Fenestration Testing Laboratory, Inc.
10235 8th Street, Rancho Cucamonga, CA 91730

Report #: T23-104

REPORT SUMMARY

REPORT #
T23-104

TESTED FOR
Fleetwood Windows and Doors
1 Fleetwood Way
Corona, CA 92879

SERIES & PRODUCT TYPE
450-T - THERMALLY BROKEN ALUMINUM AWNING WINDOW

CONFIGURATION
X

FRAME SIZE
1828.80 mm x 914.40 mm (72.00" x 36.00")

SPECIFICATION
NAFS - North American Fenestration Standard/specification for windows, doors, and skylights AAMA/WDMA/CSA 101/I.S.2/A440-22

CSA A440S1:19 Canadian Supplement to AAMA/WDMA/CSA 101/I.S.2/A440

PRIMARY DESIGNATOR
CLASS CW-PG40 1828.80 x 914.40 mm (72.00 x 36.00 in) Type: AP

TEST COMPLETION DATE
December 8, 2023

REPORT DATE
December 12, 2023

1.0 Tested For: Fleetwood Windows and Doors
1 Fleetwood Way
Corona, CA 92879

2.0 Purpose:
The purpose of this report is to present the testing methods employed and the test results obtained during the performance testing of one (1) THERMALLY BROKEN ALUMINUM AWNING WINDOW described in paragraph 5.0 of this report.

3.0 Test References:
3.1 NAFS - North American Fenestration Standard/specification for windows, doors, and skylights AAMA/WDMA/CSA 101/I.S.2/A440-22
3.2 CSA A440S1:19 Canadian Supplement to AAMA/WDMA/CSA 101/I.S.2/A440
3.3 ASTM F 588-17 Forced Entry Resistance Tests for Windows
3.4 CAWM 301-90(1995) Forced Entry Test for Windows (CMBSO 1-79)

4.0 Compliance Statement: The test results in paragraph 6.0 indicate that the test sample described in paragraph 5.0 of this report met the performance requirements of the above specifications for the performance grade shown in 4.1 below.
4.1 CLASS CW-PG40 1828.80 x 914.40 mm (72.00 x 36.00 in) Type: AP

5.0 Sample Sumbitted:
5.1 Product Type: THERMALLY BROKEN ALUMINUM AWNING WINDOW
5.2 Series: 450-T
5.3 Configuration: X
5.4 Product Dimensions:

	Millimeters	Inches
Total Frame:	1828.80 x 914.40	72.00 x 36.00
Active (Vent) sash:	1813.05 x 898.65	71.38 x 35.38

5.5 Glass and Glazing:

IGU Thickness	*Spacer Size*	*Interior Lite*	*Exterior Lite*	*Glazing method*
1" overall wide	5/8"	3/16" Annealed	3/16" Annealed	Outside glazed onto hollow bulb vinyl. A 5" long bead of sealant bead was applied parallel to the bulb vinyl 5" each way at each corner. Rubber setting blocks 3/8" high were set at quarter points on the vent bottom . Aluminum glazing stop applied full perimeter on the outside of the IGU. Each stop contained a strip of hollow bulb vinyl.

5.6 Weepage:

Drainage Method	*Size*	*Quantity*	*Location*
Weep notch	1" x 3/16"	One (1) at each end	Two outer sill legs were notched. The bulb vinyl on the vent was notched in line with each sill weep notch.
Vertical round weep	0.31" diameter	One (1) at each end	Vent bottom rail.

5.7 Pressure balancing: None

5.8 Weather-stripping:

Type	*Quantity*	*Location*
Hollow bulb vinyl (BOM item 7)	Two (2) strips	Frame inside leg - one strip full perimeter facing out. Vent sash – one strip full perimeter facing in.
Hollow bulb vinyl (BOM item 6)	Two (2) strips	Same as listed under "Glass and Glazing". One strip was on the vent glazing leg facing out and the other strip on the glass stops.

