2032 mm) (Non-Standard Size)

**NFRC Standard Size:** 78.7" x 78.7" (2000 mm wide x 2000 mm high)

**Test Sample Submitted by:** Client

**Test Sample Submitted for:** Validation for Initial Certification (Production Line Unit)  
& Plant Qualification

**Test Procedure:** U-factor tests were performed in a Guarded Hot Box in accordance with NFRC 102-2004, *Test Procedure for Measuring the Steady-State Thermal Transmittance of Fenestration Systems*.

### **Test Results Summary:**

Standardized U-factor ( $U_{st}$ ): 0.33 Btu/hr·ft<sup>2</sup>·F CTS Method

**Test Sample Description:**

<b>CONSTRUCTION</b>	<b>Frame</b>
Size (in.) Non-Standard	80" x 80"
Daylight Opening (in.)	36-1/4" x 75-1/4" (x2)
<b>CORNERS</b>	Butted
Fasteners	Screws
Sealant	Yes
<b>MATERIAL</b>	AT (1.13") with R-13 Fiberglass Insulation in Frame Cavities
Color Exterior	Gray
Finish Exterior	Anodized
Color Interior	Gray
Finish Interior	Anodized
<b>GLAZING METHOD</b>	Interior Pocket

**Glazing Information:**

<b>Layer 1</b>	1/4" Viracon VUE1-50 Low-E (e=0.030*, #2) Heat Strengthened
<b>Gap 1</b>	0.50" Gap, Stainless Steel Spacer (SS-D), 90% Argon Filled
<b>Layer 2</b>	1/4" Clear Heat Strengthened
<b>Gas Fill Method</b>	Single-Probe Timed*

*\*Stated per Client/Manufacturer*

*N/A 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 Wedge gasket	1 Row	Exterior glazing perimeter
	EPDM Compression gasket	1 Row	Interior glazing perimeter
<b>HARDWARE</b>			
	R-13 Fiberglass Insulation	1 Row	Interior frame perimeter in the cavities
<b>DRAINAGE</b>			
	(0.25") Diameter weephole	8	Two per horizontal trim on exterior

## Thermal Transmittance (U-factor)

### Measured Test Data

#### Heat Flows

1. Total Measured Input into Metering Box ( $Q_{total}$ )	1149.98 Btu/hr
2. Surround Panel Heat Flow ( $Q_{sp}$ )	44.83 Btu/hr
3. Surround Panel Thickness	8.00 inches
4. Surround Panel Conductance	0.0261 Btu/hr·ft <sup>2</sup> ·F
5. Metering Box Wall Heat Flow ( $Q_{mb}$ )	35.49 Btu/hr
6. EMF vs Heat Flow Equation (equivalent information)	0.0196*EMF + 0.020
7. Flanking Loss Heat Flow ( $Q_{fl}$ )	17.90 Btu/hr
8. Net Specimen Heat Loss ( $Q_s$ )	1051.77 Btu/hr

#### Areas

1. Test Specimen Projected Area ( $A_s$ )	44.44 ft <sup>2</sup>
2. Test Specimen Interior Total (3-D) Surface Area ( $A_h$ )	62.85 ft <sup>2</sup>
3. Test Specimen Exterior Total (3-D) Surface Area ( $A_c$ )	53.46 ft <sup>2</sup>
4. Metering Box Opening Area ( $A_{mb}$ )	69.44 ft <sup>2</sup>
5. Metering Box Baffle Area ( $A_{b1}$ )	60.74 ft <sup>2</sup>
6. Surround Panel Interior Exposed Area ( $A_{sp}$ )	25.00 ft <sup>2</sup>

#### Test Conditions

1. Average Metering Room Air Temperature ( $t_h$ )	69.80 F
2. Average Cold Side Air Temperature ( $t_c$ )	-0.39 F
3. Average Guard/Environmental Air Temperature	71.25 F
4. Metering Room Average Relative Humidity	13.65 %
5. Measured Cold Side Wind Velocity (Perpendicular Flow)	17.07 mph
6. Measured Static Pressure Difference Across Test Specimen	0.00" ± 0.04"H <sub>2</sub> O

#### Results

1. Thermal Transmittance of Test Specimen ( $U_s$ )	0.34 Btu/hr·ft <sup>2</sup> ·F
2. Standardized Thermal Transmittance of Test Specimen ( $U_{st}$ )	0.33 Btu/hr·ft <sup>2</sup> ·F

## Thermal Transmittance (U-factor)

### Calculated Test Data

#### CTS Method

1. Emittance of Glass ( $e_i$ )	0.84
2. Warm Side Baffle Emittance ( $e_{bi}$ )	0.92
3. Equivalent Warm Side Surface Temperature	51.98 F
4. Equivalent Cold Side Surface Temperature	3.99 F
5. Warm Side Baffle Surface Temperature	68.63 F
6. Measured Warm Side Surface Conductance ( $h_h$ )	1.33 Btu/hr·ft <sup>2</sup> ·F
7. Measured Cold Side Surface Conductance ( $h_c$ )	5.40 Btu/hr·ft <sup>2</sup> ·F
8. Test Specimen Thermal Conductance ( $C_s$ )	0.49 Btu/hr·ft <sup>2</sup> ·F
9. Convection Coefficient ( $K_c$ )	0.31 Btu/(hr·ft <sup>2</sup> ·F <sup>1.25</sup> )
10. Radiative Test Specimen Heat Flow ( $Q_{ri}$ )	558.09 Btu/hr
11. Conductive Test Specimen Heat Flow ( $Q_{ci}$ )	493.68 Btu/hr
12. Radiative Heat Flux of Test Specimen ( $q_{ri}$ )	12.56 Btu/hr·ft <sup>2</sup> ·F
13. Convective Heat Flux of Test Specimen ( $q_{ci}$ )	11.11 Btu/hr·ft <sup>2</sup> ·F
14. Standardized Warm Side Surface Conductance ( $h_{sth}$ )	1.20 Btu/hr·ft <sup>2</sup> ·F
15. Standardized Cold Side Surface Conductance ( $h_{stc}$ )	5.28 Btu/hr·ft <sup>2</sup> ·F
16. Standardized Thermal Transmittance ( $U_{st}$ )	0.33 Btu/hr·ft <sup>2</sup> ·F

#### Test Duration

1. The environmental systems were started at 16:58 hours, 07/09/09.
2. The test parameters were considered stable for two consecutive four hour test periods from 00:03 hours, 07/10/09 to 08:03 hours, 07/10/09.
3. The thermal performance test results were derived from 04:03 hours, 07/10/09 to 08:03 hours, 07/10/09.

The reported Standardized Thermal Transmittance ( $U_{st}$ ) was determined using CTS Method, per Section 8.2(A) of NFRC 102.

**Glazing Deflection (in):**

	<b>Left Glazing</b>	<b>Right Glazing</b>
Edge Gap Width	0.50	0.50
Estimated center gap width upon receipt of specimen in laboratory (after stabilization)	0.50	0.50
Center gap width at laboratory ambient conditions on day of testing	0.50	0.50
Center gap width at test conditions	0.41	0.41

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.

"This test method does not include procedures to determine the heat flow due to either air movement through the specimen or solar radiation effects. As a consequence, the thermal transmittance results obtained do not reflect performances which may be expected from field installations due to not accounting for solar radiation, air leakage effects, and the thermal bridge effects that may occur due to the specific design and construction of the fenestration system opening. Therefore, it should be recognized that the thermal transmittance results obtained from this test method are for ideal laboratory conditions and should only be used for fenestration product comparisons and as input to thermal performance analyses which also include solar, air leakage and thermal bridge effects."

