



NATIONAL CERTIFIED TESTING LABORATORIES

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PRODUCT APPROVAL SUPPORTING CALCULATIONS

***Auraline* Stationary Casement Window**

REPORT TO:

**JELD-WEN WINDOWS & DOORS
3737 LAKEPORT BLVD
KLAMATH FALLS, OREGON**

REPORT NUMBER: NCTL-110-23091-1

REPORT DATE: 01/22/20

Revision 1: 03/26/20

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FL PE 58920
FL REG 33474



Scope

National Certified Testing Laboratories was contracted by Jeld-Wen Windows & Doors to evaluate alternate installation methods for their *Auraline* Stationary Casement windows. The evaluation is based on physical testing and product certifications. Reference standards utilized in this project include:

Florida Building Code, Building. International Code Council.

ANSI/AWC National Design Specification (NDS) for Wood Construction. American Wood Council.

AISI S100 North American Specification for the Design of Cold-Formed Steel Structural Members. American Iron and Steel Institute.

ICC-ES Report ESR-1976 *ITW Buildex TEKS Self-Drilling Fasteners*. ICC Evaluation Service.

NOA 16-1222.06 *Tapcon Concrete and Masonry Anchors with Advanced Threadform Technology*. Miami-Dade County Product Control Section.

The anchorage analyses presented herein do not address the water resistance, water penetration or air infiltration performance of the installation method or the installed product. In addition, the analyses rely on the assumption that the building substrate is capable of withstanding incurred loads.

Certification of Independence

In accordance with Rule 61G20-3 Florida Administrative Code, National Certified Testing Laboratories hereby certifies the following:

- National Certified Testing Laboratories does not have, nor does it intend to acquire or will it acquire, a financial interest in any company manufacturing or distributing products tested or labeled by the agency.
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Analyses

Summary of Test Results

The following table summarizes the various *Auraline* Stationary Casement Window products and their corresponding performance levels which have been established by testing or product certification.

Table 1 Summary of Test Results

Series/Model	Test Report Number	Size (W x H)	Performance
<i>Auraline</i> Stationary Casement Window	NCTL 310-19-122 (Rev. -, 09/25/19)	72" x 72"	+35/-40 psf

Testing documented in Table 1 was conducted by the National Certified Testing Laboratories laboratory in Everett, Washington (Florida Department of Business & Professional Regulation Test Lab No. TST9341, A2LA Certificate 3054.01).

As-Tested Installation Analysis

For air/water/structural testing the test specimen was secured to a 2x Spruce-Pine-Fir buck. The as-tested installation method is evaluated on page 3. These capacities will be used to prove acceptable alternate anchors and substrates for the windows.

Alternate Anchorages

Calculations on page 4 through page 19 determine the design capacity of alternate installation anchorages for the window.

Anchorage Requirements

As-tested spacing must be maintained. It must be determined the anchorages are not overloaded for the approved window size and design pressures. Calculations presented on page 20 show the as-tested anchor spacing is adequate for all of the established anchor capacities.

Anchorage requirements established by this report are accurately presented in Drawing D015608 (attached).

Attachments

Appendix A – Revision Log (1 page)

Appendix B – Drawings (9 pages)



As-Tested Installation – Nail Fin to Wood

#8 x 1-1/4" Pan Head Screw

0.062" thick Nail Fin

Spruce-Pine-Fir 2x Wood Substrate Minimum (G=0.42)

Allowable Tension of #8 x 1-1/4" Pan Head Screw

$$W = 1.6(1.250"-0.062")(82 \text{ lb/in}) \quad (\text{NDS, Table 11.2B})$$
$$W = 156 \text{ lb}$$

Allowable Pull-Over of #8 x 1-1/4" Pan Head Screw

Validated by Testing

Must maintain anchor spacing and anchor head size

As-tested spacing: 8" on center

As-tested anchor head size: 0.314"

Capacity of Connection is 156 lb



Alternate Installation – Nail Fin to Steel Stud

#10-16 TEKS Screw

Minimum 18 gauge 33 KSI Steel Stud

Allowable Tension of #10-16 TEKS Screw

$$P_{ss}/\Omega = 885 \text{ lb} \quad (\text{ESR-1976})$$

Pull-Out of #10-16 TEKS Screw

$$P_{\text{not}} = 0.85t_c d F_{u2} / \Omega$$

$$P_{\text{not}} = 0.85(0.0428")(0.190")(45,000 \text{ psi}) / 3.0$$

$$P_{\text{not}} = 104 \text{ lb}$$

Pull-Over of #10-16 TEKS Screw

Head Diameter = 0.400" > 0.314" (as tested) **OK**

Capacity of Connection is 104 lb



Alternate Installation – Through Frame to Wood

#10 x 1-1/2" Pan Head Screw

0.062" thick Window Frame

1/4" Maximum Shim Space

Spruce-Pine-Fir 2x Wood Substrate Minimum (G=0.42)

Allowable Shear of #10 x 1-1/2" Pan Head Screw

$Z' = 143 \text{ lb}$ (See Following 2 Pages)

Bending of #10 x 1-1/2" Pan Head Screw

$L = 1/4"$ (maximum shim space)

$S = \pi d^3/32 = \pi(0.152)^3/32 = 0.000345 \text{ in}^3$

$F_b = (1.3)(0.6F_y) = (1.3)(0.6)(90,000 \text{ psi}) = 70,200 \text{ psi}$ (1.3 weak axis factor)

$F_b = M/S = (VL/2)/S$ (L/2 for guided bending)

$V = 2SF_b/L = (2)(0.000345 \text{ in})(70,200 \text{ psi})/0.25" = 194 \text{ lb}$.

Capacity of Connection is 143 lb



Alternate Installation – Through Frame to Wood (Continued)

Lateral Design Strength of Wood Connections

Data

Fastener			
Fastener	=	#10 Wood Screw	
Shank Dia	=	0.190	in.
Root Dia.	=	0.152	in.
F_{yb}	=	80,000	psi
Fastener length	=	2.500	in.
Main Member			
Material	=	SPF	
G	=	0.42	
θ	=	90	<= (Angle of load to grain $0^\circ \leq \theta \leq 90^\circ$)
F_e	=	3,350	psi
Thickness	=	1.500	in.
Side Member			
Material	=	Vinyl (PVC)	
G	=	N/A	
θ	=	90	<= (Angle of load to grain $0^\circ \leq \theta \leq 90^\circ$)
F_{es}	=	13,750	psi
Thickness	=	0.125	in.

Calculations

Lateral Bearing Factors

D	=	0.152	in.
ℓ_m	=	1.500	in.
K_θ	=	1.25	
K_D	=	2.20	
R_e	=	0.244	
R_t	=	12.00	
k_1	=	1.1349	
k_2	=	0.6524	
k_3	=	6.94	

Yield Mode	R_d
I_m, I_s	2.20
II	2.20
III_m, III_s, IV	2.20



Alternate Installation – Through Frame to Wood (Continued)

Lateral Design Values, Z

Mode I _m	=	347	lbf
Mode I _s	=	119	lbf
Mode II	=	135	lbf
Mode III _m	=	152	lbf
Mode III _s	=	89	lbf
Mode IV	=	126	lbf
C _D	=	1.6	

<===== Minimum Value

Wet Service Factor

Fabrication/In-Service	Dry/Dry
C _M	= 1.0
In service temperature	T ≤ 100°F
C _t	= 1.0
C _g	= 1.0
C _Δ	= 1.0
Is fastener installed in end grain?	No
C _{eg}	= 1.00
Is fastener part of a diaphragm?	No
C _{di}	= 1.0
Is fastener toe-nailed?	No
C _{tn}	= 1.00
Z'	= <u>143</u> lbf



Alternate Installation – Trough Frame to Steel Stud

#10-16 TEKS Screw

1/4" Maximum Shim Space

Minimum 18 gauge 33 KSI Steel Stud

Allowable Shear of #10-16 TEKS Screw

$$P_{ss}/\Omega = 573 \text{ lb (ESR-1976)}$$

Bearing of #10-16 TEKS Screw on Frame

$$F_p = 10,000 \text{ psi}$$

$$D = 0.190''$$

$$t = 0.125''$$

$$V_a = F_p D t = (10,000 \text{ psi})(0.190'')(0.125'') = 238 \text{ lb}$$

Bearing of #10-16 TEKS Screw on Steel Stud

$$V_a = 2.7 D t F_{tu} / 3.0$$

$$V_a = 2.7(0.190'')(0.0428'')(45,000 \text{ psi}) / 3.0$$

$$V_a = 329 \text{ lb.}$$

Tilting of #10-16 TEKS Screw in Steel Stud

$$V_a = 4.2(t_2^3 D)^{1/2} F_{tu2} / n_s$$

$$V_a = 4.2(0.0428''^3 \times 0.190'')^{1/2} (45,000 \text{ psi}) / 3.0$$

$$V_a = 243 \text{ lb.}$$

Bending of #10-16 TEKS Screw

$$L = 1/4'' \text{ (Maximum Shim Space)}$$

$$S = \pi d^3 / 32 = \pi(0.135)^3 / 32 = 0.000242 \text{ in}^3$$

$$F_b = (1.3)(0.6 F_y) = (1.3)(0.6)(92,000 \text{ psi}) = 71,760 \text{ psi (1.3 weak axis factor)}$$

$$F_b = M/S = (V L / 2) / S \text{ (L/2 for guided bending)}$$

$$V = 2 S F_b / L = (2)(0.000242 \text{ in}^3)(71,760 \text{ psi}) / 0.25'' = 139 \text{ lb.}$$

Capacity of Connection is 139 lb.