5.9 Sealants:

Sealant was applied at the following locations:
-Vent and frame corners were sealed full profile.
-Aluminum sill pan was set in sealant to the rough opening and the window sill was set into the sill pan on a bead of sealant.
-The roto-operator housing was sealed to the sill with a rubber gasket.
-The locks were sealed with adhesive foam gasket to their respective jamb.
-All staked locations were sealed.
-Sealant at glazing described under "Glass and Glazing"

5.10 Hardware:

Type	*Quantity*	*Location*
Roto-operator and tracks	One (1) set.	The roto-operator arms fit through a fabricated hole at midspan of the sill inside leg. The housing was fastened to the sill leg with a pair of #8x 3/8" PH screws applied from the outside through the sill leg and into the housing screw races. Each of the two arms had a PVC shoe and each shoe moved along a metal track fastened to the vent bottom rail with a pair of #10 x ½" PPH screws.
Metal two point lock	Two (2)	Each jamb - One two point lock was located 9" up from the bottom of each jamb. Each lock housing fit into a fabricated hole in its respective jamb and fastened to it with a pair of #10 x 3/8" PH screws applied from the outside, through an aluminum retainer and into screw races in the lock housing. Each lock had a cam handle linked to a metal slide rod. Each slide rod was supported by three nylon retainer/guides. Each retainer was fastened to its respective jamb with a pair of ##8 x 3/4" PPH screws. Each slide rod contained two lock pins that engaged their respective metal keeper located at 4" and 14" from the bottom of each stile. Each keeper was fastened to its respective stile with four #8 x 1/2" PFH screws.
4 bar friction hinge	Two (2)	The sash was supported in the frame with a 4 bar friction hinge in each jamb. Each hinge was fastened to its jamb with three #10 x 1/2" PPH screws. A 1/8" aluminum shim plate was set between each hinge and the frame. Each hinge was fastened to its respective vent stile with four #10 x 1/2" PPH screws.
Metal snubbers	Two (2) pair	A pair of snubbers was located on the vent top rail and frame head 18.5" from each end. Each snubber on head was fastened with a pair of #10 x 1/2" PPH screws and each snubber on vent top rail was fastened with a pair of #10 x 3/8" PPH screws.

5.11 Construction:

Location	*Joinery Type*	*Number of Fasteners*	*Fastener Size*
Frame corners	Mitered, keyed with two keys, and staked.	N/A	N/A
Sash corners	Mitered, keyed with two keys, and staked.	N/A	N/A

5.12 Reinforcement: None

5.13 Installation:

Location on frame	*Anchor type*	*Spacing*
The rough opening was constructed with 2" x 6" lumber doubled on all four sides. The window was fastened to it with screws through the nail on fins full perimeter.	#8 x 1.5" PFH	6.5" from each end and 16" on center.

6.0 - Test procedures and results: All testing procedures were performed in accordance with the performance requirements of the test specifications referenced in paragraph 3.0 of this report. The number preceding each test listed below refer to the corresponding sections in the NAFS.

8.3.1 – Operation Force (ASTM E2068-00(2016))

Test Description	Results	Allowed	Comments
Maximum force to initiate or maintain motion	28.02 N (6.30 lbf)	60 N (14.0 lbf)	1
Latching device force	8.89 N (2.00 lbf)	100 N (22.48 lbf)	

8.3.2 – Air Infiltration (ASTM E283-19)

Test Description	Results	Allowed	Comments
75 Pa differential pressure	0.00 L/s*m²	1.5 L/s*m²	
1.57 psf differential pressure	0.00 cfm/ft²	0.30 cfm/ft²	
The tested specimen exceeds the performance levels specified in AAMA/WDMA/CSA 101/I.S.2/A440 for air leakage resistance.			
The tested specimen meets Canadian Supplement CSA A440S1:19A3 level for air leakage resistance.			

8.3.2 – Air Exfiltration (ASTM E283-19)

Test Description	Results	Allowed	Comments
75 Pa differential pressure	0.05 L/s*m²	1.5 L/s*m²	
1.57 psf differential pressure	0.01 cfm/ft²	0.30 cfm/ft²	
The tested specimen exceeds the performance levels specified in AAMA/WDMA/CSA 101/I.S.2/A440 for air leakage resistance.			
The tested specimen meets Canadian Supplement CSA A440S1:19 A3 level for air leakage resistance.			