"Ratings included in this report are for submittal to an NFRC-licensed IA for certification purposes and are not meant to be used for labeling purposes. Only those values identified on a valid Certification Authorization Report (CAR) are to be used for labeling purposes."

The test sample was installed in a vertical orientation, the exterior of the specimen was exposed to the cold side. The direction of heat transfer was from the interior (warm side) to the exterior (cold side) of the specimen.

ANSI/NCSL Z540-2-1997 type B uncertainty for this test was 1.61%.

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 7/10/2013. 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. Ratings included in this report are for submittal to an NFRC licensed IA for certification purposes and are not meant to be used for labeling purposes. Only those values identified on a valid Certification Authorization Report (CAR) are to be used for labeling purposes. 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.

Tested By:



Digitally Signed by: Ryan P. Moser

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Ryan P. Moser  
Technician

Reviewed By:



Digitally Signed by: Shon W. Einsig

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

RPM:amg  
92324.03-116-46

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

Appendix-A: Description Table Abbreviations (1)

Appendix-B: Submittal Form and Drawings (14)



### Revision Log

<b><u>Rev. #</u></b>	<b><u>Date</u></b>	<b><u>Page(s)</u></b>	<b><u>Revision(s)</u></b>
.03R0	06/19/12	All	Original Report Issue. Work requested by Steve Wilkening of Tubelite, Inc.

## 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 ( > 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 >= 1"

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

## **Appendix B: Submittal Form and Drawings**

## NFRC PRODUCT CERTIFICATION PROGRAM

### Submittal Form for Test Samples

For use by manufacturers, lineal suppliers and fabricators



National Fenestration  
Rating Council®

1. Information on Production of the Test Sample (complete ALL fields):

Manufacturer: TUBELITE Date of sample manufacture: DECEMBER 2008  
Plant Address where manufactured: 3056 WALKER RIDGE DR. NW SUITE G  
City: WALKER State: MI Zip Code: 49544  
Name of IA: ALI Phone: 214-565-0593 Fax: 214-565-1094

2. Product Information (complete ALL fields):

Product Line ID (CPD) No.: NEW Product/Operator Type (Table 4-3 of NFRC 100): GLAZED WALL  
Series/Model: 300ES HP THERMAL CURTAIN WALL

3. Test sample is being submitted for (select ONE):

- a. ☐ Validation for Initial Certification (prototype only) no plant qualification
- b. ☒ Validation for Initial Certification (production line unit) & plant qualification
- c. ☐ Validation for Recertification (production line unit) & plant qualification
- d. ☐ Plant Qualification Only (production line unit)

I, STEVEN R. WILKINSON, as the designated agent for TUBELITE  
do hereby attest that the foregoing information is true to the best of my information, knowledge, and belief.  
Further, if the unit is identified in Section 3 as a production line unit, I hereby authorize the NFRC-accredited  
testing laboratory to send a copy of the test report to the IA identified above for plant qualification purposes  
pursuant to the NFRC Product Certification Program.

Signature: [Signature] Date: 6/18/12

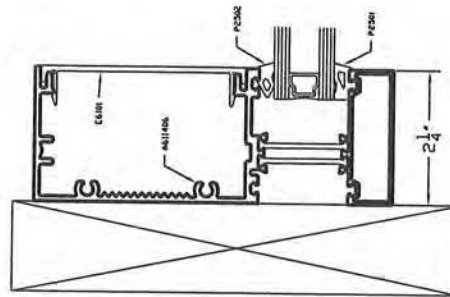
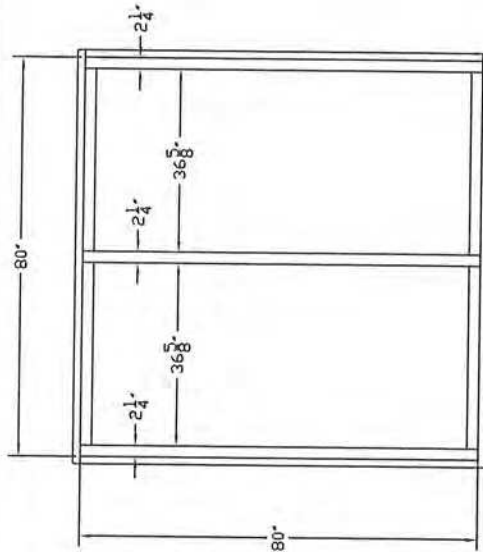
FOR LABORATORY USE ONLY

1. Laboratory: ATI - VOER PA  
2. Date Sample Received: 7/09 File number ID: 92324.03  
3. Date Sample Tested: 7-10-09 By: JWB  
4. Modifications made: \_\_\_\_\_

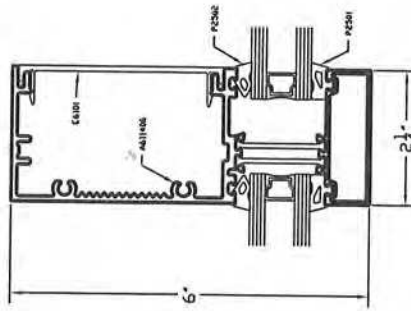
5. Reason for non-testing of sample unit: \_\_\_\_\_

[Note: If the sample submitted can not be tested due to damage prior to testing, a new sample and new form shall be submitted to the testing laboratory. Both forms shall be submitted to the IA when the testing is completed.]

Conduct Sound Transmission Loss Testing in accordance with ASTM E 90.  
 Calculate Sound Transmission Class (STC) Rating in accordance with ASTM E 413.  
 Calculate Outdoor-Indoor Transmission Class (OITC) Rating in accordance with ASTM E 1332.



③



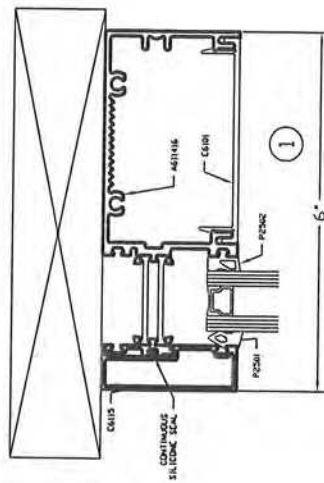
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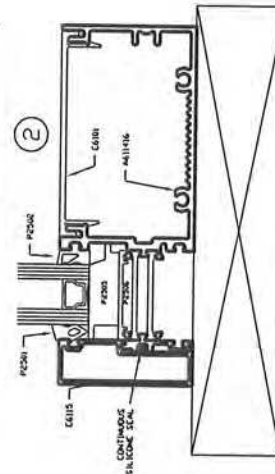
### Architectural Testing

Test sample complies with these details.  
 Deviations are noted.

Report # 92324  
 Date 7/10/09 Test PRM



①



②

**TUBELITE®**  
 STOREFRONT, CURTAINWALL & ENTRANCES  
 DEPENDABLE

300ES CURTAINWALL SYSTEM  
 ACoustical TEST

DRAWN BY	SRD	DATE	8/15/08	APPROVED BY		DATE	
SCALE	1/2"	SIZE	PRODUCT 440	SHEET NO.	1	OF	1
REV							

23.12  
300ES Curtainwall  
Outside Set Vertical



Architectural Testing

Test sample complies with these details.  
Deviations are noted.

