

**AAMA 1503-09 THERMAL PERFORMANCE
TEST REPORT**

Rendered to:

CR LAURENCE CO., INC.

SERIES/MODEL: StormWall XL Curtain Wall (Low-E)

TYPE: Glazed Wall Systems (Site-built)

Summary of Results	
Thermal Transmittance (U-Factor)	0.42
Condensation Resistance Factor - Frame (CRF _f)	68
Condensation Resistance Factor - Glass (CRF _g)	71
Unit Size	78-3/4" x 78-3/4" (2000 mm x 2000 mm)
Layer 1	1/4" Oldcastle SunGlass VT (e=0.021*, #2) Tempered
Gap 1	0.53" Gap, Technoform TGI Spacer (TS-D), 90% Argon-Filled*
Layer 2	0.53" (1/4" Clear / 0.075" PVB / 1/4" Clear) Laminated

Reference must be made to Report No. C2682.04-116-46, dated 10/14/16 for complete test specimen description and data.

AAMA 1503-09 THERMAL PERFORMANCE TEST REPORT

Rendered to:

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

Report Number: C2682.04-116-46
Test Date: 11/07/12
Report Date: 10/14/16

Test Sample Identification:

Series/Model: StormWall XL Curtain Wall (Low-E)

Type: Glazed Wall Systems (Site-built)

Test Sample Submitted by: Oldcastle BuildingEnvelope - Terrell, Texas

This report is a reissue of the original Report No. C2682.02-116-46. This report is reissued in the name of CR Laurence CO., Inc. through written authorization of Oldcastle BuildingEnvelope.

Test Procedure: The condensation resistance factor (CRF) and thermal transmittance (U) were determined in accordance with AAMA 1503-09, *Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections*

- | | |
|---|---------|
| 1. Average warm side ambient temperature | 69.80 F |
| 2. Average cold side ambient temperature | -0.40 F |
| 3. 15 mph dynamic wind applied to test specimen exterior. | |
| 4. 0.0" \pm 0.04" static pressure drop across specimen. | |

Test Results Summary:

- | | |
|--|------|
| 1. Condensation resistance factor - Frame (CRF _f) | 68 |
| Condensation resistance factor - Glass (CRF _g) | 71 |
| 2. Thermal transmittance due to conduction (U)
(U-factors expressed in Btu/hr·ft ² ·F) | 0.42 |

Test Sample Description:

CONSTRUCTION	Frame
Size (in.)	78-3/4" x 78-3/4"
Daylight Opening (in.)	35-5/8" x 73-3/4" (x2)
CORNERS	Butted
Fasteners	Screws
Sealant	Yes
MATERIAL	AT (0.25")
Color Exterior	Clear
Finish Exterior	Anodized
Color Interior	Clear
Finish Interior	Anodized
GLAZING METHOD	Exterior Pressure Plate (Screwed 9" O.C.)

Glazing Information:

Layer 1	1/4" Oldcastle SunGlass VT (e=0.021*, #2) Tempered
Gap 1	0.53" Gap, Technoform TGI Spacer (TS-D), 90% Argon-Filled*
Layer 2	0.53" (1/4" Clear / 0.075" PVB / 1/4" Clear) Laminated
Gas Fill Method	Single-Probe Method*
Desiccant	Yes

**Stated per Client/Manufacturer*

NA Non-Applicable

See Description Table Abbreviations

Test Sample Description: (Continued)

COMPONENTS		
Type	Quantity	Location
WEATHERSTRIP		
GP107 gasket	1 row	Frame at pressure plate
GP117 gasket	1 row	Exterior glazing perimeter
FG5185 gasket	1 row	Interior glazing perimeter
HARDWARE		
Aluminum pressure plate	7	Four exterior horizontals, three exterior verticals
Aluminum face cap	7	Four exterior horizontals, three exterior verticals
(1.38" x 0.75") Wood blocks	6	Two per head and sill, one per jamb
DRAINAGE		
(0.31") diameter weephole	4	Two per sill pressure plate

Test Duration:

1. The environmental systems were started at 16:34 hours, 11/06/12.
2. The thermal performance test results were derived from 02:04 hours, 11/07/12 to 06:04 hours, 11/07/12.

