

PRODUCT APPROVAL SUPPORTING CALCULATIONS

Series/Model 6000 Impact Horizontal Slider (XX)

REPORT No.: 29261.05-106-11-R2

RENDERED TO: Vytex Corporation
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REVISION 2 DATE: 4/23/2026

This item has been digitally signed and sealed by Michael D. Stremmel, PE on the date adjacent to the seal.

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A handwritten signature in black ink, appearing to read "Michael D. Stremmel".

Michael D. Stremmel, P.E.
Senior Project Engineer
FL PE 65868
FL REG 37122

It is a violation to alter this document in any way unless acting under the direction of a licensed professional engineer.

SCOPE:

Molimo, LLC was contracted by Vytex Corporation to evaluate alternate installation methods for their 6000 Impact Horizontal Slider (XX) window. The evaluation is based on physical testing and product certifications.

Reference standards utilized in this project include:

Florida Building Code, Building, 8th Edition (2023). International Code Council, 2023.

ANSI/AWC NDS-2018 National Design Specification (NDS) for Wood Construction. American Wood Council, 2018.

AISI S100-16 North American Specification for the Design of Cold-Formed Steel Structural Members, 2016. American Iron and Steel Institute, 2016.

ADM1-2020 2020 Aluminum Design Manual. The Aluminum Association, Inc. 2020.

ICC-ES Report ESR-1976 ITW Buildex TEKS Self-Drilling Fasteners. ICC Evaluation Service. 07/2016.

NOA 21-0201.06 *Tapcon Concrete and Masonry Anchors with Advanced Threadform Technology.* Miami-Dade County Product Control Section. 05/06/2021.

The anchorage analysis 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 the incurred loads.

Certification of Independence

In accordance with Rule 61G20-3 Florida Administrative Code, Molimo, LLC hereby certifies the following:

- Molimo, LLC 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.
- Molimo LLC is not owned, operated or controlled by any company manufacturing or distributing products it tests or labels.
- Michael D. Stremmel, P.E. does not have nor will acquire, a financial interest in any company manufacturing or distributing products for which the reports are being issued.
- Michael D. Stremmel, P.E. does not have, nor will acquire, a financial interest in any other entity involved in the approval process of the product.

ANALYSES:

Summary of Test Results

Table 1 summarizes the various 6000 Impact Horizontal Slider (XX) Window products and their corresponding performance levels which have been established by testing for product certification.

The products considered in this report satisfy the requirements of the *Florida Building Code, Building 8th Edition (2023)* for the overall sizes and design pressures of the following product certifications and their installation methods presented in this report.

Table 1: Summary of Product Certifications and Limitations of Use

Series/Model	Test Report Number	Product Certification	Size (W x H)	Performance
6000 HS (XX) (Impact) <i>Thru-Frame Installation Method</i>	28069.03-106-11 (Rev. 0, 6/14/2024)	CPD 22010	73" x 63"	±55 psf
	28069.01-106-11 (Rev. 0, 5/13/2024)	CPD 22013	73" x 63"	±55 psf Missile Level D Wind Zone 3
6000 HS (XX) (Impact) <i>Fin Installation Method</i>	32468.01-106-11 (Rev. 0, 3/6/2026)	CPD 23004	73" x 63"	±55 psf
	32468.02-106-11 (Rev. 0, 3/6/2026)	CPD 23007	73" x 63"	±55 psf Missile Level D Wind Zone 3

Testing documented in Table 1 was conducted by Molimo, LLC of York, Pennsylvania (Florida Department of Business & Professional Regulation Test Lab No. TST11282, IAS Certificate of Accreditation TL-678).

ANALYSES: (Continued)

ASTM E1300 Glazing Analysis

The glazing is evaluated with ASTM E1300-12ae1 *Standard Practice for Determining Load Resistance of Glass in Buildings* assuming four-sided support. Glazing constructions are listed in Table 2. Glazing analyses are presented on Page 10 and summarized in Table 3.