Report#

92324

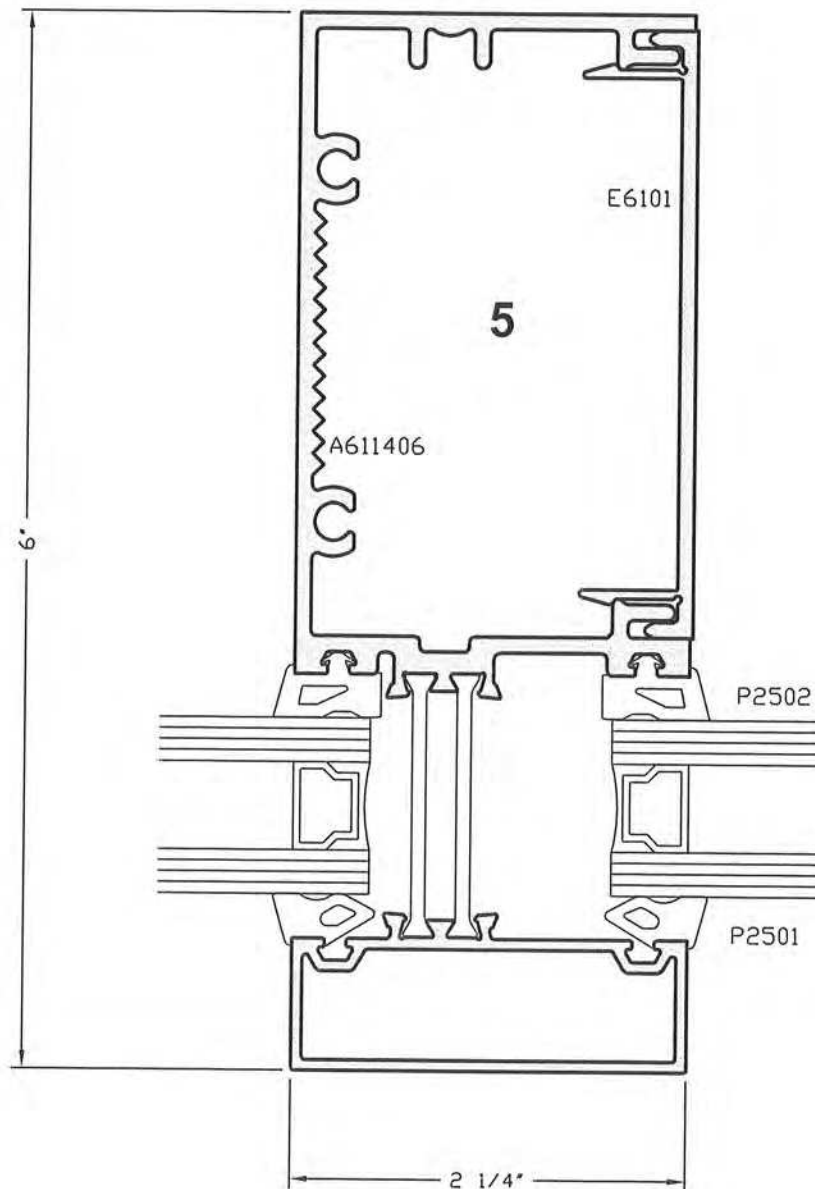
Date

7/10/09

Tech

EFM

CAD DETAIL FILE NO.  
440VERT1





A611416

INTERIOR

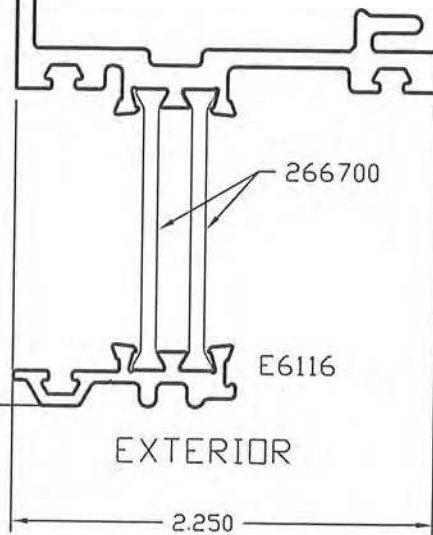
E6114

5.435

**Architectural Testing**

Test sample complies with these details.  
Deviations are noted.

Report# 92324  
Date 7/10/09 Tech RPM



EXTERIOR

2.250

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ALL UNSPECIFIED RADII .015

\* INDICATES .031 RADIUS

□ DENOTES CRITICAL DIMENSION

**TUBELITE®**  
**DEPENDABLE**

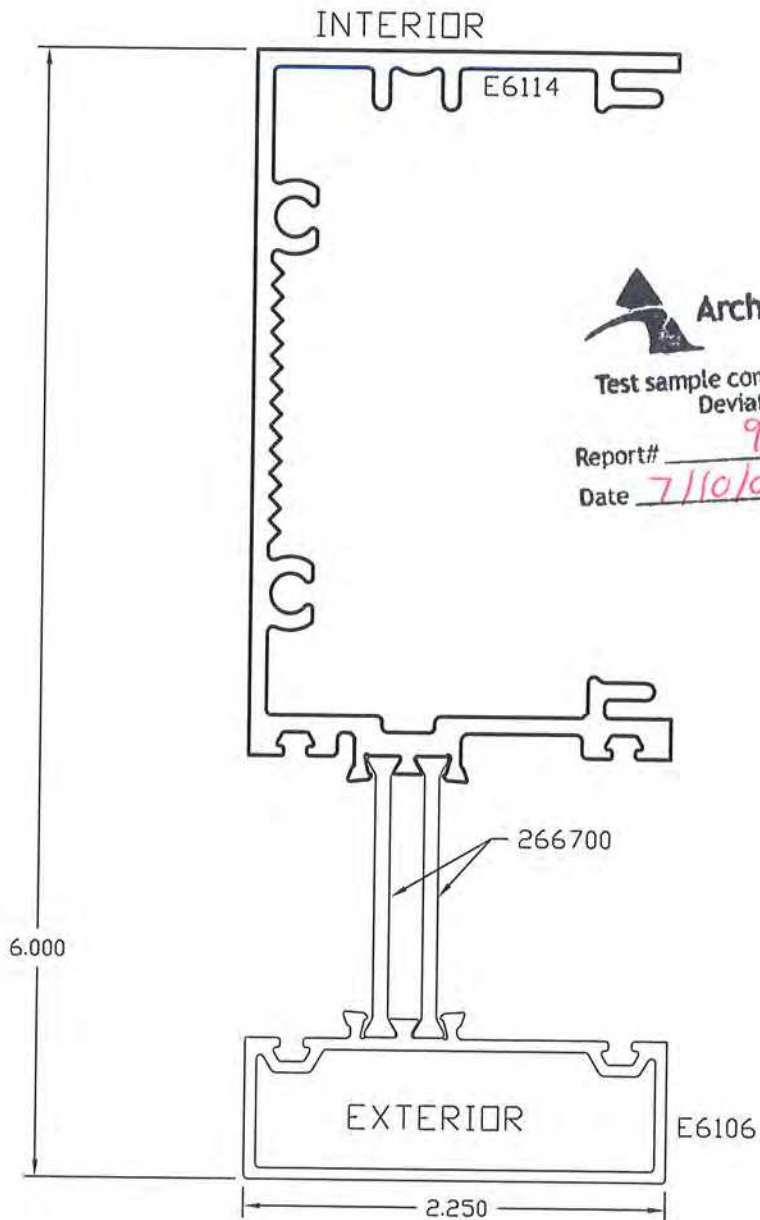
3056 WALKER RIDGE NW, SUITE G  
WALKER, MICHIGAN 49544

REV	DATE	DESCRIPTION	INTL

ASSEMBLED HEAD / SILL  
LS CURTAINWALL OUTSIDE SET  
6" SYSTEM

DRAWN BY JRJ	DRWG DATE 12/13/07	APPV'D BY	DATE APPV'D
DRWG SCALE FULL	PRODUCT CODE	A611416	REV

A611406

**Architectural Testing**

Test sample complies with these details.  
Deviations are noted.