8.3.3 – Water Penetration (ASTM E547-00(2016))

Test Description	Results	Allowed	Comments
DP40 - 290 Pa (6.06 psf)	No water penetration	No water penetration	2

8.3.4.2 – Uniform Load Deflection at Design Pressure (ASTM E330-14)

Test Description	Results	Allowed	Comments
DP40 - 1920 Pa (40.10 psf)Pos	0.51 mm (0.02")	10.16 mm (0.40")	3
DP40 - 1920 Pa (40.10 psf)Neg	4.06 mm (0.16")	10.16 mm (0.40")	3

8.3.4.3 – Uniform Load Structural Overload (OL) at 1.5 x Design Pressure (ASTM E330-14)

Test Description	Results	Allowed	Comments
OL for DP40 - 2880 Pa (60.15 psf)Pos	0.00 mm (0.00")	5.33 mm (0.21")	3
OL for DP40 - 2880 Pa (60.15 psf)Neg	0.51 mm (0.02")	5.33 mm (0.21")	3

8.3.5 – Forced Entry Resistance (ASTM F588-17 & CAWM 301-90(1995))

Test Description	Results	Allowed	Comments
ASTM F588 Type B and CAWM 301 Type II	No Entry	No Entry	4

8.3.6.6 – Awning, Hopper, Projected Hardware Load Test

Test Description	Results	Allowed	Comments
CW 140 N (31.47 lbf)	0.00 mm (0.00")	≤ 61.98 mm (2.44")	

Comment #1 - The window met the requirements of the Canadian Supplement CSA A440S1:19 for operating force.
Comment #2 - Internal screen not a factor in test.The window met the requirements of the Canadian Supplement CSA A440S1:19 for Water penetration resistance.
Comment #3 – Deflection measurement taken from vent bottom rail.
Comment #4 – Forced entry resistance per ASTM F588 grade 10.
Testing was witnessed by: Jim Cruz with FTL.

For a complete description of the tested sample, refer to the attached three (3) pages consisting of bill of materials, cross section drawings, and die drawings. This report is complete only when all the above referenced bill of materials and drawings are attached.

The bill of materials, cross section drawings, and die drawings of frame and sash members are on file and have been compared to the sample submitted. Test sample sections, bill of materials, drawings and a copy of this report will be retained at the test laboratory for four years.

This test report may not be modified in any way without the written consent of Fenestration Testing Laboratory, Inc (FTL).

The preceding test results relate only to the tested specimen and were obtained by using the applicable test methods listed in section 3.0 and 6.0 above. This report does not constitute certification of this product or an endorsement by this laboratory. It is the property of the client named in section 1.0 above. Certification can only be granted by an approved administrator and/or validator.

Test Completion Date: December 8, 2023

Report Completion Date: December 12, 2023

Pete Cruz - Test Engineer

Jim Cruz – Laboratory Testing Manager

TEST SPECIMEN DESCRIPTIONS

1. SERIES / MODEL: Series 450-T
2. PRODUCT TYPE: AWNING, CASEMENT, FIXED.

GENERAL NOTES

1. BUCKING OPENINGS & BUCKING FASTENERS MUST BE PROPERLY DESIGNED & INSTALLED TO TRANSFER LOADS TO THE STRUCTURE AND TO BE REVIEWED BY BUILDING OFFICIAL.
2. ALL HARDWARE & FASTENERS SHALL BE IN ACCORDANCE WITH THESE DRAWINGS & MAY NOT VARY UNLESS SPECIFICALLY MENTIONED ON THE DRAWINGS.
3. MATERIALS, INCLUDING BUT NOT LIMITED TO STEEL SCREWS, THAT COME INTO CONTACT WITH OTHER DISSIMILAR MATERIALS SHALL MEET THE REQUIREMENTS OF AAMA AND FLORIDA BUILDING CODE.