Alternate Installation – Through Frame to Concrete

3/16" Tapcon Anchor

2-1/2" Minimum Edge Distance, 1-1/4" Minimum Embedment

1/4" Maximum Shim Space

Minimum $f'_c = 3,000$ psi Concrete

Allowable Shear of 3/16" Tapcon Anchor

$$P_{ss}/\Omega = 181 \text{ lb} \quad (\text{NOA-No. 16-1222.06})$$

Bearing of 3/16" Tapcon Anchor on Frame

$$F_p = 10,000 \text{ psi}$$

$$D = 0.170"$$

$$t = 0.125"$$

$$V_a = F_p D t = (10,000 \text{ psi})(0.170")(0.125") = 213 \text{ lb}$$

Bending of 3/16" Tapcon Anchor

$$L = 1/4" \text{ (Maximum Shim Space)}$$

$$S = \pi d^3/32 = \pi(0.170")^3/32 = 0.000482 \text{ in}^3$$

$$F_b = (1.3)(0.6F_y) = (1.3)(0.6)(137,000 \text{ psi}) = 106,860 \text{ psi (1.3 weak axis factor)}$$

$$F_b = M/S = (VL/2)/S \text{ (L/2 for guided bending)}$$

$$V = 2SF_b/L = (2)(0.000482 \text{ in}^3)(106,860 \text{ psi})/0.25" = 412 \text{ lb.}$$

Capacity of Connection is 181 lb



Alternate Installation – Through Frame to CMU

3/16" Tapcon Anchor

2-1/2" Minimum Edge Distance, 1-1/4" Minimum Embedment

1/4" Maximum Shim Space

Minimum ASTM C90 Concrete Masonry Unit

Allowable Shear of 3/16" Tapcon Anchor

$$P_{ss}/\Omega = 135 \text{ lb} \quad (\text{NOA-No. 16-1222.06})$$

Bearing of 3/16" Tapcon Anchor on Frame

$$F_p = 10,000 \text{ psi}$$

$$D = 0.170"$$

$$t = 0.125"$$

$$V_a = F_p D t = (10,000 \text{ psi})(0.170")(0.125") = 213 \text{ lb}$$

Bending of 3/16" Tapcon Anchor

$$L = 1/4" \text{ (Maximum Shim Space)}$$

$$S = \pi d^3/32 = \pi(0.170")^3/32 = 0.000482 \text{ in}^3$$

$$F_b = (1.3)(0.6F_y) = (1.3)(0.6)(137,000 \text{ psi}) = 106,860 \text{ psi} \text{ (1.3 for weak axis bending)}$$

$$F_b = M/S = (VL/2)/S \text{ (L/2 for guided bending)}$$

$$V = 2SF_b/L = (2)(0.000482 \text{ in}^3)(106,860 \text{ psi})/0.25" = 412 \text{ lb.}$$

Capacity of Connection is 135 lb



Alternate Installation – Strap Anchor to Wood

Two #8 x 1-1/2" Pan Head Screws securing strap to substrate

Spruce-Pine-Fir 2x Wood Substrate Minimum (G=0.42)

Two #8 Screws securing strap to window frame

0.125" thick Window Frame

20 gauge (0.033" thick) 33 KSI Steel Strap Anchor

1/4" Maximum Shim Space

Allowable Shear of #8 x 1-1/2" Pan Head Screw

$$Z' = 122 \text{ lb} \quad (\text{See Following 2 Pages})$$

Bending of #8 x 1-1/2" Pan Head Screw

$$L = 1/4" \text{ (maximum shim space)}$$

$$S = \pi d^3/32 = \pi(0.131)^3/32 = 0.000221 \text{ in}^3$$

$$F_b = (1.3)(0.6F_y) = (1.3)(0.6)(90,000 \text{ psi}) = 70,200 \text{ psi} \text{ (1.3 weak axis factor)}$$

$$F_b = M/S = (VL/2)/S \text{ (L/2 for guided bending)}$$

$$V = 2SF_b/L = (2)(0.000221 \text{ in})(70,200 \text{ psi})/0.25" = 124 \text{ lb.}$$

Bearing of #8 Screw on Frame

$$F_p = 10,000 \text{ psi}$$

$$D = 0.164"$$

$$t = 0.125"$$

$$V_a = F_pDt = (10,000 \text{ psi})(0.164")(0.125") = 205 \text{ lb}$$

Bearing of #8 Screw on Strap Anchor

$$V_a = 2.7DtF_{tu}/3.0$$

$$V_a = 2.7(0.164")(0.033")(45,000 \text{ psi})/3.0$$

$$V_a = 219 \text{ lb.}$$

Capacity of Connection is 122 lb

Capacity for Two Screws is 244 lb

Qualifies 8d (0.131" diameter) Nail



Alternate Installation – Strap Anchor to Wood (Continued)

Lateral Design Strength of Wood Connections

Data

Fastener	
Fastener	= #8 Wood Screw
Shank Dia	= 0.164 in.
Root Dia.	= 0.131 in.
F _{yb}	= 90,000 psi
Fastener length	= 2.500 in.
Main Member	
Material	= SPF
G	= 0.42
θ	= 90 ≤ (Angle of load to grain 0° ≤ θ ≤ 90°)
F _e	= 3,350 psi
Thickness	= 1.500 in.
Side Member	
Material	= ASTM A 653, Grade 33 Steel
G	= N/A
θ	= 90 ≤ (Angle of load to grain 0° ≤ θ ≤ 90°)
F _{es}	= 61,850 psi
Thickness	= 0.033 in.

Calculations

Lateral Bearing Factors

D	=	0.131	in.
ℓ _m	=	1.500	in.
K _θ	=	1.25	
K _D	=	2.20	
R _e	=	0.054	
R _t	=	45.45	
k ₁	=	1.0041	
k ₂	=	0.5032	
k ₃	=	23.87	

Yield Mode	R _d
I _m , I _s	2.20
II	2.20
III _m , III _s , IV	2.20



Alternate Installation – Strap Anchor to Wood (Continued)

Lateral Design Values, Z

Mode I _m	=	299	lbf
Mode I _s	=	122	lbf
Mode II	=	122	lbf
Mode III _m	=	136	lbf
Mode III _s	=	77	lbf
Mode IV	=	108	lbf

<===== Minimum Value

C_D = 1.6

Wet Service Factor

Fabrication/In-Service Dry/Dry

C_M = 1.0

In service temperature T ≤ 100°F

C_t = 1.0

C_g = 1.0

C_Δ = 1.0

Is fastener installed in end grain? No

C_{eg} = 1.00

Is fastener part of a diaphragm? No

C_{di} = 1.0

Is fastener toe-nailed? No

C_{tn} = 1.00

Z' = 122 lbf



Alternate Installation – Strap Anchor to Steel Stud

#10-16 TEKS Screws Connecting Strap to Steel Stud

#8 Screws Connecting Strap to Window Frame

0.125" thick Window Frame

18 gauge (0.043" thick) 33 KSI Steel Stud

20 gauge (0.033" thick) 33 KSI Steel Strap Anchor

1/4" Maximum Shim Space

Allowable Shear of #10-16 TEKS Screw

$$P_{ss}/\Omega = 573 \text{ lb (ESR-1976)}$$

Bearing of #10-16 TEKS Screw on Steel Strap Anchor

$$V_a = 2.7DtF_{tu}/3.0$$

$$V_a = 2.7(0.190")(0.033")(45,000 \text{ psi})/3.0$$

$$V_a = 253 \text{ lb.}$$

Bearing of #10-16 TEKS Screw on Steel Stud

$$V_a = 2.7DtF_{tu}/3.0$$

$$V_a = 2.7(0.190")(0.043")(45,000 \text{ psi})/3.0$$

$$V_a = 331 \text{ lb.}$$

Tilting of #10-16 TEKS Screw in Steel Stud

$$V_a = 4.2(t_2^3D)^{1/2}F_{tu2}/n_s$$

$$V_a = 4.2(0.0428''^3 \times 0.190'')^{1/2}(45,000 \text{ psi})/3.0$$

$$V_a = 243 \text{ lb.}$$

Bending of #10-16 TEKS Screw

$$L = 1/4'' \text{ (Maximum Shim Space)}$$

$$S = \pi d^3/32 = \pi(0.135)^3/32 = 0.000242 \text{ in}^3$$

$$F_b = (1.3)(0.6F_y) = (1.3)(0.6)(92,000 \text{ psi}) = 71,760 \text{ psi (1.3 weak axis factor)}$$

$$F_b = M/S = (VL/2)/S \text{ (L/2 for guided bending)}$$

$$V = 2SF_b/L = (2)(0.000242 \text{ in}^3)(71,760 \text{ psi})/0.25'' = 139 \text{ lb.}$$