Table 2: Glazing Constructions

Glass Type	Glazing Construction
Insulating Glass	1/8" Annealed 1/8" Annealed – 0.090" PVB – 1/8" Annealed

Table 3: Glazing Analysis

Overall Size	Glass Type	Glass Size	Load Resistance
73" x 63"	Insulating Glass	33-1/8" x 56-1/8"	62.4 psf

The glazing load resistance is more than the product design pressures. Glazing strength will not be a limiting condition.

ANALYSES: (Continued)

As-Tested Installation Analysis

For air/water/structural testing, the test specimen was secured to a pine wood test buck with #10 x 2" screws at the jambs. The rough opening allowed for a 1/4" shim space. The as tested installation methods are evaluated on Pages 11 through 15 and the established design capacities are summarized in Table 5.

Table 4: As-tested Anchorage Design Capacities

Test Specimen Installation Method	Connection Details	Capacity
Thru-Frame Installation Method		
Head Installation Detail	#10 x 2" Pan head screw Located 6" and 32-1/2" from each corner	122 lb
Jamb Installation Detail	#10 x 2" Pan head screw Located 6" and 23" from each corner	122 lb
Sill Installation Detail	#10 x 1" Pan head screw through the rigid vinyl mounting flange (snapped to the interior accessory groove) Located 6", 22" and 32-1/2" from each end and mid-span	106 lb
Nail Fin Installation Method		
Nail Fin (Head, Sill, and Jambs)	#10 x 1-1/2 Pan head screws Located 4" from each corner, and spaced 10" on center through the nail fin into the wood buck	58.6 lb

The capacities presented in Table 5 will be used to prove acceptable alternate anchors and substrates for the windows.

ANALYSES: (Continued)

Calculations on Pages 16 through 25 determine the design capacity of alternate through-frame installation anchorages for the window. The alternate anchorage capacities are summarized in Tables 5 through 7.

Table 5: Alternate Anchorage Capacities for Through-frame Installations

Substrate	Anchor	Capacity	Comments
18 Ga. Steel Stud	#10-16 TEKS Screw	152 lb	1. 33 KSI yield strength stud 2. Full penetration +3 threads 3. Limited by bending capacity
Concrete	3/16" Tapcon	136 lb	1. Minimum $f'_c = 3,000$ psi 2. 1-1/2" min. embedment 3. 2" min. edge distance 4. Limited by frame bearing capacity 5. Maximum 1x buck strip
CMU Block	3/16" Tapcon	135 lb	1. Minimum ASTM C90 CMU Block 2. 1-1/2" min. embedment 3. 2" min. edge distance 4. Limited by anchor shear capacity 5. Maximum 1x buck strip
Aluminum (1/8" thick)	#10-16 TEKS Screw	152 lb	1. Minimum 6063-T5 aluminum 2. Full penetration +3 threads 3. Limited by bending capacity

ANALYSES: (Continued)

Table 6: Alternate Anchorage Capacities for Sill Clip Installations

Substrate	Anchor	Capacity	Comments
18 Ga. Steel Stud	#10-16 TEKS Screw	133 lb	1. 33 KSI yield strength stud 2. Full penetration +3 threads 3. Limited by bending capacity
Concrete	3/16" Tapcon	119 lb	1. Minimum $f'_c = 3,000$ psi 2. 1-1/2" min. embedment 3. 2" min. edge distance 4. Limited by frame bearing capacity 5. Maximum 1x buck strip
CMU Block	3/16" Tapcon	119 lb	1. Minimum ASTM C90 CMU Block 2. 1-1/2" min. embedment 3. 2" min. edge distance 4. Limited by anchor shear capacity 5. Maximum 1x buck strip
Aluminum (1/8" thick)	#10-16 TEKS Screw	133 lb	1. Minimum 6063-T5 aluminum 2. Full penetration +3 threads 3. Limited by bearing capacity or clip

Note: Maximum available length of a 3/16" Tapcon anchor is 3-1/4". Use 1/4" x 4" Tapcon anchors for through-frame installations with 1x buck strip.