SPECIFICATIONS

1. AAMA/WDMA/CSA 101/I.S.2/A440
2. A440 S1 (CANADIAN SUPPLEMENT)

PAGE # / DETAIL #

CORNERS CONSTRUCTION

1. SERIES 450-T
   1.1. MITERED, WELD ALONG INNER MITER, AND CRIMPED AT THE OUTER CORNERS. SEE BOM ITEM 19 & 20.

ANCHOR SCHEDULE

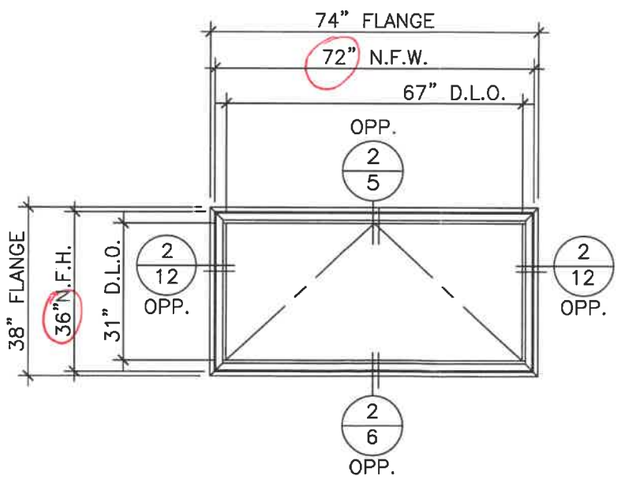
1. OPENING TYPE (SUBSTRATE): 2X- WOOD FRAME, STEEL STUD, CONCRETE
2. FRAME: NO. 10 SCREW, 8" FROM END, 16" O.C. MAX.
   MINIMUM EMBEDMENT: 1 1/2"
   MINIMUM EDGE DISTANCE: 3/4"

GLAZING : SEE PAGE 3

*FRAME ANCHOR REQUIREMENTS TABLE

OPENING TYPE (SUBSTRATE)	FRAME TO OPENING FASTENER TYPE	MINIMUM EMBEDMENT	MINIMUM EDGE DIST.
2X_ WOOD FRAME OR BUCK	(1) NO. 8 SMS SCREW	1 1/2"	3/4"
MIN. 18 GA. 33 KSI STEEL STUD	(1) NO. 8 SMS SCREW	FULL	3/8"
CMU/CONCRETE	(2) 3/16" CONCRETE SCREWS	1 1/4"	2 5/8"

(1) SMS SCREWS
(2) CONCRETE SCREWS SHALL BE 3/16" ITW TAPCON



4 A-PROJECTED
Series 450-T
QTY: 1
GLASS: 1"; 5mm, A.S., 5mm-R

NOTES:
1. NAIL-ON FRAME
2. 4-BAR HINGES
3. MULTI-POINT, CAM HANDLE
4. (2) SNUBBERS

SPEC 4: A440

FENESTRATION TESTING LAB
REPORT NO: T23-104
DATE: 12/12/23

COMMENTS | DRAWN BY | DATE | REVISIONS

DATE: 12/7/23
DRAWN BY: CJ
JOB NUMBER: 566766

NOTES: PROJECT #:
CUSTOMER: FLEETWOOD WINDOWS AND DOORS
JOB NAME: 450-T TESTING

1 FLEETWOOD WAY
CORONA, CA 92879
www.fleetwoodusa.com
FLEETWOOD WINDOWS & DOORS

SCALE : N.T.S.
DRAWING NO. : (1)
SHEET : 1 OF 3

5 NAIL-FIN HEAD
SCALE: FULL SIZE

12 NAIL-FIN AWNING M.P. JAMB
SCALE: FULL SIZE

6 NAIL-FIN ROTO OPERATOR SILL
SCALE: FULL SIZE

FENESTRATION TESTING LAB
REPORT NO: T23-104
DATE: 12/12/23

DRAWN BY: CJ	DATE: 12/7/23	REVISIONS	DATE	DRAWN BY	COMMENTS
JOB NUMBER: 565786					

NOTES: PROJECT #:

CUSTOMER: FLEETWOOD WINDOWS AND DOORS

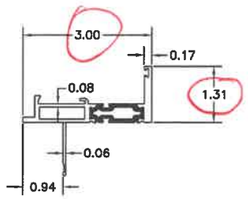
JOB NAME: 450-T TESTING

FLEETWOOD WINDOWS & DOORS
1 FLEETWOOD WAY
CORONA, CA 92879
www.fleetwoodusa.com

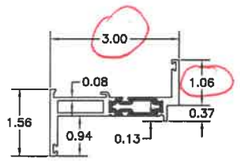
SCALE: N.T.S.

