Intertek | Architectural Testing

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

Rendered to:
CR LAURENCE CO., INC.

SERIES/MODEL:
StormWall XL Curtain Wall

Report Number: **C2680.06-116-45**
Report Date: **10/14/16**

130 Derry Court
York, PA 17406

www.archtest.com • www.intertek.com/building

p. 717.764.7700
f. 717.764.4129

Intertek | Architectural Testing

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

Rendered to:
CR LAURENCE CO., INC.
2503 East Vernon Avenue
Los Angeles, California 90058

Report Number:	C2680.06-116-45
Simulation Date:	11/27/12
Report Date:	10/14/16

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 7.4.3
Center-of-Glass Modeling:	WINDOW 7.4.8
Total Product Calculations:	WINDOW 7.4.8
Spectral Data Library:	IGDB 48.0

Simulations Specimen Description:

Series/Model:	StormWall XL Curtain Wall
Type:	Glazed Wall System, Curtain 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 were grouped for simulation purposes in accordance with NFRC 100-2010, Section 4.2.1.L. The painted finish was simulated since it is worst case (highest emissivity). The test sample was anodized aluminum.
3) The center-line modeling approach was conducted using the horizontal intermediate for the head and sillas and the vertical intermediate for the jambs. This procedure is outlined in the NFRC Simulation Manual Section 8.10.

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 7.4.8. 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	0.018093	0.021566	0.024823
SHGC1	0.915758	0.814185	0.718928
VT0	0.000000	0.000000	0.000000
VT1	0.897664	0.792618	0.694105

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*
Aluminum Dual Seal Spacer	Butyl Rubber	Butyl Rubber	A1-D
Technoform TGI Wave Spacer	PIB	Silicone	TS-D

Grid Option Description

Grid Size	*Grid Type*	*Grid Pattern*
None	-	-

Reinforcement Option Description

Location	*Material*
None	-

Gas Filling Technique Description

Fill Type	*Method*
78.28% Argon	Single Probe Timed
66.11% Kypton	Single Probe Timed
61.84% Krypton	Single Probe Timed
80.40% Krypton	Single Probe Timed
68.26% Krypton	Single Probe Timed
83.14% Krypton	Single Probe Timed
68.87% Krypton	Single Probe Timed
88.16% Argon	Single Probe Timed
81.23% Krypton	Single Probe Timed
72.27% Krypton	Single Probe Timed
88.83% Krypton	Single Probe Timed
94.45% Xenon	Evacuated Chamber
90.00% Argon	Single Probe Timed

Edge-of-Glass Construction

Interior Condition	EPDM Gasket Between Aluminum Frame and Glass
Exterior Condition	EPDM Gasket Between Aluminum Pressure Plate and Glass

Weatherstripping

Type	*Quantity*	*Location*
None	-	-

Frame/Sash Materials Finish

Interior	Painted Aluminum
Exterior	Painted Aluminum

NFRC 100/200/500 Summary Sheet
StormWall XL Curtain Wall

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	COG=.4200											
	0.223	0.500	0.549					KRY78	0.790(#2)	CL	A1-D	N
	U-Factor	0.56		SHGC (N)	0.46				VT (N)	0.45	CR	46
2	COG=.4000											
	0.223	0.500	0.549					KRY66	0.640(#2)	CL	A1-D	N
	U-Factor	0.54		SHGC (N)	0.26				VT (N)	0.19	CR	47
3	COG=.3800											
	0.222	0.500	0.549					KRY62	0.522(#2)	CL	A1-D	N
	U-Factor	0.53		SHGC (N)	0.19				VT (N)	0.09	CR	47
4	COG=.3600											
	0.223	0.500	0.549					KRY80	0.468(#2)	CL	A1-D	N
	U-Factor	0.51		SHGC (N)	0.20				VT (N)	0.16	CR	49
5	COG=.3400											
	0.223	0.500	0.549					KRY68	0.354(#2)	CL	A1-D	N
	U-Factor	0.49		SHGC (N)	0.13				VT (N)	0.07	CR	49
6	COG=.3200											
	0.223	0.500	0.549					KRY83	0.308(#2)	CL	A1-D	N
	U-Factor	0.48		SHGC (N)	0.10				VT (N)	0.04	CR	51
7	COG=.3000											
	0.221	0.500	0.549					KRY69	0.206(#2)	CL	A1-D	N
	U-Factor	0.46		SHGC (N)	0.46				VT (N)	0.53	CR	51
8	COG=.2800											
	0.221	0.500	0.549					ARG88	0.149(#2)	CL	A1-D	N
	U-Factor	0.44		SHGC (N)	0.29				VT (N)	0.34	CR	52
9	COG=.2600											
	0.221	0.500	0.549					KRY81	0.107(#2)	CL	A1-D	N
	U-Factor	0.43		SHGC (N)	0.54				VT (N)	0.63	CR	54
10	COG=.2400											
	0.222	0.500	0.549					KRY72	0.034(#2)	CL	A1-D	N
	U-Factor	0.41		SHGC (N)	0.33				VT (N)	0.56	CR	55