Table 7: Alternate Anchorage Capacities for Nail Fin Installations

Substrate	Anchor	Capacity	Comments
18 Ga. Steel Stud	#10-16 TEKS Screw	104 lb	1. 33 KSI yield strength stud 2. Full penetration +3 threads 3. Limited by pull-out capacity
Aluminum (1/8" thick)	#10-16 TEKS Screw	152 lb	1. Minimum 6063-T5 aluminum 2. Full penetration +3 threads 3. Limited by pull-out capacity

ANALYSES: (Continued)

Anchorage Requirements

It must be determined the anchorages are not overloaded for the approved window size and design pressures. Calculations presented on Page 26 shows the following:

Based on the calculations, Table 8 shows the maximum anchor spacing for each installation method. The anchor spacings shown in the following table apply to all substrates and anchor types.

Table 8: Anchorage Spacing Requirements

Installation Method	Maximum Anchor Spacing
Thru-Frame Installation Method	
Through-Frame (Jambs only)	Located 6" and 23" from each corner, through the frame into the building substrate
Through-Frame (Head only)	Located 6" and 32-1/2" from each corner, through the frame into the building substrate
Through-Frame (Sill only)	Located 6" and 22" from each end and a group of three anchors at mid-span (3" OC spacing), through the frame into the building substrate
Nail Fin Installation Method	
Head, Sill, and Jambs	Located 4" from each corner, and spaced 10" on center through the nail fin into the building substrate

ASTM E1300 Glazing Analysis

Input

November 18, 2024

Glazing Information

Supported Edges: Four sides simply supported
Shape: Rectangular
Lite Width: 33.1 in.
Lite Height: 56.1 in.
Glazing Angle: 90.0 °

Glazing Construction (Double Glazed Insulating Unit)

Exterior Lite Properties (1/8 in. Monolithic)

Construction: 1/8 in. (AN)

Airspace Properties

Thickness: 0.500 in.

Interior Lite Properties (1/4 in. Laminated)

Construction: 1/4 in. (AN) | 0.090 in. (PVB)

Applied Loads

Description	Load	Duration
Short Duration	55.0 psf	3.00 sec

Load Resistance

Short Duration (3 Sec)

Description	NFL	GTF	LSF	LR
Exterior Lite	33.2 psf	0.900	1/0.127	236 psf
Interior Lite	60.5 psf	0.900	1/0.873	62.4 psf

Long Duration (30 Days)

Description	NFL	GTF	LSF	LR
Exterior Lite	33.2 psf	0.390	1/0.417	31.0 psf
Interior Lite	60.5 psf	0.390	1/0.583	40.5 psf

Comparisons

Short Duration	
55.0 psf 3.00 sec <= 62.4 psf	OK
Approximate center of glass deflection	
Exterior Lite	0.25 in.
Interior Lite	0.45 in.

Notes

Load resistance values are computed in accordance with ASTM E1300-16 Section 6.2 and are based on non-factored load values calculated in a manner consistent with those presented in ASTM E1300-16.

As-Tested Installation – Through-Frame to Wood

Anchor: #10 x 2" Wood Screw

Details: Through the PVC Frame
- 0.080" thick frames at anchor location
- 1/4" max shim space

Substrate: SPF wood test buck (G = 0.42 min.)

Wood Screw Capacity (Shear)

$$Z' = \underline{122 \text{ lb}}$$

(Reference the following page)

Bearing Capacity (of PVC frame)

$$P_b = D t F_{tu} = (0.190")(0.080")(10,000 \text{ psi})$$

$$P_b = \underline{152 \text{ lb}}$$

Bending Capacity (of Wood Screw)

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

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

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

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

$$V = 2 S F_b / L = (2)(0.000221 \text{ in}^3)(70,200 \text{ psi}) / 1/4"$$

$$V = \underline{124 \text{ lb}}$$

Design Capacity of the Connection = 122 lb

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	=	2.000 in.

Project:	6000 Impact
Comments:	As-Tested Installation - Thru-Frame 1-1/2" min embedment

Main Member

Material	=	SPF
G	=	0.42
θ	=	90
F_e	=	3,350 psi
Thickness	=	1.500 in.