DRAWING NO.: (2)

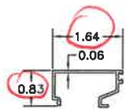
SHEET: 2 OF 3



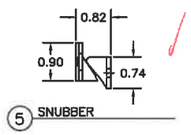
1 FRAME



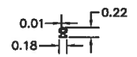
2 VENT



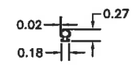
3 1" VENT GLASS STOP



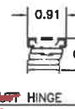
5 SNUBBER



6 MINI BULB VINYL



7 FLEXIBLE BULB VINYL



11 ~~BUTT~~ HINGE

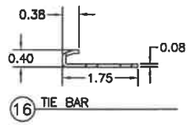
4-Bar Friction Hinge

12 MULTIPOINT LOCK

13 TIE BAR GUIDE

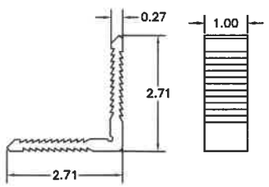
14 #8 SCREW

15 TIE BAR

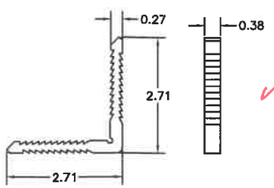


16 TIE BAR

17 #8 SCREW



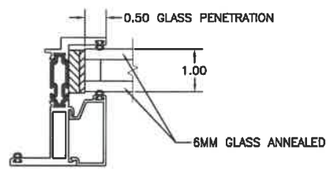
19 1" CORNER KEY



20 3/8" CORNER KEY

BILL OF MATERIALS				
ITEM NO.	FWID	PART DESCRIPTION	VENDOR NAME	VENDOR PART NO.
EXTRUSIONS				
1	4501	FRAME	SIERRA	905749 -905750
2	4502	VENT	SIERRA	905751 – 905752
3	4503	1" VENT GLASS STOP	SIERRA	905753
HARDWARE				
5	25245	SNUBBER– PULL–IN BLOCK	WHS FENESTRATION	CPB1
6	25199	MINI BULB VINYL	TREMCO	TX20801E
7	26233	FLEXIBLE BULB VINYL	TREMCO	TR–25007P
9	–	SILLPAN		
11	VARIES	4–BAR HINGE	TRUTH	
12	26065	MULTIPOINT LOCK	D&B	234–100–316SS
13	24731	TIE BAR GUIDE	TRUTH	32798.00.0001
14	20314	#8 SCREW, 0.75"		
15	VARIES	TIE BAR	TRUTH	
16	26069	MULTIPOINT STRIKE	D&B	
17	20240	#8 SCREW, 0.5"		
18	VARIES	ROTO OPERATOR	TRUTH	
19	05P04–1	1" CORNER KEY	MERIT	5230
20	26228	3/8" CORNER KEY	D&B	259–001

GLAZING DETAILS



G1 GLAZING DETAIL SPECIMEN #1–4

FENESTRATION TESTING LAB
REPORT NO: T23-104
DATE: 12/12/23

REVISIONS	DATE	DRAWN BY	COMMENTS

DRAWN BY: CJ
DATE: 12/7/23
JOB NUMBER: 555766

NOTES:
PROJECT #:
CUSTOMER: FLEETWOOD WINDOWS AND DOORS
JOB NAME: 450-T TESTING

FLEETWOOD WINDOWS & DOORS
1 FLEETWOOD WAY
CORONA, CA 92879
www.fleetwoodusa.com

SCALE: N.T.S.
DRAWING NO.: (3)
SHEET: 3 OF 3