



NATIONAL CERTIFIED TESTING LABORATORIES

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PRODUCT APPROVAL SUPPORTING CALCULATIONS

Premium Vinyl Tilt Double Hung Window

REPORT TO:

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

REPORT NUMBER: NCTL-110-24718-1
REPORT DATE: 10/27/21

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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 *Premium Vinyl Tilt Double Hung Window*. 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 21-0201.06 *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 *Premium Vinyl* Tilt Double Hung 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>Premium Vinyl</i> Tilt Double Hung (Fin Install and Frame Install)	ESP024843P.6 (Rev. 1, 05/16/17)	48" x 77"	+50/-55 psf
<i>Premium Vinyl</i> Tilt Double Hung, XOX (Fin Install and Strap Install)	H0700.15-30--47 (Rev. -, 06/09/17)	108" x 72"	+50/-55 psf
<i>Premium Vinyl</i> Tilt Double Hung, XOX (Fin Install and Strap Install)	ESP026028P.1 (Rev. -, 08/08/17)	120" x 84"	+35/-40 psf

Testing documented in Table 1 was conducted the Element Testing laboratory in Wausau, Wisconsin (Florida Department of Business & Professional Regulation Test Lab No. TST2613, A2LA Certificate 1479.01) and the Intertek laboratory in Fresno, California (Florida Department of Business & Professional Regulation Test Lab No. TST2609, IAS Laboratory Accreditation TL-264).

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 methods are evaluated on page 4 to page 10. These capacities will be used to prove acceptable alternate anchors and substrates for the windows.

Alternate Anchorages

Calculations on page 11 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 and page 21 show the anchor spacing requirements for the established limiting anchor capacities.

Anchorage requirements established by this report are accurately presented in Drawing D014484 and Drawing D014539.



Attachments

Appendix A – Revision Log (1 page)



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

As-tested spacing:	12" on center
As-tested Window Width:	48"
As-tested Pressure:	55 psf
As-tested Anchor Load:	$(48"/2)(12")(55 \text{ psf}/144) = 110 \text{ lb/anchor}$

Capacity of Connection is 110 lb



As-Tested Installation – Through Frame to Wood

#8 Pan Head Screw; 1-1/2" penetration to wood

0.062" thick Window Frame

1/4" Maximum Shim Space

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

Allowable Shear of #8 Pan Head Screw

$Z' = 113 \text{ lb}$ (See Following 2 Pages)

Bending of #8 Pan Head Screw

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

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

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

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

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

Capacity of Connection is 113 lb



As-Tested Installation – Through Frame 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	=	Vinyl (PVC)
G	=	N/A
θ	=	90 ≤ (Angle of load to grain 0° ≤ θ ≤ 90°)
F _{es}	=	13,750 psi
Thickness	=	0.125 in.

Calculations

Lateral Bearing Factors

D	=	0.131 in.
ℓ _m	=	1.500 in.
K _θ	=	1.25
K _D	=	2.20
R _e	=	0.244
R _t	=	12.00
k ₁	=	1.1349
k ₂	=	0.6403
k ₃	=	6.37

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



As-Tested Installation – Through Frame to Wood (Continued)

Lateral Design Values, Z

Mode I _m	=	299	lbf
Mode I _s	=	102	lbf
Mode II	=	116	lbf
Mode III _m	=	129	lbf
Mode III _s	=	71	lbf
Mode IV	=	99	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>113</u> lbf



As-Tested 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



As-Tested 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



As-tested 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
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>122</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

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

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

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

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

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

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 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

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

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

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

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

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

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



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



48 x 77 +50/-55 psf

Anchorage Requirements – Nail Fin

Window Overall Size: 48" x 77"
Window Overall Area: $(48")(77")/144 = 25.7 \text{ ft}^2$
Window Overall Wind Load: $(55 \text{ psf})(25.7 \text{ ft}^2) = 1,414 \text{ lb}$

Installed Anchors: 4 head + 4 sill + 2(7) jambs = 22 installed anchors
Minimum Anchor Capacity: 110 lb/anchor
Total Anchor Capacity: $(22 \text{ anchors})(110 \text{ lb/anchor}) = 2,420 \text{ lb} > 1,414 \text{ lb}$ **OK**