NFRC 100/200/500 Summary Sheet
StormWall XL Curtain Wall

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	
11	COG=.2200											
	0.223	0.500	0.549					KRY89	0.018(#2)	CL	A1-D	N
	U-Factor	0.39		SHGC (N)	0.26				VT (N)	0.55	CR	56
12	COG=.2000											
	0.223	0.500	0.549					XEN94	0.018(#2)	CL	A1-D	N
	U-Factor	0.38		SHGC (N)	0.26				VT (N)	0.55	CR	55
13	Clear/Air/Clear Lami075 (6mm/Lami) - 1"											
	0.225	0.500	0.549					AIR		CL	TS-D	N
	U-Factor	0.58		SHGC (N)	0.61				VT (N)	0.68	CR	45
14	SunGlass/Air/Clear Lami075 (6mm/Lami) - 1"											
	0.223	0.500	0.549					AIR	0.021(#2)	CL	TS-D	N
	U-Factor	0.43		SHGC (N)	0.24				VT (N)	0.42	CR	54
15	SunGlass/Argon/Clear Lami075 (6mm/Lami) - 1"											
	0.223	0.500	0.549					ARG90	0.021(#2)	CL	TS-D	N
	U-Factor	0.39		SHGC (N)	0.23				VT (N)	0.42	CR	57
16	Solarban 60/Air/Clear Lami075 (6mm/Lami) - 1"											
	0.223	0.500	0.549					AIR	0.035(#2)	CL	TS-D	N
	U-Factor	0.44		SHGC (N)	0.35				VT (N)	0.60	CR	54
17	Solarban 60/Argon/Clear Lami075 (6mm/Lami) - 1"											
	0.223	0.500	0.549					ARG90	0.035(#2)	CL	TS-D	N
	U-Factor	0.40		SHGC (N)	0.35				VT (N)	0.60	CR	57
18	Solarban 70/Air/Clear Lami075 (6mm/Lami) - 1"											
	0.223	0.500	0.549					AIR	0.018(#2)	CL	TS-D	N
	U-Factor	0.43		SHGC (N)	0.26				VT (N)	0.55	CR	54
19	Solarban 70/Argon/Clear Lami075 (6mm/Lami) - 1"											
	0.223	0.500	0.549					ARG90	0.018(#2)	CL	TS-D	N
	U-Factor	0.39		SHGC (N)	0.26				VT (N)	0.55	CR	57
20	SuperNeutral 68/Air/Clear Lami075 (6mm/Lami) - 1"											
	0.221	0.500	0.549					AIR	0.039(#2)	CL	TS-D	N
	U-Factor	0.44		SHGC (N)	0.35				VT (N)	0.58	CR	54

NFRC 100/200/500 Summary Sheet
StormWall XL Curtain Wall

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	SuperNeutral 68/Argon/Clear Lami075 (6mm/Lami) - 1"											
	0.221	0.500	0.549					ARG90	0.039(#2)	CL	TS-D	N
	U-Factor		0.40	SHGC (N)				0.34	VT (N)	0.58	CR	57
22	SuperNeutral 54/Air/Clear Lami075 (6mm/Lami) - 1"											
	0.221	0.500	0.549					AIR	0.034(#2)	CL	TS-D	N
	U-Factor		0.44	SHGC (N)				0.26	VT (N)	0.46	CR	54
23	SuperNeutral 54/Argon/Clear Lami075 (6mm/Lami) - 1"											
	0.221	0.500	0.549					ARG90	0.034(#2)	CL	TS-D	N
	U-Factor		0.40	SHGC (N)				0.26	VT (N)	0.46	CR	57

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.

This report is reissued in the name of CR Laurence CO., Inc. through written authorization of Oldcastle BuildingEnvelope, to whom the original report was rendered. The original Oldcastle BuildingEnvelope report number is C2680.02-116-45.