Condensation Resistance Factor (CRF):

The following information, condensed from the test data, was used to determine the condensation resistance factor:

T_h	=	Warm side ambient air temperature	69.80 F
T_c	=	Cold side ambient air temperature	-0.40 F
FT_p	=	Average of pre-specified frame temperatures (14)	48.11 F
FT_r	=	Average of roving thermocouples (4)	41.25 F
W	=	$[(FT_p - FT_r) / (FT_p - (T_c + 10))]$ x 0.40	0.071
FT	=	$FT_p(1-W) + W (FT_r)$ = Frame Temperature	47.62 F
GT	=	Glass Temperature	49.59 F
CRF_g	=	Condensation resistance factor – Glass	71
		$CRF_g = (GT - T_c) / (T_h - T_c) \times 100$	
CRF_f	=	Condensation resistance factor – Frame	68
		$CRF_f = (FT - T_c) / (T_h - T_c) \times 100$	

The CRF number was determined to be 68 (on the size as reported). When reviewing this test data, it should be noted that the frame temperature (FT) was colder than the glass temperature (GT) therefore controlling the CRF number. Refer to the 'CRF Report' page and the 'Thermocouple Location Diagram' page of this report.

Thermal Transmittance (U):

T_h	= Average warm side ambient temperature	69.80 F
T_c	= Average cold side ambient temperature	-0.40 F
P	= Static pressure difference across test specimen 15 mph dynamic perpendicular wind at exterior	0.00 psf
	Nominal sample area	43.07 ft ²
	Total measured input to calorimeter	1331.90 Btu/hr
	Calorimeter correction	63.74 Btu/hr
	Net specimen heat loss	1268.17 Btu/hr
U	= Thermal Transmittance	0.42 Btu/hr·ft ² ·F

Glazing Deflection (in.):

	Left Glazing	Right Glazing
Edge Gap Width	0.53	0.53
Estimated center gap width upon receipt of specimen in laboratory (after stabilization)	0.41	0.47
Center gap width at laboratory ambient conditions on day of testing	0.41	0.47
Center gap width at test conditions	0.38	0.44

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.

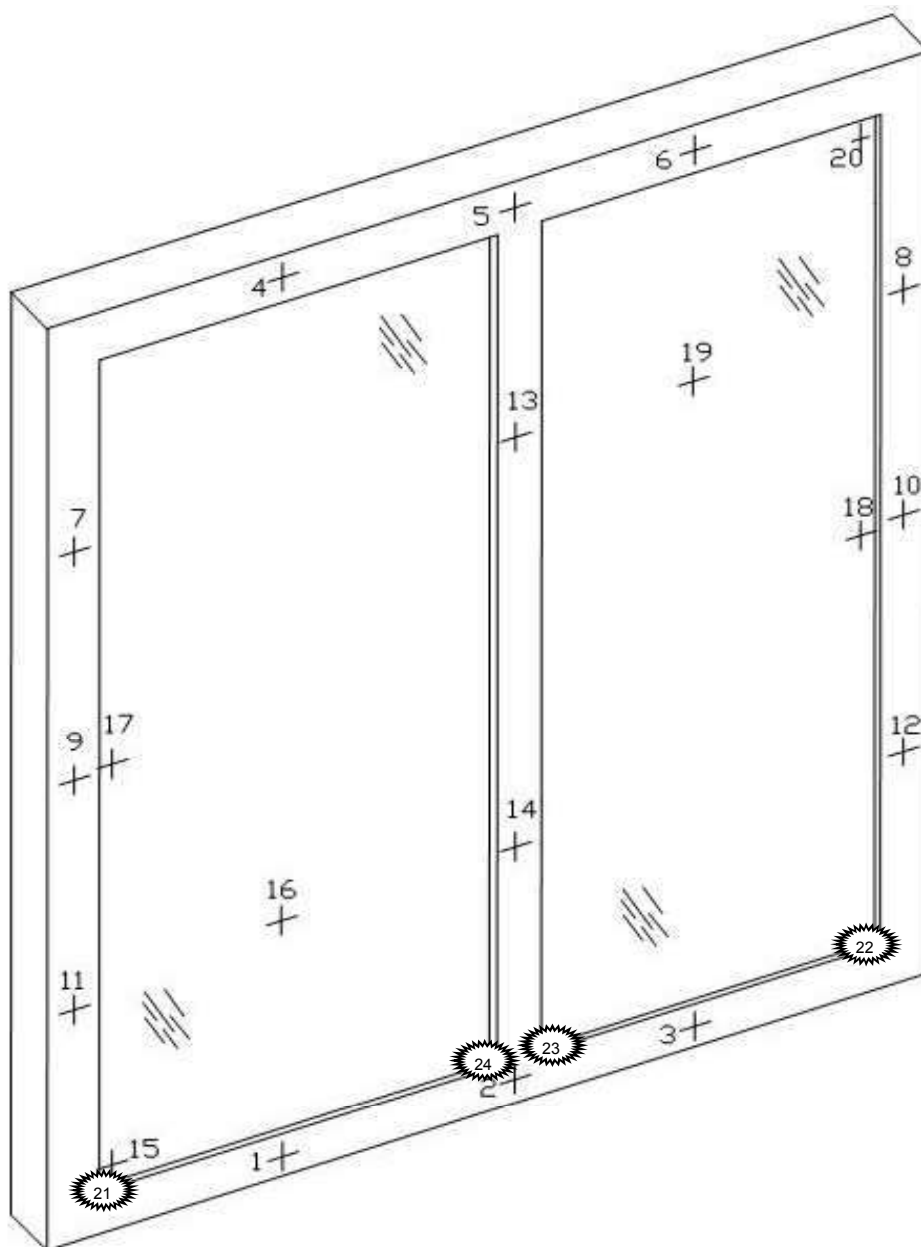
Required annual calibrations for the Architectural Testing Inc. 'thermal test chamber' (ICN 000001) in York, Pennsylvania were last conducted in May 2012 in accordance with Architectural Testing Inc. calibration procedures. A CTS Calibration verification was performed in June 2012. A Metering Box Wall Transducer and Surround Panel Flanking Loss Characterization was performed in June 2012.