Report# 92324  
Date 7/10/09 Tech Rpm

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ALL UNSPECIFIED RADII .015

\* INDICATES .031 RADIUS

□ DENOTES CRITICAL DIMENSION

**TUBELITE®**  
**DEPENDABLE**

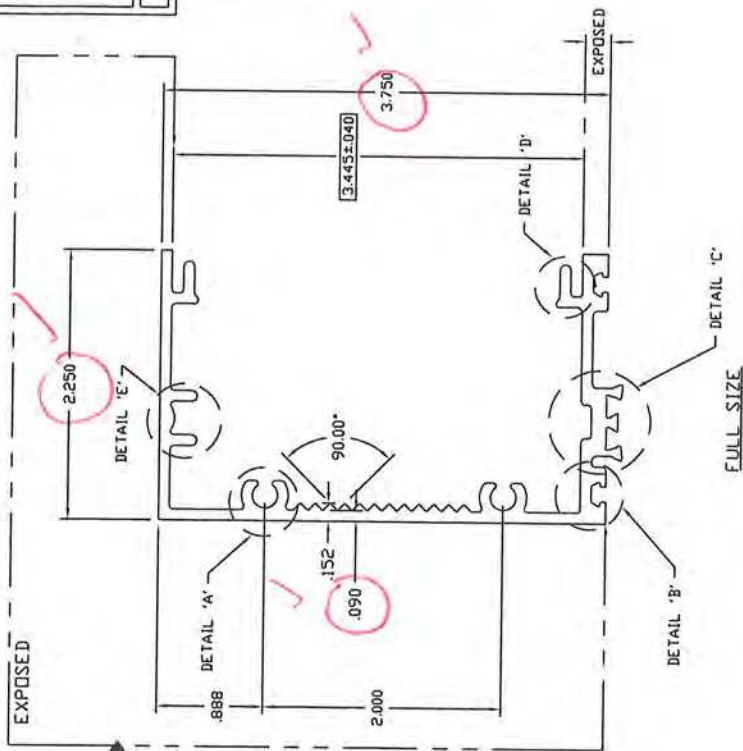
3056 WALKER RIDGE NW, SUITE G  
WALKER, MICHIGAN 49544

REV	DATE	DESCRIPTION	INTL

ASSEMBLED JAMB  
ES300 CURTAINWALL INSIDE SET  
6" SYSTEM

DRAWN BY	DRWG DATE 12/13/07	APPV'D BY	DATE APPV'D
DRWG SCALE FULL	PRODUCT CODE	A611406	REV

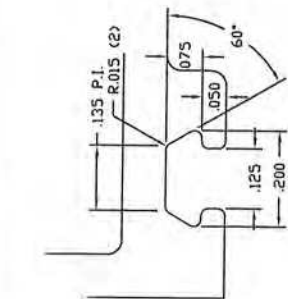




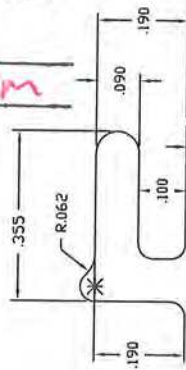
## Architectural Testing

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Deviations are noted.

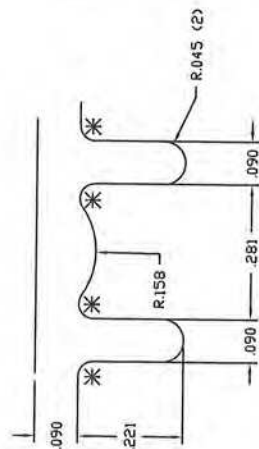
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Date 7/10/07 Tech RPM



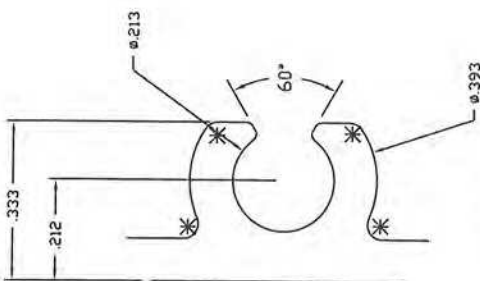
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FOUR TIMES SIZE



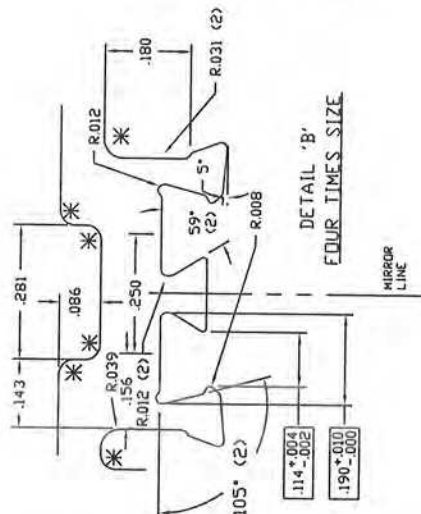
DETAIL 'D'  
FOUR TIMES SIZE



DETAIL 'E'  
FOUR TIMES SIZE



DETAIL 'A'  
FOUR TIMES SIZE



DETAIL 'B'  
FOUR TIMES SIZE

VAL.		NOTED	SECTION S	MAT'L 6063-T5	RATIO 4B1
PROMINER		23.927		AREA 1.153	WGTF/FT 1.355
DOT (TOTAL)					
FACTOR		18	CIRCLE SIZE	4.373	WALL THICKNESS N/A

RXX	1.488	SXX	1.261	IYY	2.550	CXX	2.022
RTY	.744	STY	.423	JYY	.638	CYY	1.509

## HEAD AND SILL MULLION SL CURTAIN WALL

DRAWN JRJ	REVISED 12/13/07	APPROVED BY	DATE APPROVED
BY			

PAGE SCALE	NOTED	PROJECT XX	E6114
REV			

## Architectural Testing

Test sample complies with these details.  
Deviations are noted.