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 November 27, 2016.

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:

Kristen L. Louder

Digitally Signed by: Kristen Louder

Kristen L. Louder
Senior Simulation Technician
NFRC Certified Simulator

REVIEWED BY:

Michael J. Thoman

Digitally Signed by: Michael J. Thoman

Michael J. Thoman
Director - Simulations and Thermal Testing
Simulator-In-Responsible-Charge

KLL:kll
C2680.06-116-45

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

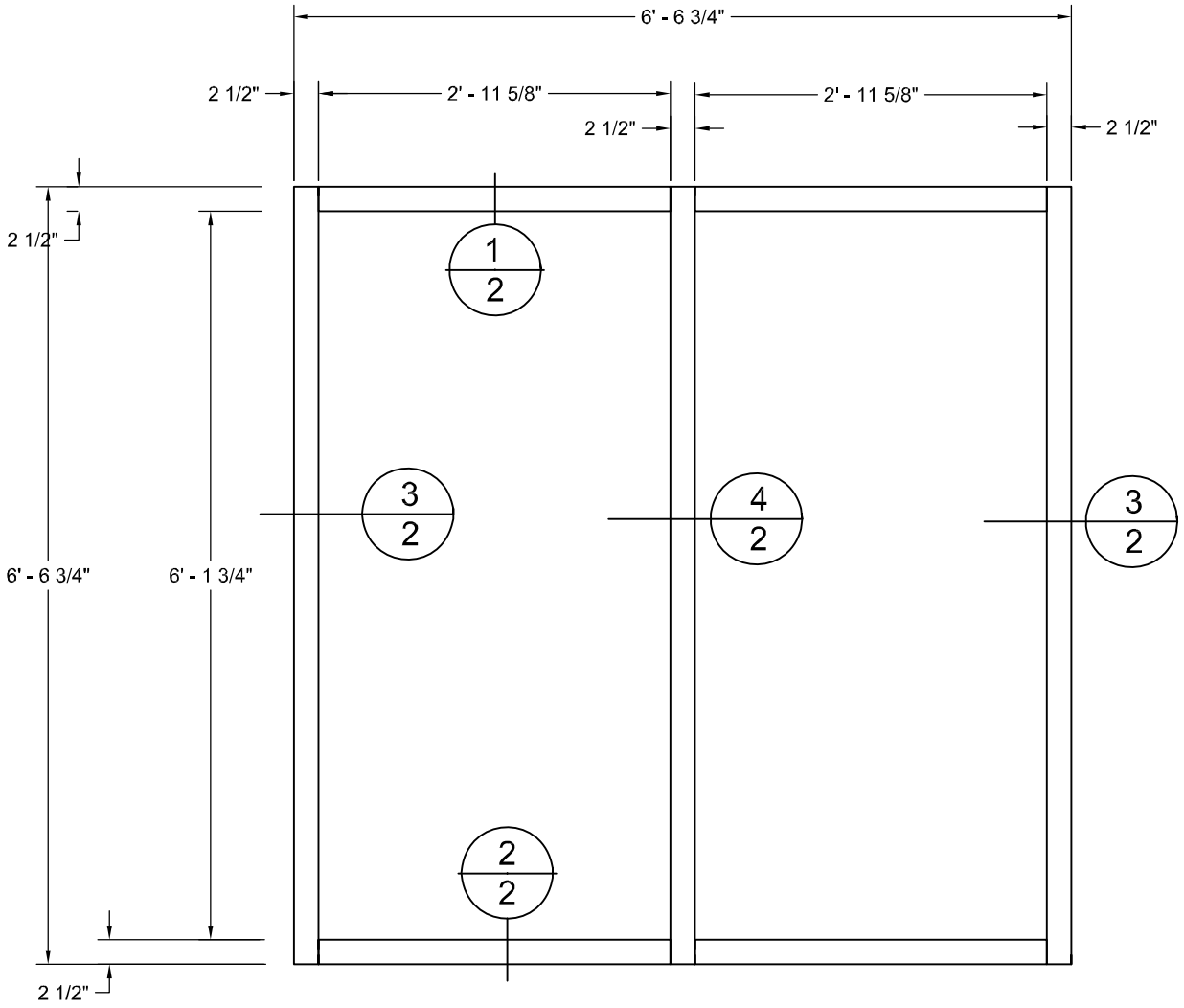
Revision Log

Rev. #	Date	Page(s)	Revision(s)
.06R0	10/14/16	All	Original Report Issue - Reissue of Report No. C2680.02-116-45 in the name of CR Laurence CO., Inc.