Prior to testing the specimen was sealed with silicone on the interior side and checked for air infiltration per Section 9.3.4.





CRF Report

Time:	04:04	04:34	05:04	05:34	06:04	AVERAGE
Pre-specified Thermocouples - Frame						
1	44.08	44.08	44.09	44.12	44.12	44.10
2	44.98	45.02	45.00	44.98	44.99	44.99
3	44.46	44.46	44.52	44.50	44.49	44.49
4	51.26	51.27	51.32	51.26	51.22	51.26
5	51.36	51.35	51.33	51.30	51.30	51.33
6	51.62	51.64	51.63	51.64	51.63	51.63
7	50.23	50.22	50.22	50.20	50.20	50.21
8	49.92	49.94	49.91	49.91	49.94	49.92
9	47.76	47.77	47.79	47.76	47.76	47.77
10	47.17	47.22	47.21	47.19	47.15	47.19
11	44.84	44.85	44.84	44.85	44.82	44.84
12	44.66	44.70	44.69	44.68	44.66	44.68
13	53.03	53.04	53.03	53.01	53.03	53.03
14	48.09	48.09	48.10	48.10	48.10	48.10
FT _p	48.10	48.12	48.12	48.11	48.10	48.11
Pre-specified Thermocouples - Glass						
15	40.62	40.61	40.62	40.66	40.65	40.63
16	55.56	55.56	55.58	55.59	55.56	55.57
17	48.59	48.59	48.60	48.60	48.59	48.60
18	47.85	47.87	47.89	47.89	47.86	47.87
19	58.32	58.33	58.32	58.28	58.25	58.30
20	46.53	46.56	46.54	46.56	46.55	46.55
GT	49.58	49.59	49.59	49.60	49.58	49.59
Cold Point (Roving) Thermocouples						
21	40.00	40.00	40.00	40.00	40.00	40.00
22	40.60	40.60	40.60	40.60	40.60	40.60
23	42.10	42.10	42.10	42.10	42.10	42.10
24	42.30	42.30	42.30	42.30	42.30	42.30
FT _R	41.25	41.25	41.25	41.25	41.25	41.25
W	0.07	0.07	0.07	0.07	0.07	0.07
FT	47.62	47.63	47.63	47.62	47.61	47.62
Warm Side - Room Ambient Air Temperature						
	69.80	69.81	69.79	69.80	69.80	69.80
Cold Side - Room Ambient Air Temperature						
	-0.38	-0.40	-0.44	-0.37	-0.42	-0.40
CRF _f	68	68	68	68	68	68
CRF _g	71	71	71	71	71	71

Thermocouple Location Diagram



Cold Point Locations

-  21. 40.00
-  22. 40.60
-  23. 42.10
-  24. 42.30

This report is a reissue of the original Report No. C2682.02-116-46. This report is reissued in the name of CR Laurence CO., Inc. through written authorization of Oldcastle BuildingEnvelope.