Report#

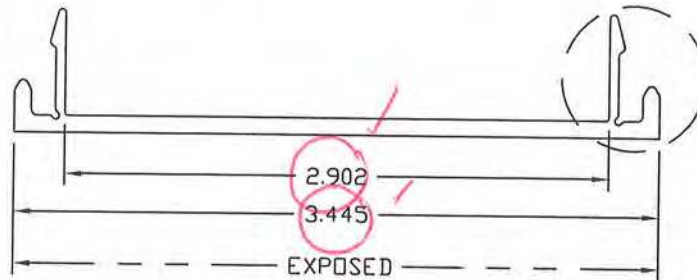
97324

Date \_\_\_\_\_

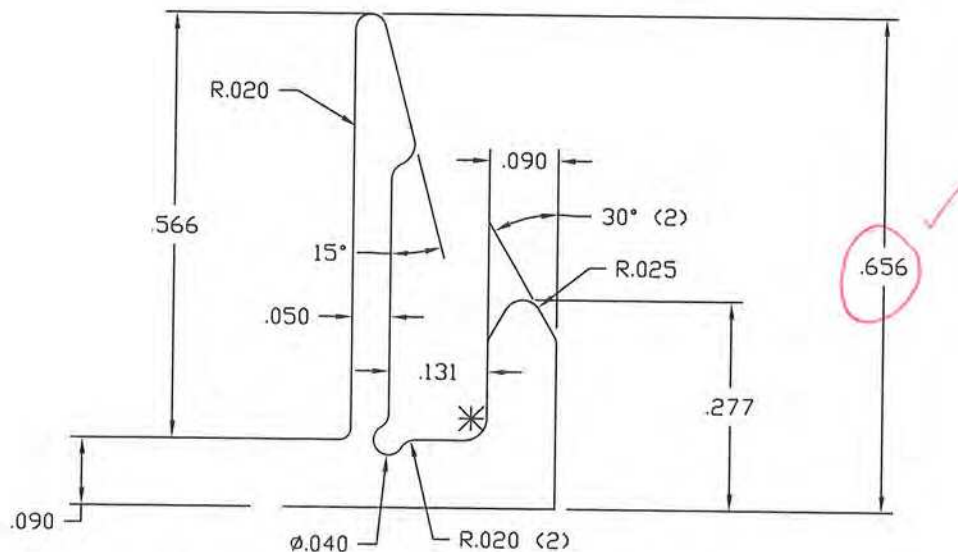
7/10/00

## Tech

12/11/20



FULL SIZE



DETAIL 'A'  
FOUR TIMES SIZE

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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 TURBULITE

# TUBELITE®

**DEPENDABLE**

3056 WALKER RIDGE NW, SUITE G  
WALKER, MICHIGAN 49544

WALL THK.	NOTED	SECTION CLASS	S	MAT'L	6063-T5	RATIO	138:1
PERIMETER OUT (TOTAL)	10.015	AREA	.400	WGT/FT	.470		
FACTOR	21	CIRCLE SIZE	3.453	INFILL VOLUME	N/A		

RXX	1.143	SXX	.303	IXX	.522	CXX	1.722
RYY	.138	SYX	.073	IYY	.008	CYY	.550

[illegible]

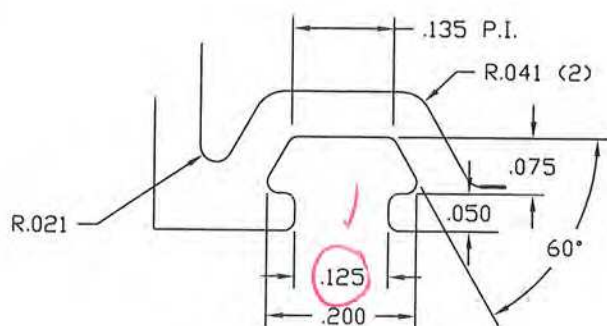
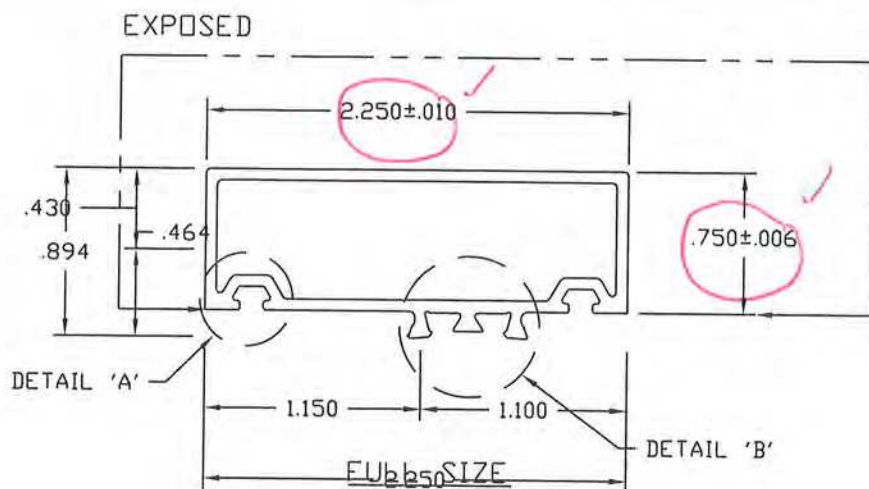
POCKET CLOSURE

DRAWN BY JEM	DRWG DATE 08/13/07	APPV'D BY	DATE APPV'D	
DWG SCALE NOTED	PRODUCT CODE	E6101		REV

E6101

E6106

A



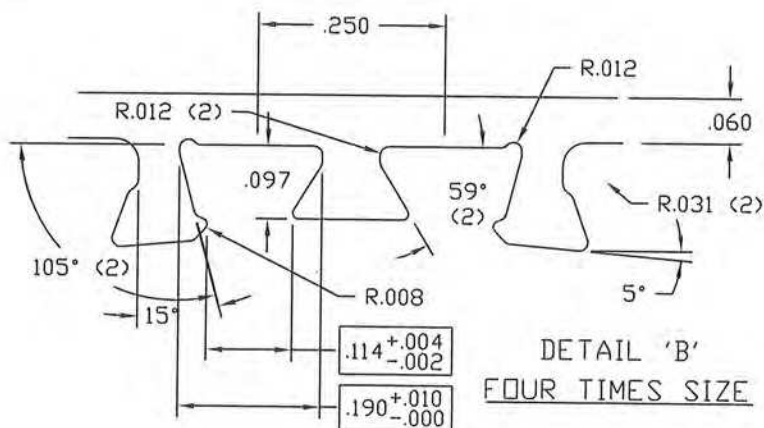
DETAIL 'A'  
FOUR TIMES SIZE



**Architectural Testing**

Test sample complies with these details.  
Deviations are noted.

Report# 92324  
Date 7/10/09 Tech RPM



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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

**TUBELITE**

DEPENDABLE

LEADERS IN ECO-EFFICIENT STOREFRONT,  
CURTAINWALL AND ENTRANCE SYSTEMS

3056 WALKER RIDGE NW, SUITE G  
WALKER, MICHIGAN 49544

WALL THK.	NOTED	SECTION CLASS	H	MAT'L	6063-T5	RATIO	133:1
PERIMETER OUT (TOTAL)	7.556	AREA	.415	WGT/FT	.488		
FACTOR	16	CIRCLE SIZE	2.372	INFILL VOLUME	N/A		