Side Member

Material	=	Vinyl (PVC)
G	=	N/A
θ	=	90
F_{es}	=	13,750 psi
Thickness	=	0.080 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	=	18.75

k_1	=	1.7830
k_2	=	0.6524
k_3	=	10.80
R_d	=	2.20 (Mode I _m , I _s)
R_d	=	2.20 (Mode II)
R_d	=	2.20 (Mode III _m , III _s , IV)

Lateral Design Values, Z

Mode I _m	=	347 lbf
Mode I _s	=	76 lbf
Mode II	=	136 lbf
Mode III _m	=	152 lbf
Mode III _s	=	89 lbf
Mode IV	=	126 lbf

<===== Minimum Value

Adjustment Factors

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

Adjusted Design Value, Z

Z'	=	122 lbf
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As-Tested Installation – Through-Frame to Wood

(Sill)

Anchor: #10 x 2" Wood Screw

Details: Through the PVC Frame
- 0.070" thick frames at anchor location
- 1/4" max shim space

Substrate: SPF wood test buck (G = 0.42 min.)

Wood Screw Capacity (Shear)

$$Z' = \underline{106 \text{ lb}}$$

(Reference the following page)

Bearing Capacity (of PVC frame)

$$P_b = D t F_{tu} = (0.190")(0.070")(10,000 \text{ psi})$$

$$P_b = \underline{133 \text{ lb}}$$

Bending Capacity (of Wood Screw)

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

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

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

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

$$V = 2 S F_b / L = (2)(0.000221 \text{ in}^3)(70,200 \text{ psi}) / 1/4"$$

$$V = \underline{124 \text{ lb}}$$

Design Capacity of the Connection = 106 lb

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	=	1.000 in.

Project:	6000 Impact (Sill)
Comments:	As-Tested Installation - Thru-Frame 1" min embedment

Main Member

Material	=	SPF
G	=	0.42
θ	=	90
F_e	=	3,350 psi
Thickness	=	1.500 in.

Side Member

Material	=	Vinyl (PVC)
G	=	N/A
θ	=	90
F_{es}	=	13,750 psi
Thickness	=	0.070 in.

Calculations

Lateral Bearing Factors

D	=	0.152 in.
ℓ_m	=	0.740 in.
K_θ	=	1.25
K_D	=	2.20
R_e	=	0.244
R_t	=	10.57

k_1	=	0.9994
k_2	=	0.8672
k_3	=	12.37
R_d	=	2.20 (Mode I _m , I _s)
R_d	=	2.20 (Mode II)
R_d	=	2.20 (Mode III _m , III _s , IV)

Lateral Design Values, Z

Mode I _m	=	171 lbf
Mode I _s	=	67 lbf
Mode II	=	66 lbf
Mode III _m	=	100 lbf
Mode III _s	=	89 lbf
Mode IV	=	126 lbf

<===== Minimum Value

Adjustment Factors

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

Adjusted Design Value, Z'

Z'	=	106 lbf
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As-Tested Installation – Nail Fin to Wood

Anchor: #10 x 1-1/2" Wood Screw

Details: Through the PVC Nail Fin

Substrate: SPF wood test buck (G = 0.42 min.)

Wood Screw Capacity (Tension)

$W = 1.6(1.50" - 0.062")(95 \text{ lb/in})$ (NDS, Table 12.2B)

$W = \underline{218 \text{ lb}}$

Pull-over of Wood Screw

Pull-over of the wood screw is validated by the test

As-tested spacing: 10" on center

As-tested Anchor head size: 0.350"

Anchor Placement: 4" from corner; 10" on center

Anchor Quantities:

Jambs: 7 per Jamb

Head: 8

Sill: 8

Total: 24

Load to Anchors: $(73")(63")(55 \text{ psf} / 144) = 1,757 \text{ lb}$

Individual Anchor Load: $(1,757 \text{ lb}) / (30 \text{ anchors}) = 58.6 \text{ lb} (< \text{withdrawal capacity})$

Design Capacity of the Connection = 58.6 lb

Alternate Installation – Through-Frame to Steel Stud

Anchor: #10-16 TEKS Screw

Details: Through the PVC Frame
 - 0.080" thick frame at anchor location
 - 1/4" max shim space

Substrate: 18 ga steel stud (33 ksi, 0.043" thick)