Architectural Testing 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 Architectural Testing, Inc. for the entire test record retention period. The test record retention end date for this report is November 7, 2016.

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. 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.


Digitally Signed by: Ryan P. Moser

Ryan P. Moser
Technician


Digitally Signed by: Shon W. Einsig

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

RPM:kmm
C2682.04-116-46

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

Appendix-A: Description Table Abbreviations (1)

Appendix-B: Drawings (9)

Revision Log

<u>Rev. #</u>	<u>Date</u>	<u>Page(s)</u>	<u>Revision(s)</u>
.04R0	10/14/16	All	Original Report Issue - Reissue of Report No. C2682.02-116-46 in the name of CR Laurence CO., 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	Polyamide

Appendix B: Drawings

GENERAL TEST INFORMATION
 AAMA 507 SIMULATIONS
 AAMA 1503
 NFRC 100
 NFRC 100, 200, 500 SIMULATIONS

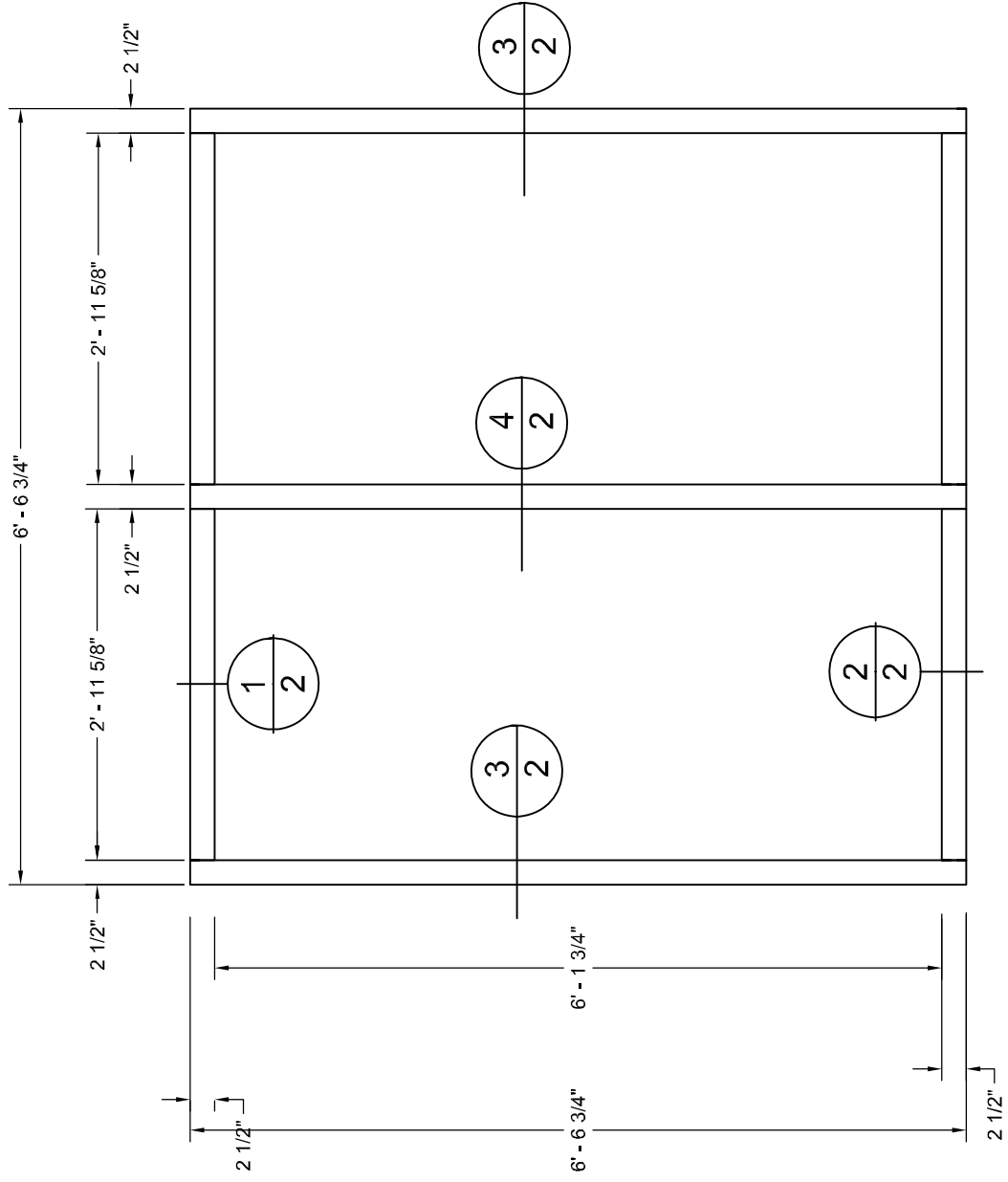
GLAZING SCHEDULE
 GLASS COMPOSITION MANUFACTURER NAME
 1 5/16" STORMGLASS INSULATED GLASS
 CONSISTING OF 1 1/4" TEMP - 1/2" AIR SPACE
 & 1/4" INS. INTERLAYER & 1/4" INS.