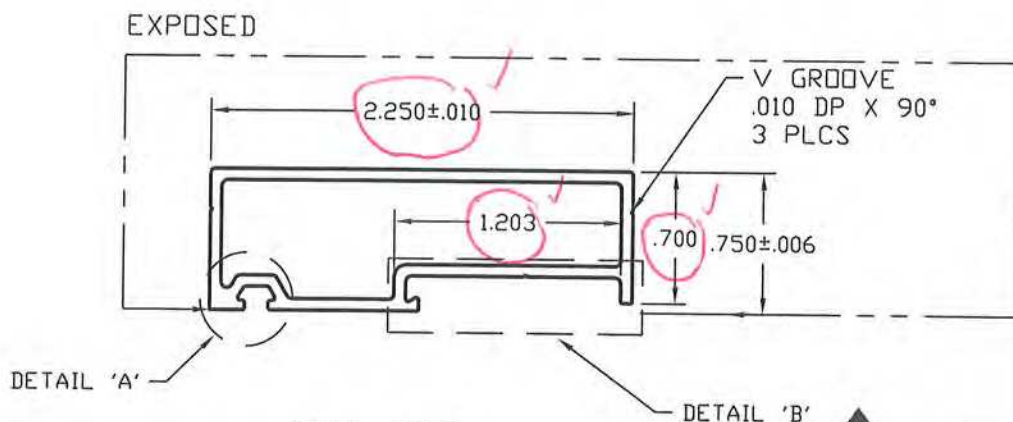
RXX	.318	SXX	.090	IXX	.042	CXX	.464
RYX	.751	SYX	2.04	IYX	.234	CYX	1.150

EXTERIOR CAP

DRAWN BY	JEM	DRWG DATE	08/10/07	APP'D BY		DATE APP'D	
DWG SCALE	NOTED	PRODUCT CODE		E6106		REV	A



E6115

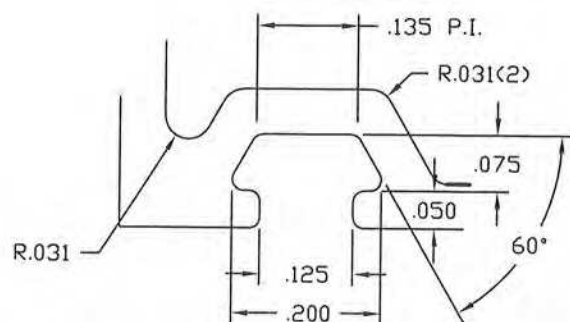


FULL SIZE



Architectural Testing

Test sample complies with these details.  
Deviations are noted.



DETAIL 'A'  
FOUR TIMES SIZE

Report#

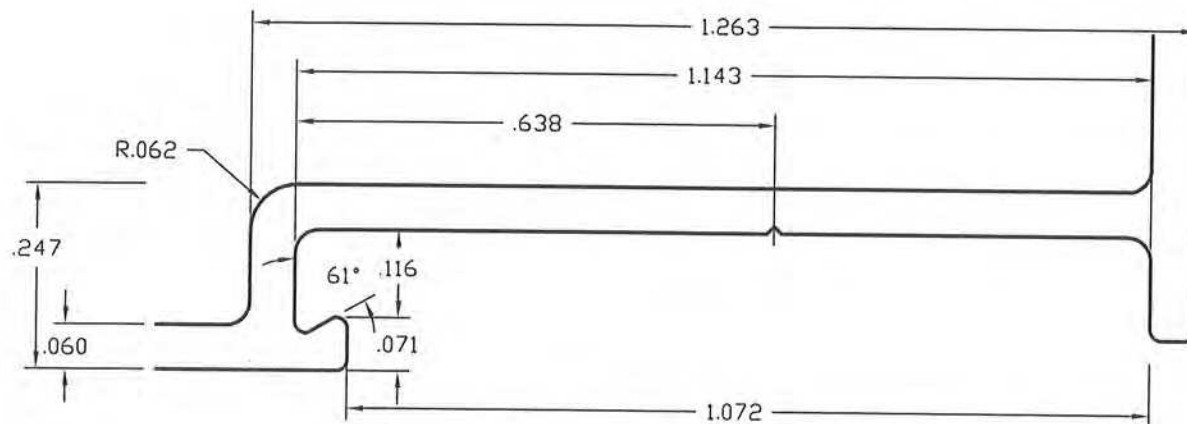
92324

Date

7/10/09

Tech

RPM



DETAIL 'B'  
FOUR TIMES SIZE

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TOLERANCES APPLY UNLESS NOTED

ALL UNSPECIFIED RADII .015

\* INDICATES .031 RADIUS

□ DENOTES CRITICAL DIMENSION  
ALL DIES PROPERTY OF TUBELITE

**TUBELITE**  
DEPENDABLE

LEADERS IN ECO-EFFICIENT STOREFRONT,  
CURTAINWALL AND ENTRANCE SYSTEMS

3056 WALKER RIDGE NW, SUITE G  
WALKER, MICHIGAN 49544

WALL THK.	.060	SECTION CLASS	H	MAT'L	6063-T5	RATIO	147:1
PERIMETER OUT (TOTAL)	6.701	AREA	.375	WGT/FT	.441		
FACTOR	16	CIRCLE SIZE	2.366	INFILL VOLUME	N/A		

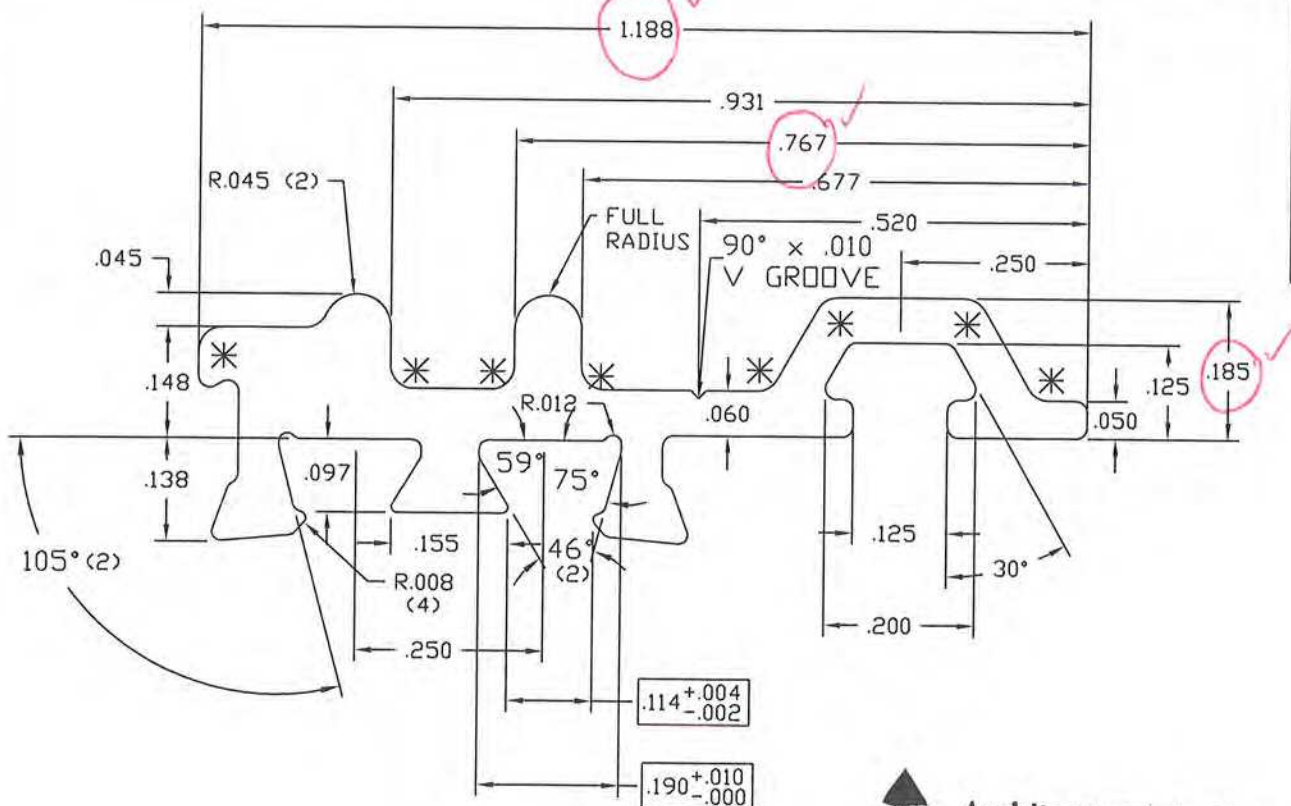
RXX	.280	SXX	.075	IXX	.030	CXX	.392
RYY	.756	SYY	.182	IYY	.214	CYY	1.178