Alternate Installation – Strap Anchor to Steel Stud (Continued)

Bearing of #8 Screw on Strap Anchor

$$V_a = 2.7DtF_{tu}/3.0$$
$$V_a = 2.7(0.164")(0.033")(45,000 \text{ psi})/3.0$$
$$V_a = 219 \text{ lb.}$$

Bearing of #8 Screw on Frame

$$F_p = 10,000 \text{ psi}$$
$$D = 0.164"$$
$$t = 0.125"$$
$$V_a = F_pDt = (10,000 \text{ psi})(0.164")(0.125") = 205 \text{ lb}$$

Capacity of Connection is 139 lb

Capacity for Two Screws is 278 lb



Alternate Installation – Strap Anchor to Concrete

3/16" Tapcon Anchor; 2-1/2" Minimum Edge Distance, 1-1/4" Minimum Embedment

#8 Screws Connecting Strap to Window Frame

0.125" thick Window Frame

20 gauge (0.033" thick) 33 KSI Steel Strap Anchor

1/4" Maximum Shim Space

Minimum $f'_c = 3,000$ psi Concrete

Allowable Shear of 3/16" Tapcon Anchor

$$P_{ss}/\Omega = 181 \text{ lb} \quad (\text{NOA-No. 16-1222.06})$$

Bearing of 3/16" Tapcon Anchor on Strap Anchor

$$V_a = 2.7DtF_{tu}/3.0$$

$$V_a = 2.7(0.170")(0.033")(45,000 \text{ psi})/3.0$$

$$V_a = 227 \text{ lb.}$$

Bending of 3/16" Tapcon Anchor

$$L = 1/4" \text{ (Maximum Shim Space)}$$

$$S = \pi d^3/32 = \pi(0.170")^3/32 = 0.000482 \text{ in}^3$$

$$F_b = (1.3)(0.6F_y) = (1.3)(0.6)(137,000 \text{ psi}) = 106,860 \text{ psi} \text{ (1.3 weak axis factor)}$$

$$F_b = M/S = (VL/2)/S \text{ (L/2 for guided bending)}$$

$$V = 2SF_b/L = (2)(0.000482 \text{ in}^3)(106,860 \text{ psi})/0.25" = 412 \text{ lb.}$$

Bearing of #8 Screw on Strap Anchor

$$V_a = 2.7DtF_{tu}/3.0$$

$$V_a = 2.7(0.164")(0.033")(45,000 \text{ psi})/3.0$$

$$V_a = 219 \text{ lb.}$$



Alternate Installation – Strap Anchor to Concrete (Continued)

Bearing of #8 Screw on Frame

$$F_p = 10,000 \text{ psi}$$

$$D = 0.164''$$

$$t = 0.125''$$

$$V_a = F_p D t = (10,000 \text{ psi})(0.164'')(0.125'') = 205 \text{ lb}$$

Capacity of Connection is 181 lb



Alternate Installation – Strap Anchor to CMU

3/16" Tapcon Anchor; 2-1/2" Minimum Edge Distance, 1-1/4" Minimum Embedment

#8 Screws Connecting Strap to Window Frame

0.125" thick Window Frame

20 gauge (0.033" thick) 33 KSI Steel Strap Anchor

1/4" Maximum Shim Space

Minimum ASTM C90 Concrete Masonry Unit

Allowable Shear of 3/16" Tapcon Anchor

$$P_{ss}/\Omega = 135 \text{ lb} \quad (\text{NOA-No. 16-1222.06})$$

Bearing of 3/16" Tapcon Anchor on Strap Anchor

$$V_a = 2.7DtF_{tu}/3.0$$

$$V_a = 2.7(0.170")(0.033")(45,000 \text{ psi})/3.0$$

$$V_a = 227 \text{ lb.}$$

Bending of 3/16" Tapcon Anchor

$$L = 1/4" \text{ (Maximum Shim Space)}$$

$$S = \pi d^3/32 = \pi(0.170")^3/32 = 0.000482 \text{ in}^3$$

$$F_b = (1.3)(0.6F_y) = (1.3)(0.6)(137,000 \text{ psi}) = 106,860 \text{ psi} \text{ (1.3 for weak axis bending)}$$

$$F_b = M/S = (VL/2)/S \text{ (L/2 for guided bending)}$$

$$V = 2SF_b/L = (2)(0.000482 \text{ in}^3)(106,860 \text{ psi})/0.25" = 412 \text{ lb.}$$

Bearing of #8 Screw on Strap Anchor

$$V_a = 2.7DtF_{tu}/3.0$$

$$V_a = 2.7(0.164")(0.033")(45,000 \text{ psi})/3.0$$

$$V_a = 219 \text{ lb.}$$



Alternate Installation – Strap Anchor to CMU (Continued)

Bearing of #8 Screw on Frame

$$F_p = 10,000 \text{ psi}$$

$$D = 0.164''$$

$$t = 0.125''$$

$$V_a = F_p D t = (10,000 \text{ psi})(0.164'')(0.125'') = 205 \text{ lb}$$

Capacity of Connection is 135 lb



Anchorage Requirements – Nail Fin

Window Overall Size: 72" x 72"

Window Overall Area: $(72")(72")/144 = 36 \text{ ft}^2$

Window Overall Wind Load: $(40 \text{ psf})(36 \text{ ft}^2) = 1,440 \text{ lb}$

Installed Anchor Spacing: 8" head; 8" sill; 8" each jamb

Installed Anchors: 9 head + 9 sill + 2(9) jambs = 36 installed anchors

Minimum Anchor Capacity: 104 lb/anchor

Total Anchor Capacity: $(36 \text{ anchors})(104 \text{ lb/anchor}) = 3,744 \text{ lb} > 1,440 \text{ lb}$ **OK**

Anchorage Requirements – Through Frame and Strap Anchor

Window Overall Size: 72" x 72"

Window Overall Area: $(72")(72")/144 = 36 \text{ ft}^2$

Window Overall Wind Load: $(40 \text{ psf})(36 \text{ ft}^2) = 1,440 \text{ lb}$

Installed Anchor Spacing: 8" head; 8" each jamb

Installed Anchors: 9 head + 2(9) jambs = 27 installed anchors

Minimum Anchor Capacity: 135 lb/anchor

Total Anchor Capacity: $(27 \text{ anchors})(135 \text{ lb/anchor}) = 3,645 \text{ lb} > 1,440 \text{ lb}$ **OK**



Appendix A

Revision Log

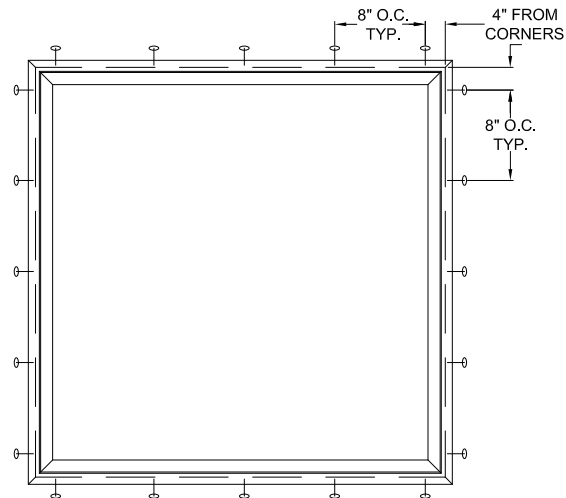
<u>Identification</u>	<u>Date</u>	<u>Page & Revision</u>
Original Issue	01/22/20	Not Applicable
Revision 1	03/26/20	Cover, 1, 2, Header Correct product name