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

XL5B-2102	Setting Block
XLF-009	#14 x 1 1/2" HH
XL2-325	#12 - 14 x 1 1/2" HWH Elco Drill Flex
XLF-118	#10 x 1" PPH
XLB-183-01	Shear Block
XLG-117	Exterior Gasket
XLG-107	Isolator Gasket
XLG-5185	Interior Spacer Gasket



REV	DESCRIPTION	DATE	APPD

UNLESS OTHERWISE SPECIFIED:
 ANSIS HES-2009 TOLERANCES FOR:
 A. ALUMINUM EXTRUSIONS APPLY
 B. UNSPICED CORNER RVD. IN.
 UNSPICED WALL THICKNESS: IN.
 UNSPICED WALL PER: IN.
 CLASS: IN.
 ESTIMATED PERMETER: IN.
 ESTIMATED WEIGHT / FT²: IN.
 ESTIMATED AREA: SQ. IN.
 6063-T6

IDENTIFIES CRITICAL CHARACTERISTICS FOR CRI INSPECTION

IDENTIFIES EXPOSED AREA

THIS DRAWING AND THE DESIGN SHOWING THEREIN ARE THE PROPERTY OF C.R. LAURENCE CO., INC. AND USE OF THIS DRAWING OR CHANGES THEREIN BE MADE WITHOUT WRITTEN CONSENT.

BRAND: US ALUMINUM

PART DESCRIPTION: STORMWALL XL ELEVATION

DATE: 07/06/16

SCALE: XL

PROJECT NUMBER: 16000000000000000000

DATE: 07/06/16

SCALE: XL

C.R. LAURENCE CO.
 2503 E. Orion Avenue, Los Angeles, CA 90058-1897
 PH (800)-421-6144 FX (800)-687-7501
 www.crlaurence.com

ALLOY & TEMPER: 6063-T6	ESTIMATED AREA: 2.08	SQ. IN.
ESTIMATED WEIGHT / FT: 2.86	ESTIMATED PERMETER:	IN
EXP/PAINTED PER:	IN	OUTL. PER:
CLASS:	CIRCLE SIZE:	IN
SECTION PROPERTIES:	IDENTIFIES OPTICAL CHARACTERISTICS	IDENTIFIES EXPOSED AREA
UNLESS OTHERWISE SPECIFIED:	ALUMINUM EXTRUSIONS APPLY	UNSPECIFIED CORNER RAD:
ANSI HAS 2-2009 TOLERANCES FOR	IN	UNSPECIFIED WALL THICKNESS:
FOR CRL INSPECTION	IN	IDENTIFIES OPTICAL CHARACTERISTICS
FOR CRL INSPECTION	IN	IDENTIFIES EXPOSED AREA
AND USE OF CORNERS THEREOF CANNOT BE MADE	WITHOUT WRITTEN CONSENT.	
C.R. LAURENCE CO., INC.		
C.R. LAURENCE CO., INC.		
THE DRAWING AND THE DESIGN SHOWN THEREIN IS THE PROPERTY OF		
BRAND: US ALUMINUM		
NOTES: THERMAL TEST DRAWINGS		
DWG #:		
DATE:		
SCALE:		
FULL SIZE		
07/09/16		
XL		
STANDARD BASE PART NO.		
DATE:		
APPROVED BY:		
DATE:		
APPROVED:		
DATE:		
APPROVED:		