REV	DATE	DESCRIPTION	INTL
	03/31/08	RELEASE TO TOOLING	SRD

EXTERIOR CAP  
LS CURTAIN WALL

DRAWN BY	JRJ	DRWG DATE	12/13/07	APPV'D BY		DATE APPV'D	
DWG SCALE	NOTED	PRODUCT CODE	XX	E6115		REV	

1



## Architectural Testing

Test sample complies with these details.  
Deviations are noted.

Report# 92324  
Date 7/10/09 Tech RPM

FOUR TIMES SIZE



FULL SIZE

NO EXPOSED SURFACES

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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

# TUBELITE®

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

3056 WALKER RIDGE NW, SUITE G  
WALKER, MICHIGAN 49544

[illegible]

WALL THK.	NOTED	SECTION CLASS	S	MAT'L	6063-T5	RATIO	358:1
PERIMETER OUT (TOTAL)	4.262			AREA	.154	WGT/FT	.181
FACTOR	195	CIRCLE SIZE	1.193	INFILL VOLUME	N/A		

RXX .330	SXX .024	IXX .017	CXX .691
RYY .078	SYX .005	IYY .001	CYY .183

CAP ADAPTOR

DRAWN BY	JRJ	DWG DATE	12/12/07	APPV'D BY	DATE APPV'D
DWG SCALE	NOTED	PRODUCT CODE	XX	E6116	REV



# Architectural Testing

Test sample complies with these details.  
Deviations are noted.

Report# 92324  
Date 7/10/09 Tech RPM

1 0.05 A

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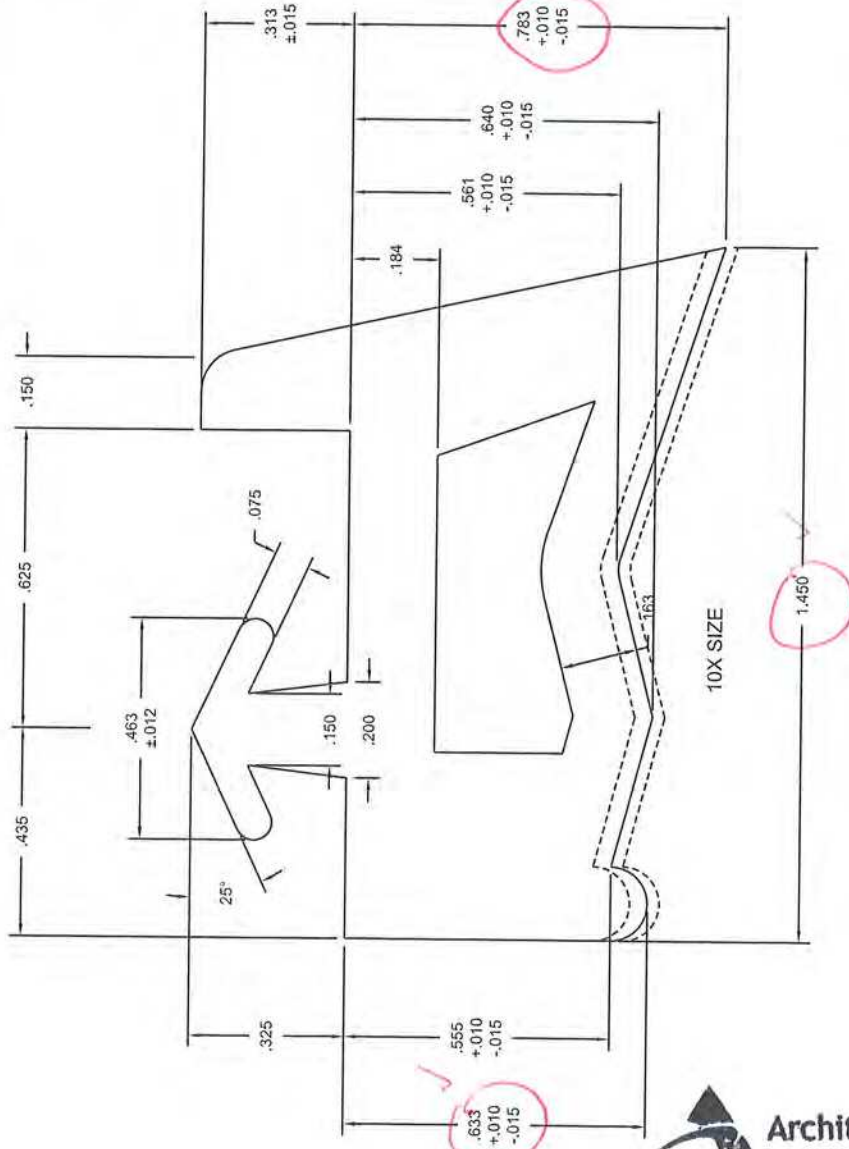
measure base

A

1 Comments		2 scale 1:1	
3 Bending $X = \pm 15 \text{ mm/n}$ $Y = \pm 50 \text{ mm/n}$ Distortion $\pm 15/n$		4 Not specified dimension (construction dimension)	
5 customer reference		6 Not specified tolerances DIN 16941 class 2	
7 customer		8 scale M 5:1 (1:1)	
9 Status		10 material PA 66 GF 25, dry impact	
11 Date 2212		12 Resp. HSCh	
13 1 2312		14 HSCh	
15 2 100105		16 HSCh	
17 3 040205		18 HSCh	
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P2502



ACTUAL SIZE



**Architectural Testing**

Test sample complies with these details.  
Deviations are noted.