Anchor Capacity (Shear of #10-16 TEKS)

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

Bearing Capacity (of PVC frame)

$$P_b = D t F_{tu} = (0.190")(0.080")(10,000 \text{ psi})$$

$$P_b = \underline{152 \text{ lb}}$$

Bearing/Tilting Capacity (of steel stud)

$$P_b = 2.7 D t F_{tu} = 2.7(0.190")(0.043")(45,000 \text{ psi}) = 992 \text{ lb}$$

$$P_b = 4.2 (D t^3)^{1/2} F_{tu} = 2.7 \{ (0.190")(0.043")^3 \}^{1/2} (45,000 \text{ psi}) = 743 \text{ lb}$$

$$P_{\text{allow}} = 743 \text{ lb} / 3.0 = \underline{243 \text{ lb}}$$

Bending Capacity (of Wood Screw)

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

$$S = \pi d^3 / 32 = \pi (0.139")^3 / 32 = 0.000264 \text{ in}^3$$

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

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

$$V = 2 S F_b / L = (2)(0.000264 \text{ in}^3)(71,760 \text{ psi}) / 1/4"$$

$$V = \underline{152 \text{ lb}}$$

Design Capacity of the Connection = 152 lb

Alternate Installation – Through-Frame to Steel Stud

(Sill)

Anchor: #10-16 TEKS Screw

Details: Through the PVC Frame
 - 0.070" thick anchor strap
 - 1/4" max shim space

Substrate: 18 ga steel stud (33 ksi, 0.043" thick)

Anchor Capacity (Shear of #10-16 TEKS)

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

Bearing Capacity (of PVC frame)

$$P_b = D t F_{tu} = (0.190")(0.070")(10,000 \text{ psi})$$

$$P_b = \underline{133 \text{ lb}}$$

Bearing/Tilting Capacity (of steel stud)

$$P_b = 2.7 D t F_{tu} = 2.7(0.190")(0.043")(45,000 \text{ psi}) = 992 \text{ lb}$$

$$P_b = 4.2 (D t^3)^{1/2} F_{tu} = 2.7 \{ (0.190")(0.043")^3 \}^{1/2} (45,000 \text{ psi}) = 743 \text{ lb}$$

$$P_{allow} = 743 \text{ lb} / 3.0 = \underline{243 \text{ lb}}$$

Bending Capacity (of Wood Screw)

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

$$S = \pi d^3 / 32 = \pi (0.139")^3 / 32 = 0.000264 \text{ in}^3$$

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

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

$$V = 2 S F_b / L = (2)(0.000264 \text{ in}^3)(71,760 \text{ psi}) / 1/4"$$

$$V = \underline{152 \text{ lb}}$$

Design Capacity of the Connection = 133 lb

Alternate Installation – Through-Frame to Concrete

Anchor: 3/16" Tapcon Anchor
- 1-1/2" min embedment
- 2" min edge distance
- 3" min anchor spacing

Details: Through the PVC Frame
- 0.080" thick frame at anchor location
- 1/4" max shim space

Substrate: 3,000 psi Concrete

Anchor Capacity (Shear of 3/16" Tapcon)

$$P_{ss} / \Omega = \underline{186 \text{ lb}} \quad (\text{NOA-No. 16-1222.06})$$

Bearing Capacity (of PVC frame)

$$P_b = D t F_{tu} = (0.170")(0.080")(10,000 \text{ psi})$$

$$P_b = \underline{136 \text{ lb}}$$

Bending Capacity (of 3/16" Tapcon)

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

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

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

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

$$V = 2 S F_b / L = (2)(0.000482 \text{ in}^3)(106,860 \text{ psi}) / 1/4"$$

$$V = \underline{412 \text{ lb}}$$

Design Capacity of the Connection = 136 lb

Qualifies 1/4" Tapcon if longer length anchor is required to achieve minimum embedment

Alternate Installation – Through-Frame to Concrete

(Sill)

Anchor: 3/16" Tapcon Anchor
- 1-1/2" min embedment
- 2" min edge distance
- 3" min anchor spacing