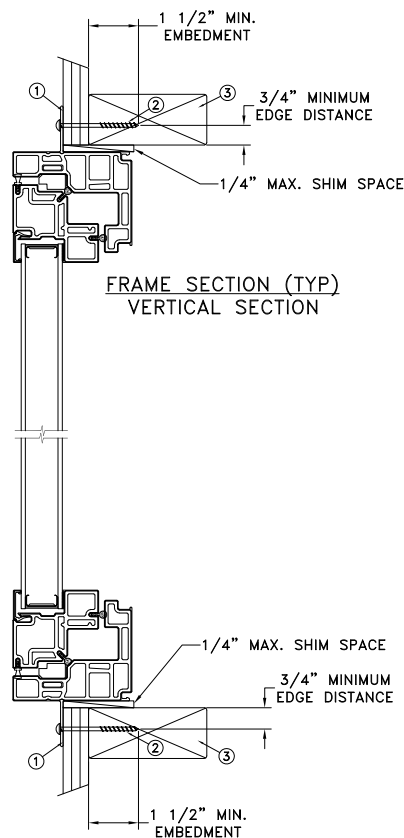
Appendix B

Drawings

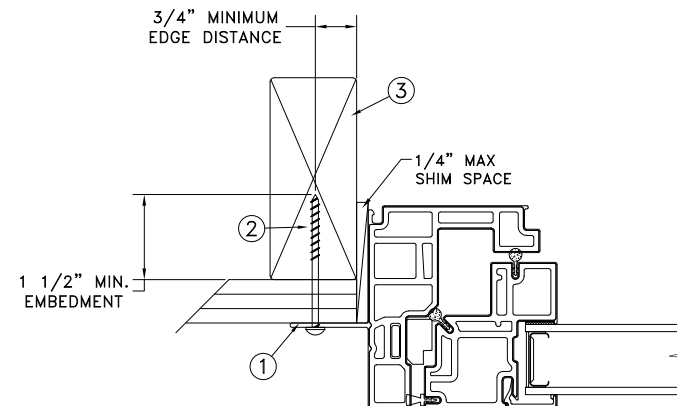
NAILFIN/WOOD
INSTALLATION



TYPICAL ELEVATION WITH FASTENER SPACING



FRAME SECTION (TYP)
VERTICAL SECTION



FRAME JAMB SECTION (TYP)
HORIZONTAL SECTION

MAXIMUM FRAME	DP	IMPACT
72" x 72"	+35/-40	NO

Installation Notes:

1. Seal flange/frame to substrate. Sill shall be set on a continuous serpentine bead of structural grade silicone caulk when no fastener is used to anchor the sill (typical).
2. Use #8 PH or greater fastener through the nailing flange with sufficient length to penetrate a minimum of 1 1/2" into the wood framing. For 2x wood frame substrate (min. S.G. = 0.42)
3. Host structure (wood buck, masonry, steel) to be designed and anchored to properly transfer all loads to the structure. The host structure is the responsibility of the architect or engineer of record for the project of installation.

General Notes:

1. The product shown herein is designed, tested and manufactured to comply with the wind load criteria of the adopted International Building Code (IBC), the International Residential Code (IRC), the current Florida Building Code (FBC) and the industry requirement for the stated conditions.
2. All glazing shall conform to ASTM E1300.
3. Use structural or composite shims where required.

This schedule addresses only the fasteners required to anchor the unit to achieve the rated design pressure and impact performance (where applicable) up to the size limitations noted. It is not intended as a guide to the installation process and does not address the sealing consideration that may arise in different wall conditions. For the complete installation procedure, see the instructions packaged with the unit or go to www.jeld-wen.com.

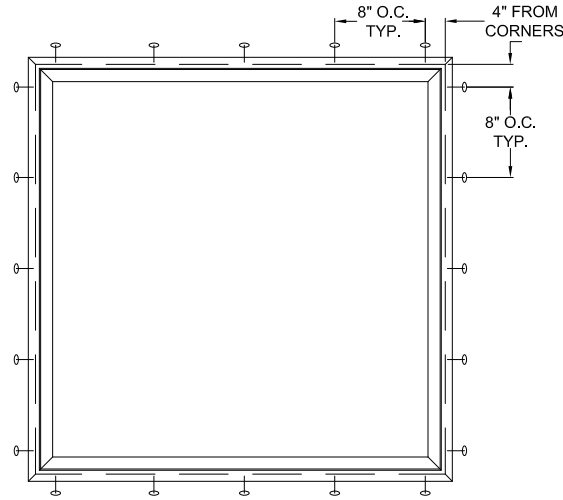
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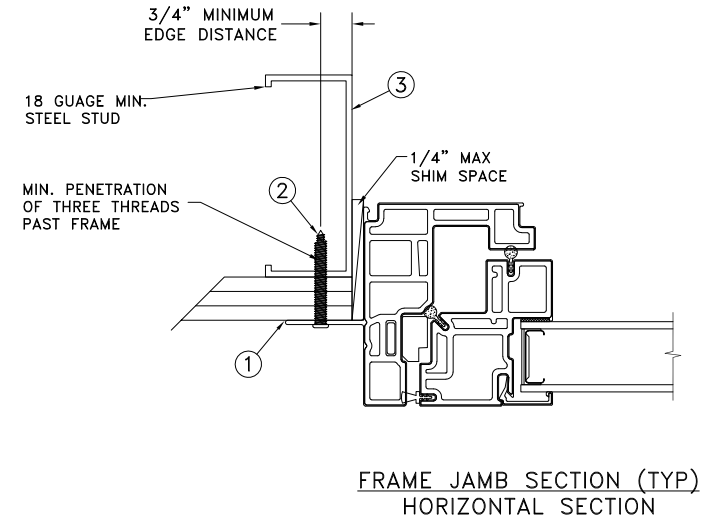
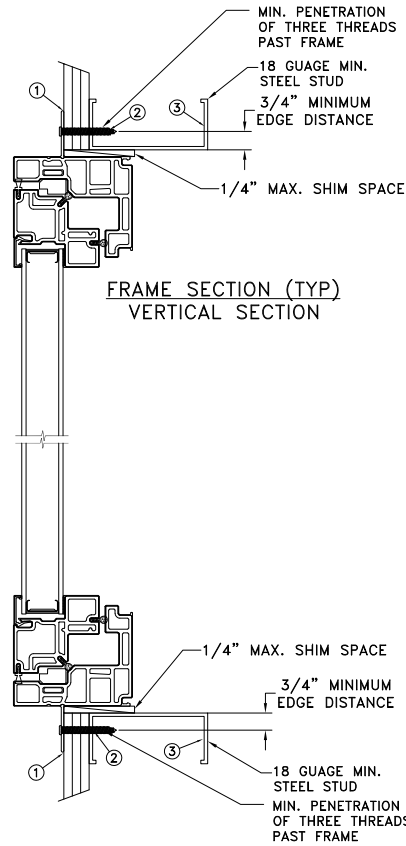
JOSEPH A. REED, P.E.
Florida P.E. No. 58920, REG. No. 33474
5 Leigh Drive
York, PA. 17406
(717) 846-1200

	DATE: 01/22/2020	JELD-WEN 3737 LAKEPORT BLVD. KLAMATH FALLS OR, 97601 PHONE: (800) 535-3936	
DRAWN BY: J.HAWKINS	SCALE: NTS		
CHECKED BY: D.BELAU	TITLE: Auraline Composite Stationary Casement Window		
APPROVED BY: K.BATH			
RECORD No: D015608			
REPORT No: NCTL-310-19-122	CAD DWG. No.: AuralNSCsmtSta Cert	REV: A	SHEET 1 of 9

NAILFIN/STEEL
INSTALLATION



TYPICAL ELEVATION WITH FASTENER SPACING



MAXIMUM FRAME	DP	IMPACT
72" x 72"	+35/-40	NO

Installation Notes:

1. Seal flange/frame to substrate. Sill shall be set on a continuous serpentine bead of structural grade silicone caulk when no fastener is used to anchor the sill (typical).
2. For anchoring through nailfin into metal framing use #10 TEK Self-Tapping screws with sufficient length to achieve a minimum penetration of three threads past the frame thickness. Steel substrate min. 18ga., $f_y = 33$ ksi.
3. Host structure (wood buck, masonry, steel) to be designed and anchored to properly transfer all loads to the structure. The host structure is the responsibility of the architect or engineer of record for the project of installation.