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

Appendix A

C2680.06-116-45



GENERAL TEST INFORMATION

AAMA 507 SIMULATIONS
AAMA 1503
NFRC 100
NFRC 100, 200, 500 SIMULATIONS

GLAZING SCHEDULE

GLASS COMPOSITION	MANUFACTURER NAME
1 5/16" STORMGLASS INSULATED GLASS CONSISTING OF 1/4" TEMP - 1/2" AIR SPACE - 1/4" H.S. .075 INTERLAYER - 1/4" H.S.	VANCEVA STORMGLASS

BILL OF MATERIAL

QTY	PART NO.	DESCRIPTION	LENGTH	NOTES
EXTRUSIONS				
	XL500-BP	Vertical/Jamb	78 3/4"	
	XL162-BP	Pressure Plate	78 3/4"	
	XL110-BP	Face Cap	78 3/4"	
	XL500-BP	Mullion	35 5/8"	
	XL162-BP	Pressure Plate	35 3/8"	
	XL110-BP	Face Cap	35 9/16"	

ACCESSORIES	
XLSB-2102	Setting Block
XLF-009	#14 x 1 1/2" HH
XLC-325	#12 - 14 x 1 1/2" HWH Elco Drill Flex
XLF-118	#10 x 1" PFH
XLB-183-01	Shear Block
XLG-117	Exterior Gasket
XLG-107	Isolator Gasket
XLG-5185	Interior Spacer Gasket

C.R.LAURENCE CO.
2503 E. Vernon Avenue, Los Angeles, CA 90058-1897
PH (800)-421-6144 FX: 800-587-7501
www.crlaurence.com

DRAWN BY: CH | APPROVED BY: | SCALE: FULL SIZE | DATE: 07/06/16 | EXTRUSION BASE PART NO.: XL

PART DESCRIPTION: STORMWALL XL ELEVATION | DWG #: ELEVATION

BRAND: US ALUMINUM

NOTES: THERMAL TEST DRAWINGS

REV	DESCRIPTION	DATE	APPD

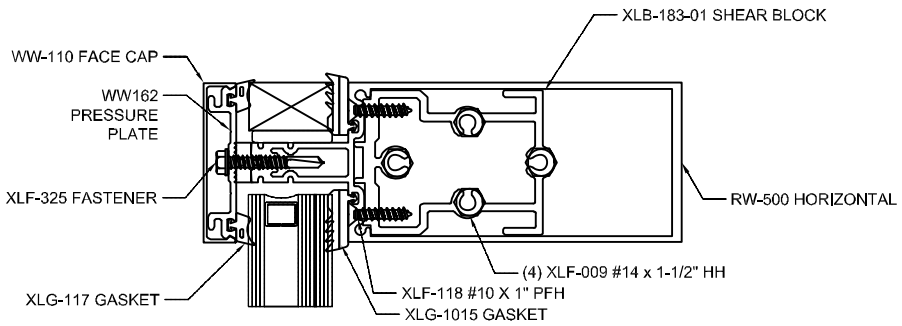
UNLESS OTHERWISE SPECIFIED:
ANSI/B4.1-2009 TOLERANCES FOR
ALUMINUM EXTRUSIONS APPLY

UNSPECIFIED CORNER RAD: IN.
UNSPECIFIED WALL THICKNESS: IN.