Details: Through the PVC Frame
- 0.070" thick anchor strap
- 1/4" max shim space

Substrate: 3,000 psi Concrete

Anchor Capacity (Shear of 3/16" Tapcon)

$$P_{ss} / \Omega = \underline{186 \text{ lb}} \quad (\text{NOA-No. 16-1222.06})$$

Bearing Capacity (of PVC frame)

$$P_b = D t F_{tu} = (0.170")(0.070")(10,000 \text{ psi})$$

$$P_b = \underline{119 \text{ lb}}$$

Bending Capacity (of 3/16" Tapcon)

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

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

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

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

$$V = 2 S F_b / L = (2)(0.000482 \text{ in}^3)(106,860 \text{ psi}) / 1/4"$$

$$V = \underline{412 \text{ lb}}$$

Design Capacity of the Connection = 119 lb

Qualifies 1/4" Tapcon if longer length anchor is required to achieve minimum embedment

Alternate Installation – Through-Frame to CMU Block

Anchor: 3/16" Tapcon Anchor
- 1-1/2" min embedment
- 2" min edge distance
- 3" min anchor spacing

Details: Through the PVC Frame
- 0.080" thick frame at anchor location
- 1/4" max shim space

Substrate: CMU Block (ASTM C90)

Anchor Capacity (Shear of 3/16" Tapcon)

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

Bearing Capacity (of PVC frame)

$$P_b = D t F_{tu} = (0.170")(0.080")(10,000 \text{ psi})$$

$$P_b = \underline{136 \text{ lb}}$$

Bending Capacity (of 3/16" Tapcon)

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

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

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

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

$$V = 2 S F_b / L = (2)(0.000482 \text{ in}^3)(106,860 \text{ psi}) / 1/4"$$

$$V = \underline{412 \text{ lb}}$$

Design Capacity of the Connection = 135 lb

Qualifies 1/4" Tapcon if longer length anchor is required to achieve minimum embedment

Alternate Installation – Through-Frame to CMU Block

(Sill)

Anchor: 3/16" Tapcon Anchor
- 1-1/2" min embedment
- 2" min edge distance
- 3" min anchor spacing

Details: Through the PVC Frame
- 0.070" thick anchor strap
- 1/4" max shim space

Substrate: CMU Block (ASTM C90)

Anchor Capacity (Shear of 3/16" Tapcon)

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

Bearing Capacity (of PVC frame)

$$P_b = D t F_{tu} = (0.170")(0.070")(10,000 \text{ psi})$$

$$P_b = \underline{119 \text{ lb}}$$

Bending Capacity (of 3/16" Tapcon)

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

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

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

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

$$V = 2 S F_b / L = (2)(0.000482 \text{ in}^3)(106,860 \text{ psi}) / 1/4"$$

$$V = \underline{412 \text{ lb}}$$

Design Capacity of the Connection = 119 lb

Qualifies 1/4" Tapcon if longer length anchor is required to achieve minimum embedment

Alternate Installation – Through-Frame to Aluminum

Anchor: #10-16 TEKS Screw

Details: Through the PVC Frame
- 0.080" thick frame at anchor location
- 1/4" max shim space

Substrate: 6063-T5 Aluminum (1/8" thick)

Anchor Capacity (Shear of #10-16 TEKS)

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

Bearing Capacity (of PVC frame)

$$P_b = D t F_{tu} = (0.190")(0.080")(10,000 \text{ psi})$$

$$P_b = \underline{152 \text{ lb}}$$

Bearing/Tilting Capacity (of aluminum substrate)

$$P_b = 2 D t F_{tu} = 2(0.190")(0.125")(22,000 \text{ psi}) = 1,045 \text{ lb}$$

$$P_{\text{allow}} = 1,045 \text{ lb} / 3.0 = \underline{348 \text{ lb}}$$

Bending Capacity (of Wood Screw)

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

$$S = \pi d^3 / 32 = \pi (0.139")^3 / 32 = 0.000264 \text{ in}^3$$

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

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

$$V = 2 S F_b / L = (2)(0.000264 \text{ in}^3)(71,760 \text{ psi}) / 1/4"$$

$$V = \underline{152 \text{ lb}}$$

Design Capacity of the Connection = 152 lb

Alternate Installation – Through-Frame to Aluminum

(Sill)