General Notes:

1. The product shown herein is designed, tested and manufactured to comply with the wind load criteria of the adopted International Building Code (IBC), the International Residential Code (IRC), the current Florida Building Code (FBC) and the industry requirement for the stated conditions.
2. All glazing shall conform to ASTM E1300.
3. Use structural or composite shims where required.

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York, PA. 17406
(717) 846-1200

DATE:
01/22/2020

DRAWN BY:
J.HAWKINS

SCALE:
NTS

CHECKED BY:
D.BELAU

TITLE:

APPROVED BY:
K.BATH

Auraline Composite Stationary Casement Window

RECORD No:
D015608

REPORT No:
NCTL-310-19-122

JELD-WEN

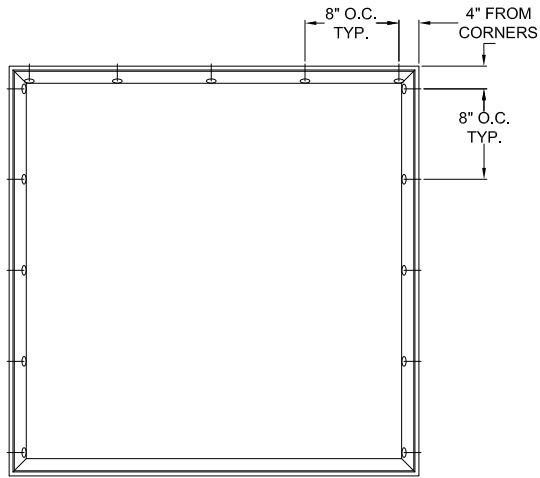
3737 LAKEPORT BLVD.
KLAMATH FALLS OR, 97601
PHONE: (800) 535-3936

CAD DWG. No.:
AuralNSCsmtSta Cert

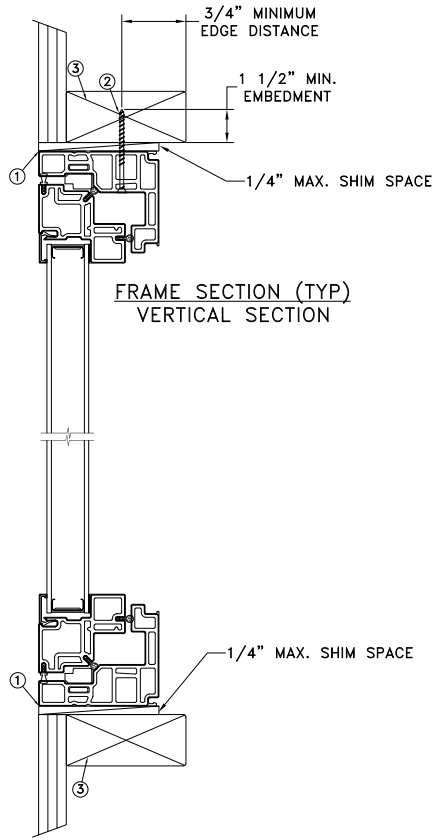
REV: A

SHEET 2 of 9

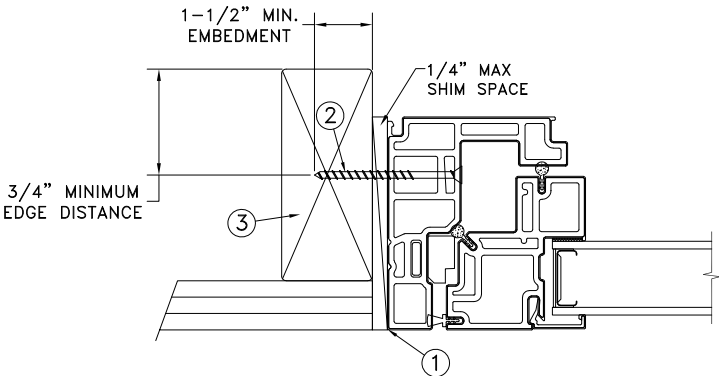
THROUGH FRAME
WOOD INSTALLATION



TYPICAL ELEVATION WITH FASTENER SPACING



FRAME SECTION (TYP)
VERTICAL SECTION



FRAME JAMB SECTION (TYP)
HORIZONTAL SECTION

MAXIMUM FRAME	DP	IMPACT
72" x 72"	+35/-40	NO

Installation Notes:

1. Seal flange/frame to substrate. Sill shall be set on a continuous serpentine bead of structural grade silicone caulk when no fasteners are used to anchor the sill (typical).
2. Use #8 PH or greater fastener through the head & side jambs with sufficient length to penetrate a minimum of 1 1/2" into the wood framing. For 2x wood frame substrate (min. S.G. = 0.42)
3. Host structure (wood buck, masonry, steel) to be designed and anchored to properly transfer all loads to the structure. The host structure is the responsibility of the architect or engineer of record for the project of installation.


General Notes:

1. The product shown herein is designed, tested and manufactured to comply with the wind load criteria of the adopted International Building Code (IBC), the International Residential Code (IRC), the current Florida Building Code (FBC) and the industry requirement for the stated conditions.
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3. Use structural or composite shims where required.

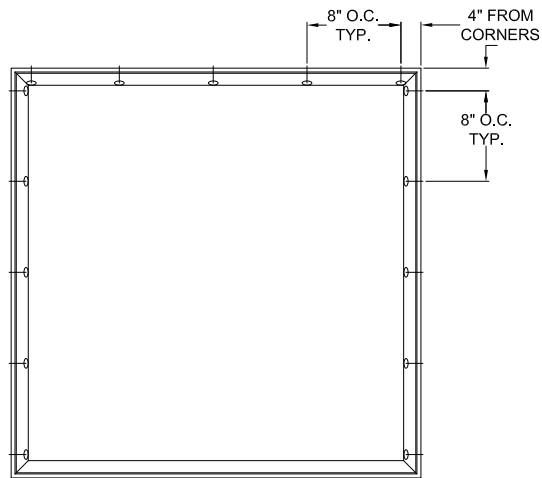
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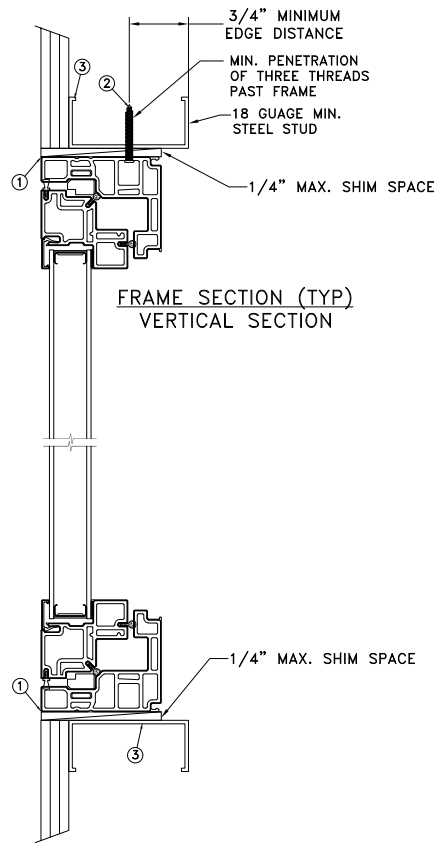
JOSEPH A. REED, P.E.
Florida P.E. No. 58920, REG. No. 33474
5 Leigh Drive
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DATE: 01/22/2020	 3737 LAKEPORT BLVD. KLAMATH FALLS OR, 97601 PHONE: (800) 535-3936	
DRAWN BY: J.HAWKINS		
CHECKED BY: D.BELAU	SCALE: NTS	
APPROVED BY: K.BATH	TITLE: Auraline Composite Stationary Casement Window	
RECORD No: D015608		
REPORT No:		
CAD DWG. No.: AuralNSCsmtSta Cert	REV: A	SHEET 3 of 9

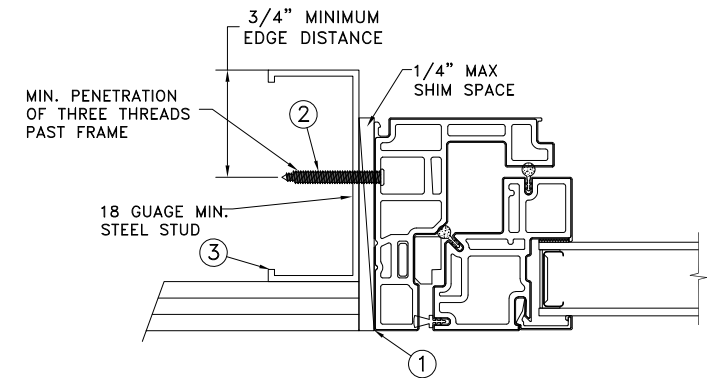
THROUGH FRAME
STEEL INSTALLATION



TYPICAL ELEVATION WITH FASTENER SPACING



FRAME SECTION (TYP)
VERTICAL SECTION



FRAME JAMB SECTION (TYP)
HORIZONTAL SECTION

MAXIMUM FRAME	DP	IMPACT
72" x 72"	+35/-40	NO

Installation Notes:

1. Seal flange/frame to substrate. Sill shall be set on a continuous serpentine bead of structural grade silicone caulk when no fastener is used to anchor the sill (typical).
2. For anchoring through head and side jamb into metal framing use #10 TEK Self-Tapping screws with sufficient length to achieve a minimum penetration of three threads past the frame thickness. Steel substrate min. 18ga., $f_y = 33$ ksi.
3. Host structure (wood buck, masonry, steel) to be designed and anchored to properly transfer all loads to the structure. The host structure is the responsibility of the architect or engineer of record for the project of installation.