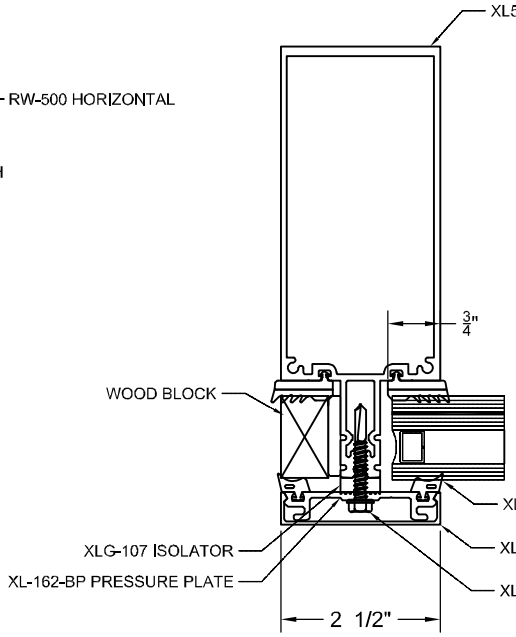
IDENTIFIES CRITICAL CHARACTERISTICS FOR CRL INSPECTION

IDENTIFIES EXPOSED AREA

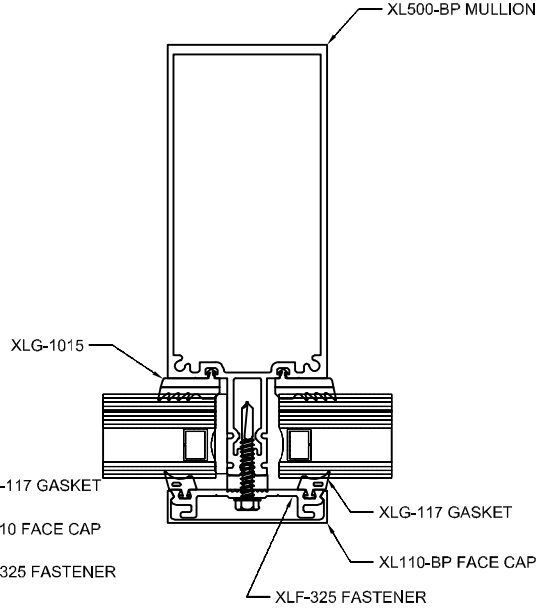
ALLOY & TEMPER: 6063-T6 | SQ. IN.
ESTIMATED AREA: | LB
ESTIMATED WEIGHT / FT: | IN.
ESTIMATED PERIMETER: | IN. | OUT_PER: | IN.
EXP/PAINTED PER: | IN.
CLASS: | CIRC. E. SIZE: | IN.
SECTION PROPERTIES: IN.^4 | IN.^3
IN.^4 | IN.^3



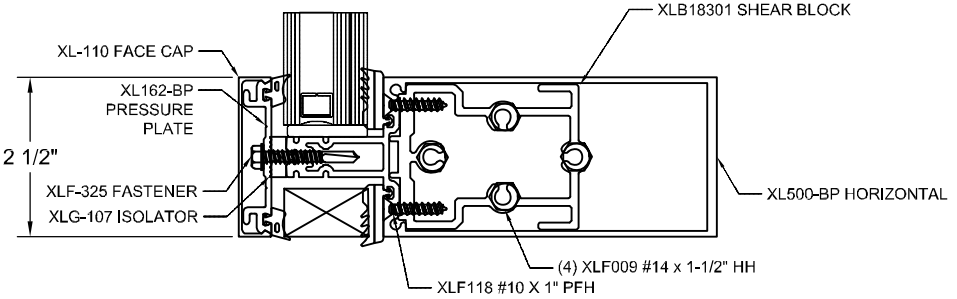
1 HORIZONTAL



3 JAMB



4 MULLION



2 HORIZONTAL

C.R.LAURENCE CO.
2503 E. Vernon Avenue, Los Angeles, CA 90058-1897
PH (800)-421-6144 FX: 800-587-7301
www.crlaurence.com

DRAWN BY: CH
APPROVED BY:
SCALE: FULL SIZE
DATE: 07/06/16
EXTRUSION BASE PART NO: XL

PART DESCRIPTION: STORMWALL XL CROSS SECTIONS
BRAND: US ALUMINUM
NOTES: THERMAL TEST DRAWINGS
PAGE #:

REV	DESCRIPTION	DATE	APPD

THE DRAWING AND THE DESIGN SHOWN THEREON IS THE PROPERTY OF C.R.LAURENCE CO., INC. AND USE OR COPIES THEREOF CANNOT BE MADE WITHOUT WRITTEN CONSENT.

UNLESS OTHERWISE SPECIFIED: ANSI H35.2-2007 TOLERANCES FOR ALUMINUM EXTRUSIONS APPLY
UNSPECIFIED CORNER RAD: IN.
UNSPECIFIED WALL THICKNESS: IN.

IDENTIFIES CRITICAL CHARACTERISTICS FOR CRL INSPECTION
IDENTIFIES EXPOSED AREA

ALLOY & TEMPER: 6063-T6
ESTIMATED AREA: 2.08 SQ. IN.
ESTIMATED WEIGHT / FT: 2.85 LB
ESTIMATED PERIMETER: IN.
EXP PAINTED PER: IN. OUT_PER: IN.
CLASS: CIRCLE SIZE: IN.
SECTION PROPERTIES:
Ix: IN.4 Sx: IN.3
Iy: IN.4 Sy: IN.3