Anchorage Requirements – Through Frame

Window Overall Size: 48" x 77"
Window Overall Area: $(48")(77")/144 = 25.7 \text{ ft}^2$
Window Overall Wind Load: $(55 \text{ psf})(25.7 \text{ ft}^2) = 1,414 \text{ lb}$

Installed Anchors: 3 head + 3 sill + 2(5) jambs = 16 installed anchors
Minimum Anchor Capacity: 113 lb/anchor
Total Anchor Capacity: $(16 \text{ anchors})(113 \text{ lb/anchor}) = 1,808 \text{ lb} > 1,414 \text{ lb}$ **OK**

120x 84 +35/-40 psf

Anchorage Requirements – Nail Fin

Window Overall Size: 120" x 84"
Window Overall Area: $(120")(84")/144 = 70.0 \text{ ft}^2$
Window Overall Wind Load: $(40 \text{ psf})(70.0 \text{ ft}^2) = 2,800 \text{ lb}$

Installed Anchors: 15 head + 15 sill + 2(10) jambs = 50 installed anchors
Minimum Anchor Capacity: 110 lb/anchor
Total Anchor Capacity: $(50 \text{ anchors})(110 \text{ lb/anchor}) = 5,500 \text{ lb} > 2,800 \text{ lb}$ **OK**

Anchorage Requirements – Strap Anchor

Window Overall Size: 120" x 84"
Window Overall Area: $(120")(84")/144 = 70.0 \text{ ft}^2$
Window Overall Wind Load: $(40 \text{ psf})(70.0 \text{ ft}^2) = 2,800 \text{ lb}$

Installed Anchors: 10 head + 10 sill + 2(5) jambs = 30 installed anchors
Minimum Anchor Capacity: 122 lb/anchor
Total Anchor Capacity: $(30 \text{ anchors})(122 \text{ lb/anchor}) = 3,660 \text{ lb} > 2,800 \text{ lb}$ **OK**



108 x 72 +50/-55 psf

Anchorage Requirements – Nail Fin

Window Overall Size: 108" x 72"
Window Overall Area: $(108")(72")/144 = 54.0 \text{ ft}^2$
Window Overall Wind Load: $(55 \text{ psf})(54.0 \text{ ft}^2) = 2,970 \text{ lb}$

Installed Anchors: 15 head + 15 sill + 2(5) jambs = 40 installed anchors
Minimum Anchor Capacity: 110 lb/anchor
Total Anchor Capacity: $(40 \text{ anchors})(110 \text{ lb/anchor}) = 4,400 \text{ lb} > 2,970 \text{ lb}$ **OK**

Anchorage Requirements – Strap Anchor

Window Overall Size: 108" x 72"
Window Overall Area: $(108")(72")/144 = 54.0 \text{ ft}^2$
Window Overall Wind Load: $(55 \text{ psf})(54.0 \text{ ft}^2) = 2,970 \text{ lb}$

Installed Anchors: 13 head + 13 sill + 2(5) jambs = 36 installed anchors
Minimum Anchor Capacity: 122 lb/anchor
Total Anchor Capacity: $(36 \text{ anchors})(122 \text{ lb/anchor}) = 4,392 \text{ lb} > 2,970 \text{ lb}$ **OK**

Anchorage Requirements – Through Frame

Window Overall Size: 108" x 72"
Window Overall Area: $(108")(72")/144 = 54.0 \text{ ft}^2$
Window Overall Wind Load: $(55 \text{ psf})(54.0 \text{ ft}^2) = 2,970 \text{ lb}$

Installed Anchors: 13 head + 13 sill + 2(5) jambs = 36 installed anchors
Minimum Anchor Capacity: 139 lb/anchor
Total Anchor Capacity: $(36 \text{ anchors})(139 \text{ lb/anchor}) = 5,004 \text{ lb} > 2,970 \text{ lb}$ **OK**



Appendix A

Revision Log

<u>Identification</u>	<u>Date</u>	<u>Page & Revision</u>
Original Issue	10/27/21	Not Applicable