General Notes:

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01/22/2020

DRAWN BY:
J.HAWKINS

SCALE:
NTS

CHECKED BY:
D.BELAU

TITLE:

APPROVED BY:
K.BATH

Auraline Composite Stationary Casement Window

RECORD No:
D015608

REPORT No:

JELD-WEN

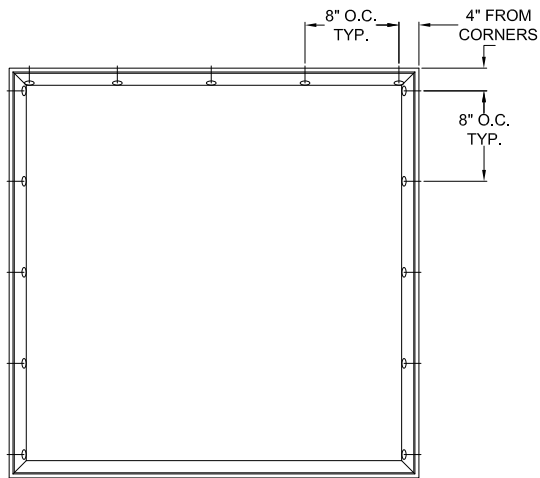
3737 LAKEPORT BLVD.
KLAMATH FALLS OR, 97601
PHONE: (800) 535-3936

CAD DWG. No.:
AuralNSCsmtSta Cert

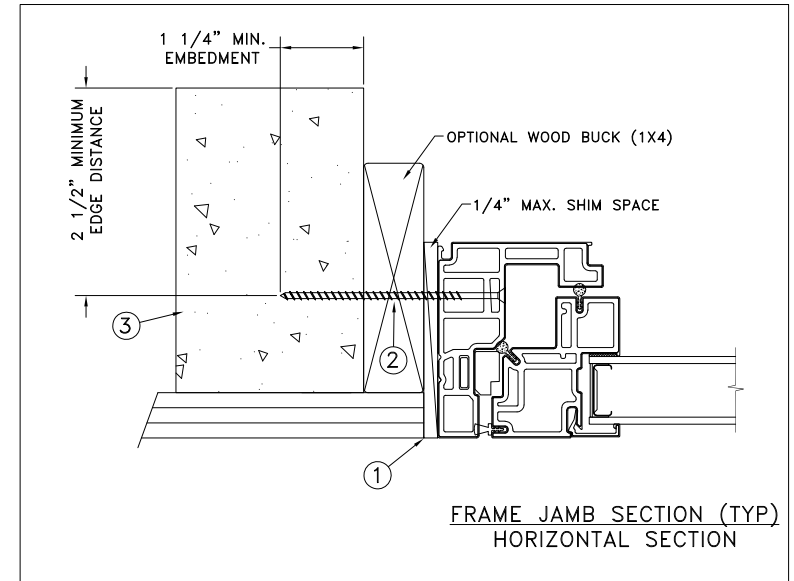
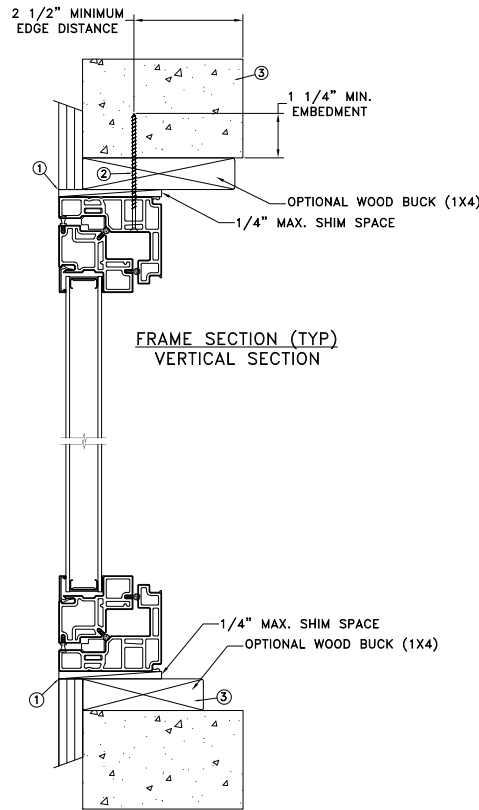
REV: A

SHEET 4 of 9

THROUGH FRAME
CONCRETE INSTALLATION



TYPICAL ELEVATION WITH FASTENER SPACING



MAXIMUM FRAME	DP	IMPACT
72" x 72"	+35/-40	NO

Installation Notes:

1. Seal flange/frame to substrate. Sill shall be set on a continuous serpentine bead of structural grade silicone caulk when no fastener is used to anchor the sill (typical).
2. Use 3/16" Tapcon or equivalent fasteners through the head, sill and side jambs with sufficient length to penetrate a minimum of 1 1/4" into concrete or masonry at each location with a 2 1/2" min. from edge distance. For concrete (min. fc = 3000 psi) or masonry substrate (CMU shall be ASTM C90).
3. Host structure (wood buck, masonry, steel) to be designed and anchored to properly transfer all loads to the structure. The host structure is the responsibility of the architect or engineer of record for the project of installation.

General Notes:


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3. Use structural or composite shims where required.

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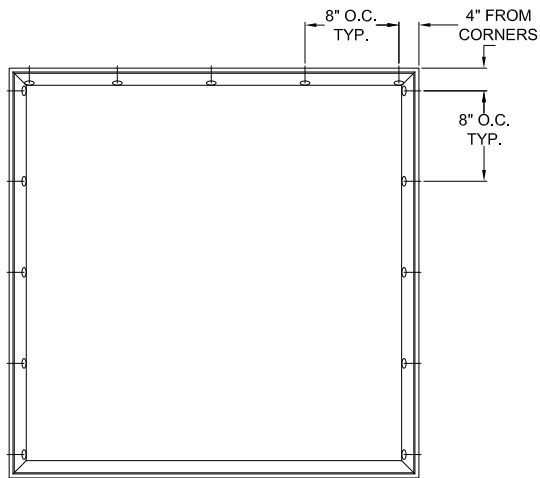
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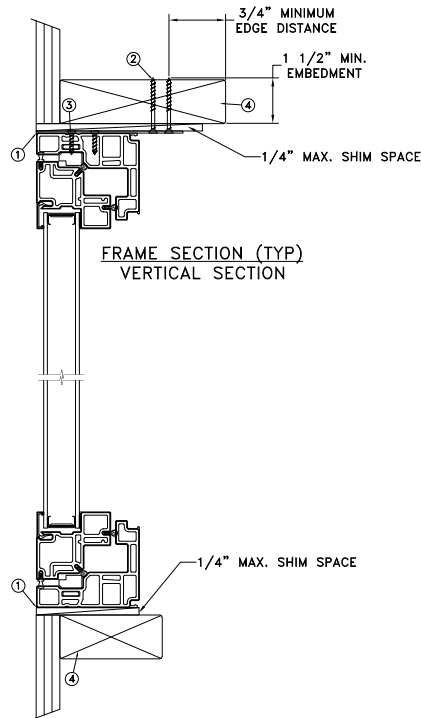
JOSEPH A. REED, P.E.
Florida P.E. No. 58920, REG. No. 33474
5 Leigh Drive
York, PA. 17406
(717) 846-1200

DATE: 01/22/2020	 3737 LAKEPORT BLVD. KLAMATH FALLS OR, 97601 PHONE: (800) 535-3936	
DRAWN BY: J.HAWKINS		SCALE: NTS
CHECKED BY: D.BELAU		TITLE: Auraline Composite Stationary Casement Window
APPROVED BY: K.BATH		
RECORD No: D015608		
REPORT No:		
CAD DWG. No.: AuralINCSmtSta Cert	REV: A	SHEET 5 of 9