Report# 92324  
Date 7/10/09 Tech RPM

60±5 SHORE "A" DURO  
BLACK EPDM  
TRELLEBORG PART 4416-02-00

**TUBELITE**  
DEPENDABLE  
Gaskets for all types of pipe and fittings  
Available in all sizes and materials

3005 WALKER RIDGE NW, SUITE 12  
WALKER, MICHIGAN 49544

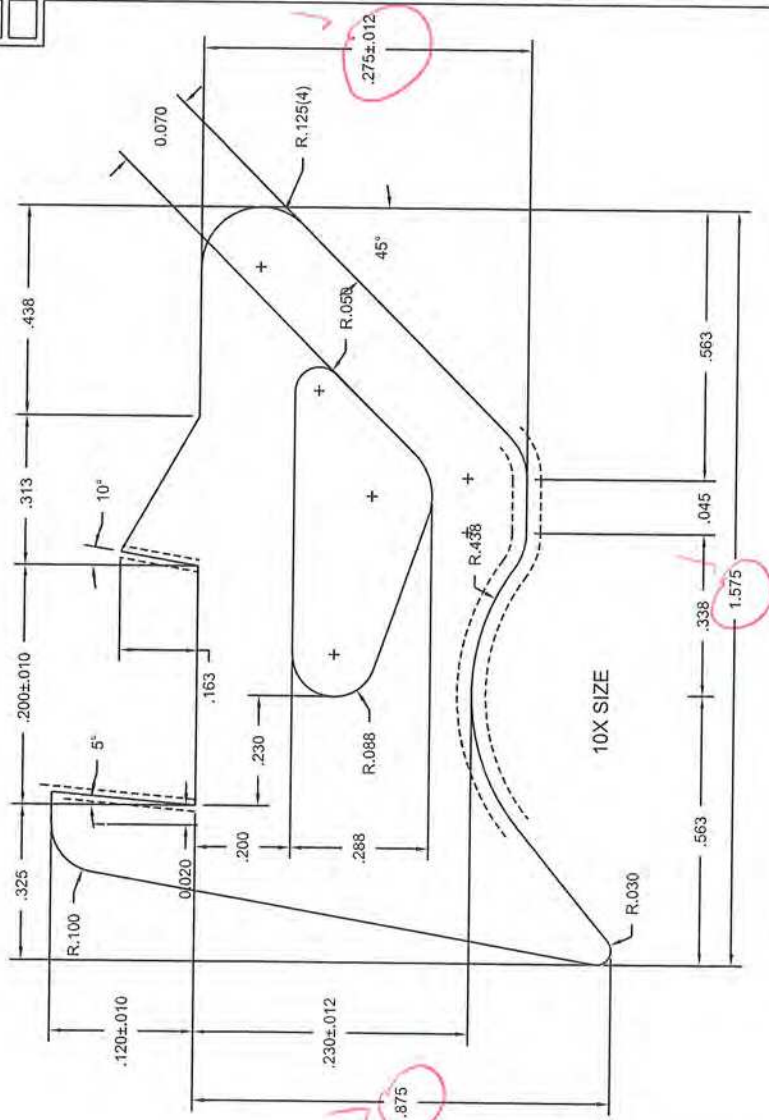
SPONGE GASKET  
300ES CURTAINWALL

DATE	APPROVED BY	DATE	APPROVED BY
09/15/08			
DATE	APPROVED BY	DATE	APPROVED BY
DATE	APPROVED BY	DATE	APPROVED BY
DATE	APPROVED BY	DATE	APPROVED BY
DATE	APPROVED BY	DATE	APPROVED BY

P2502

ALL TOLERANCES ARE  
RMA CLASS II UNLESS  
OTHERWISE NOTED

10



**TUBELITE®**  
DEPENDABLE  
LEADING IN SOO-EFFICIENT STORMWATER  
COLLECTION, CONVEYANCE, AND REMOVAL

3056 WALKER RIDGE NW, SUITE G  
WALKER, MICHIGAN 49514

WEDGE GASKET  
300ES CURTAINWALL

DRAWN BY	SRD	DWG DATE	09/15/08	APPROV BY	DATE APPROV
DWG SCALE	NOTED	PRODUCT CODE	P2501		
				REV	

[illegible]

ALL TOLERANCES ARE  
RMA CLASS II UNLESS  
OTHERWISE NOTED



## Architectural Testing

Test sample complies with these details.  
Deviations are noted.

Report# 72524  
Date 7/10/07 Tech RPm



ACTUAL SIZE

70±5 SHORE "A" DURO  
BLACK EPDM  
TRELLEBORG PART 2690-02 W/LUBE

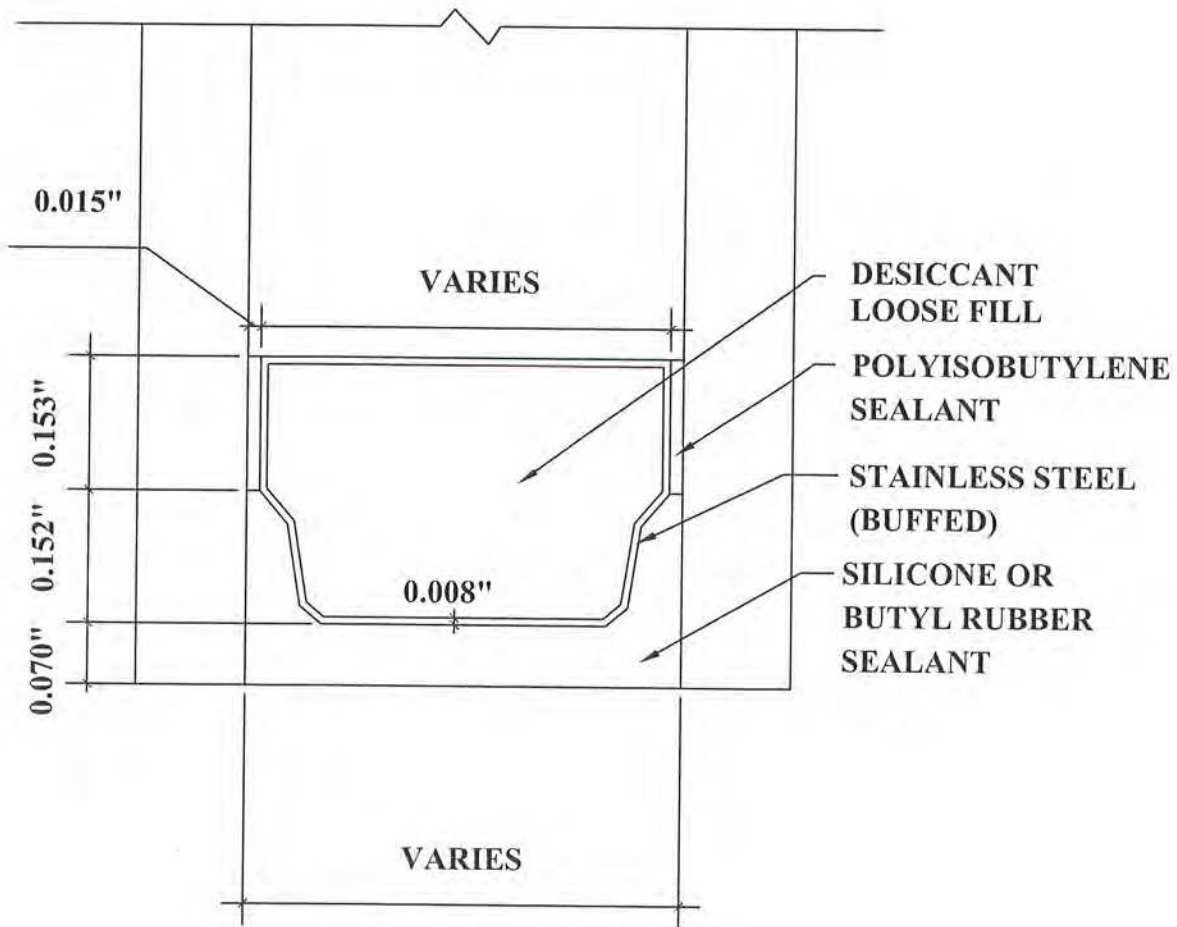




## Architectural Testing

Test sample complies with these details.  
Deviations are noted.

Report# 92324  
Date 7/10/09 Tech RLM



DETAIL FOR THERMAL MODELING OF  
VIRACON STAINLESS STEEL SPACER (SS-D)