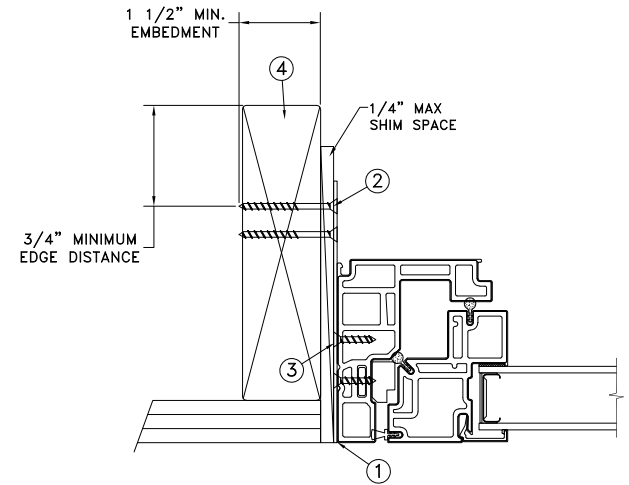
MASONRY STRAP
WOOD/SCREW INSTALLATION



TYPICAL ELEVATION WITH FASTENER SPACING



FRAME SECTION (TYP)
VERTICAL SECTION



FRAME JAMB SECTION (TYP)
HORIZONTAL SECTION

MAXIMUM FRAME	DP	IMPACT
72" x 72"	+35/-40	NO

Installation Notes:

1. Seal flange/frame to substrate. Sill shall be set on a continuous serpentine bead of structural grade silicone caulk when no fastener is used to anchor the sill (typical).
2. Use 2 - #8 PFH or larger fasteners through masonry strap with sufficient length to penetrate a minimum of 1 1/2" into the buck. For 2x wood frame substrate (min. S.G. = 0.42).
3. Use 2 - #8 PFH or larger fasteners through masonry strap into jamb without penetrating through the jamb into product causing visibility or collateral damage to product.
4. Host structure (wood buck, masonry, steel) to be designed and anchored to properly transfer all loads to the structure. The host structure is the responsibility of the architect or engineer of record for the project of installation.

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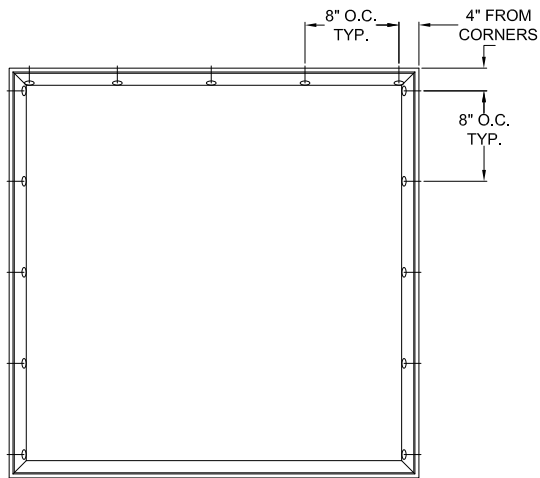
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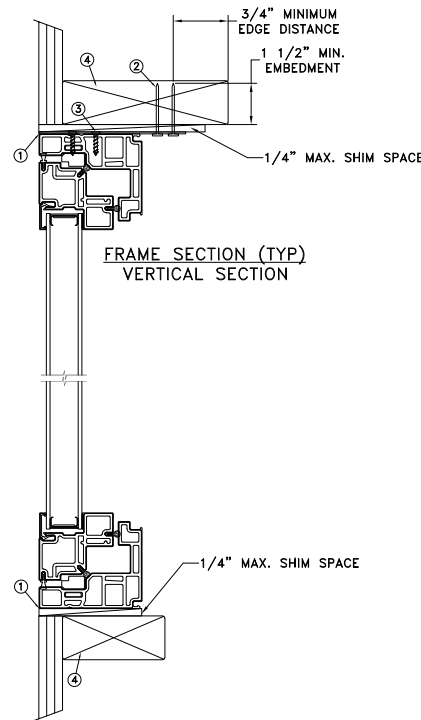
JOSEPH A. REED, P.E.
Florida P.E. No. 58920, REG. No. 33474
5 Leigh Drive
York, PA. 17406
(717) 846-1200

	DATE: 01/22/2020	JELD-WEN 3737 LAKEPORT BLVD. KLAMATH FALLS OR, 97601 PHONE: (800) 535-3936
DRAWN BY: J.HAWKINS	SCALE: NTS	
CHECKED BY: D.BELAU	TITLE: Auraline Composite Stationary Casement Window	
APPROVED BY: K.BATH		
RECORD No: D015608		
REPORT No: NCTL-310-19-126	CAD DWG. No.: AuralNSCsmStSta Cert	REV: A SHEET 6 of 9

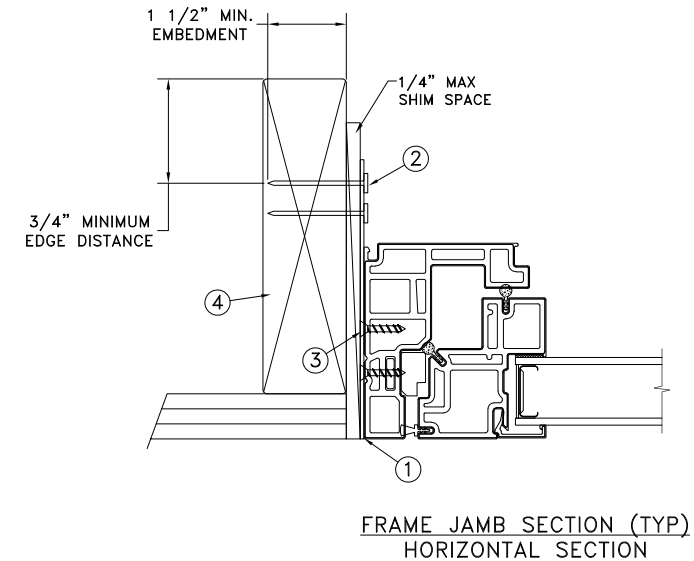
MASONRY STRAP
WOOD/NAIL INSTALLATION



TYPICAL ELEVATION WITH FASTENER SPACING



FRAME SECTION (TYP)
VERTICAL SECTION



FRAME JAMB SECTION (TYP)
HORIZONTAL SECTION

MAXIMUM FRAME	DP	IMPACT
72" x 72"	+35/-40	NO

Installation Notes:

1. Seal flange/frame to substrate. Sill shall be set on a continuous serpentine bead of structural grade silicone caulk when no fastener is used to anchor the sill (typical).
2. Use 2 - 6d x 2" fasteners through masonry strap with sufficient length to penetrate a minimum of 1 1/2" into the buck. For 2x wood frame substrate (min. S.G. = 0.42).
3. Use 2 - #8 PFH or larger fasteners through masonry strap into jamb without penetrating through the jamb into product causing visibility or collateral damage to product.
4. Host structure (wood buck, masonry, steel) to be designed and anchored to properly transfer all loads to the structure. The host structure is the responsibility of the architect or engineer of record for the project of installation.

General Notes:

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York, PA. 17406
(717) 846-1200

DATE:
01/22/2020

DRAWN BY:
J.HAWKINS

SCALE:
NTS

CHECKED BY:
D.BELAU

TITLE:

APPROVED BY:
K.BATH

Auraline Composite Stationary Casement Window

RECORD No:
D015608

REPORT No:
NCTL-310-19-126

JELD-WEN

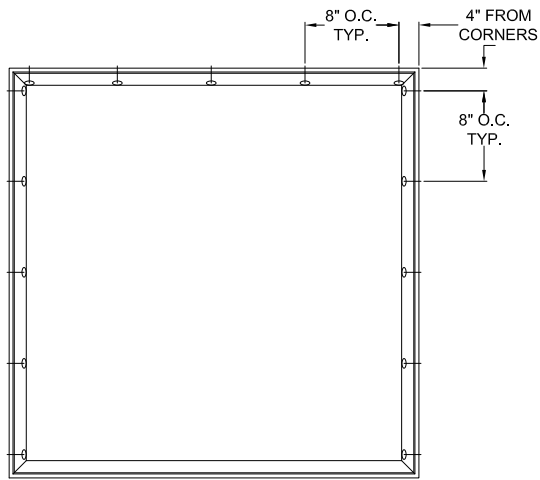
3737 LAKEPORT BLVD.
KLAMATH FALLS OR, 97601
PHONE: (800) 535-3936

CAD DWG. No.:
AuralNSCsmStSta Cert

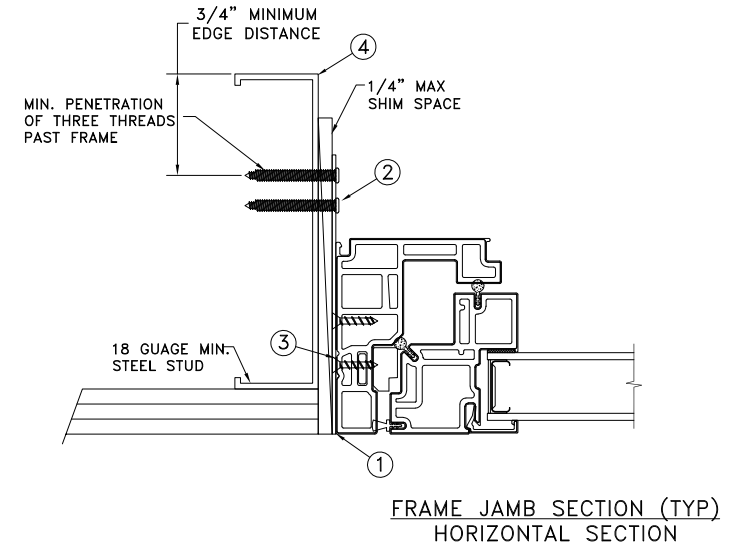
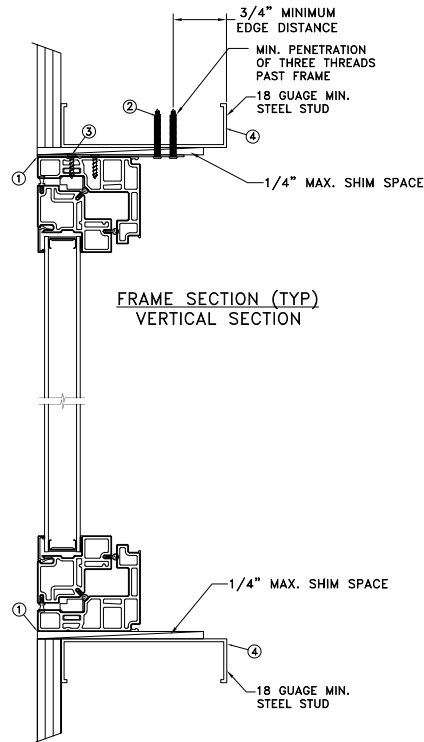
REV: A

SHEET 7 of 9

MASONRY STRAP
STEEL/SCREW INSTALLATION



TYPICAL ELEVATION WITH FASTENER SPACING



MAXIMUM FRAME	DP	IMPACT
72" x 72"	+35/-40	NO

Installation Notes:

1. Seal flange/frame to substrate. Sill shall be set on a continuous serpentine bead of structural grade silicone caulk when no fastener is used to anchor the sill (typical).
2. Use 2 - #10 TEK Self-Tapping or larger screws through masonry strap with sufficient length to achieve a minimum penetration of three threads past the frame thickness. Steel substrate min. 18ga., fy = 33 ksi.
3. Use 2 - #8 PFH or larger fasteners through masonry strap into jamb without penetrating through the jamb into product causing visibility or collateral damage to product.
4. Host structure (wood buck, masonry, steel) to be designed and anchored to properly transfer all loads to the structure. The host structure is the responsibility of the architect or engineer of record for the project of installation.

General Notes:


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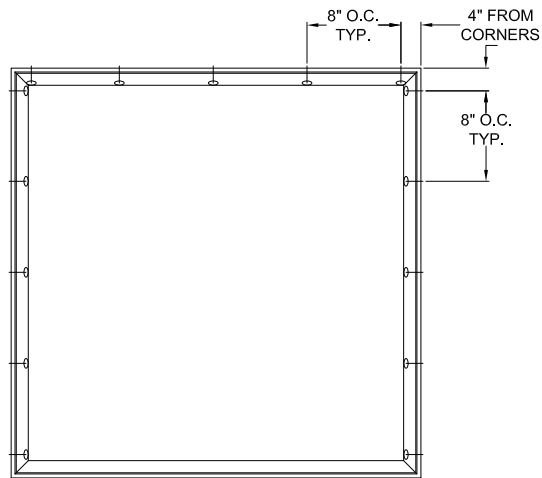
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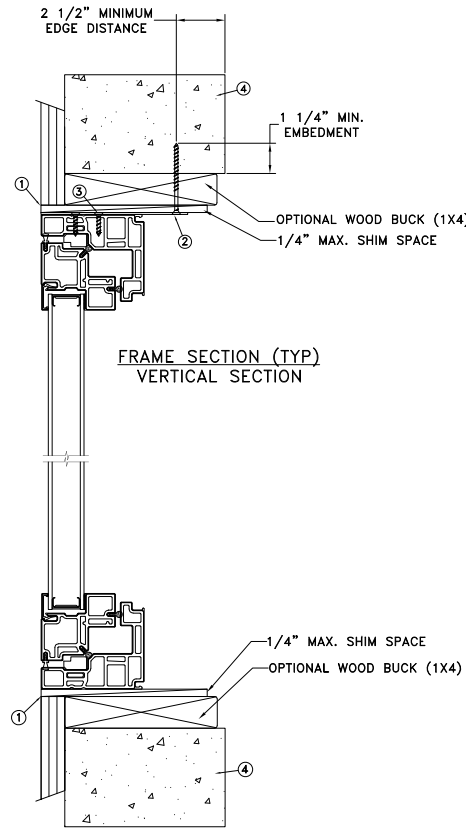
JOSEPH A. REED, P.E.
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5 Leigh Drive
York, PA. 17406
(717) 846-1200

DATE: 01/22/2020	 3737 LAKEPORT BLVD. KLAMATH FALLS OR, 97601 PHONE: (800) 535-3936
DRAWN BY: J.HAWKINS	
CHECKED BY: D.BELAU	SCALE: NTS
APPROVED BY: K.BATH	TITLE: Auraline Composite Stationary Casement Window
RECORD No: D015608	
REPORT No: NCTL-310-19-126	CAD DWG. No.: AuralNSCsmStSta Cert
	REV: A
	SHEET 8 of 9

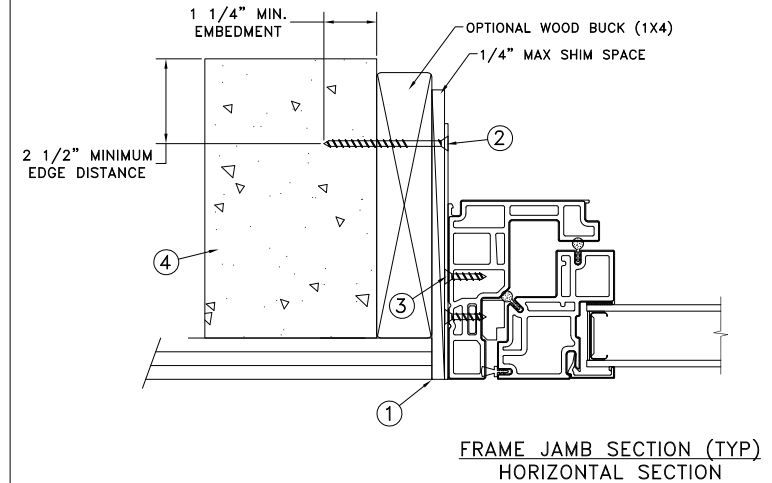
MASONRY STRAP CONCRETE
SCREW INSTALLATION



TYPICAL ELEVATION WITH FASTENER SPACING



FRAME SECTION (TYP)
VERTICAL SECTION



FRAME JAMB SECTION (TYP)
HORIZONTAL SECTION

MAXIMUM FRAME	DP	IMPACT
72" x 72"	+35/-40	NO

Installation Notes:

1. Seal flange/frame to substrate. Sill shall be set on a continuous serpentine bead of structural grade silicone caulk when no fastener is used to anchor the sill (typical).
2. Use 1 - 3/16" Tapcons or equivalent fasteners through masonry strap with sufficient length to penetrate a minimum of 1 1/4" into the buck or concrete. For 2x wood frame substrate (min. S.G. = 0.42). For concrete (min. fc = 3000 psi) or masonry substrate (CMU shall be ASTM C90).
3. Use 2 - #8 PFH or larger fasteners through masonry strap into jamb without penetrating through the jamb into product causing visibility or collateral damage to product.
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	SHEET 9 of 9