Anchor: #10-16 TEKS Screw

Details: Through the PVC Frame
- 0.070" thick anchor strap
- 1/4" max shim space

Substrate: 6063-T5 Aluminum (0.040" thick)

Anchor Capacity (Shear of #10-16 TEKS)

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

Bearing Capacity (of PVC frame)

$$P_b = D t F_{tu} = (0.190")(0.070")(10,000 \text{ psi})$$

$$P_b = \underline{133 \text{ lb}}$$

Bearing/Tilting Capacity (of aluminum substrate)

$$P_b = 2 D t F_{tu} = 2(0.190")(0.125")(22,000 \text{ psi}) = 1,045 \text{ lb}$$

$$P_{\text{allow}} = 1,045 \text{ lb} / 3.0 = \underline{348 \text{ lb}}$$

Bending Capacity (of Wood Screw)

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

$$S = \pi d^3 / 32 = \pi (0.139")^3 / 32 = 0.000264 \text{ in}^3$$

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

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

$$V = 2 S F_b / L = (2)(0.000264 \text{ in}^3)(71,760 \text{ psi}) / 1/4"$$

$$V = \underline{152 \text{ lb}}$$

Design Capacity of the Connection = 133 lb

Alternate Installation – Nail Fin to Steel Stud

Anchor: #10-16 TEKS Screw

Details: Through the PVC Nail Fin

Substrate: 18 ga steel stud (33 ksi, 0.043" thick)

Wood Screw Capacity (Tension)

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

Pull-over of #10-16 TEKS Screw

$$\text{Anchor head size} = 0.365" > 0.350" \quad (\text{maintain as tested spacing})$$

Pull-out of #10-16 TEKS Screw

$$P_{\text{not}} = 0.85 t_c d F_{tu} = 0.85(0.043")(0.190")(45,000 \text{ psi}) = 312 \text{ lb}$$

$$P_{\text{allow}} = 312 \text{ lb} / 3.0 = \underline{104 \text{ lb}}$$

Design Capacity of the Connection = 104 lb

Alternate Installation – Nail Fin to Aluminum

Anchor: #10-16 TEKS Screw

Details: Through the PVC Nail Fin

Substrate: 1/8" thick Aluminum (6063-T5)

Wood Screw Capacity (Tension)

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

Pull-over of #10-16 TEKS Screw

$$\text{Anchor head size} = 0.365" > 0.350" \quad (\text{maintain as tested spacing})$$

Pull-out of #10-16 TEKS Screw

$$P_{\text{not}} = K t_c d F_{ty} = 1.2(1/8")(0.190")(16,000 \text{ psi}) = 456 \text{ lb}$$

$$P_{\text{allow}} = 456 \text{ lb} / 3.0 = \underline{152 \text{ lb}}$$

Design Capacity of the Connection = 152 lb

Alternate Requirements

Series/Model: 6000
Test Unit Size: 73" x 63"
Design Pressure: ± 55 psf

Through-Frame Installation Method

Anchor Quantities:

Jambs:	4 per jamb
Head:	4
Sill:	7
Total:	19

Perimeter Load

Jamb Load Area: $(73")(63") / 144 = 32 \text{ ft}^2$

Anchor Quantity: $n = 19$

Load to the Anchors = $(32 \text{ ft}^2)(55 \text{ psf}) = 1,760 \text{ lb}$

Individual Anchor Load = $1,760 \text{ lb} / 18 \text{ anchors} = 97.8 \text{ lb}$

Least Anchor Capacity = 106 lb (Wood) > 97.8 lb **Tested Anchor Spacing Governs**

**** As calculated above, the total anchor capacity is greater than the applied load on the anchors. Therefore, the as tested anchor spacing is acceptable.**

Nail Fin Installation Method

Anchor Placement: 4" from corners and 10" on center

Anchor Quantities: Head / Sill = 8 per

Jambs = 7 per

Total = 30

Load to the Anchors = $(73")(63")(55 \text{ psf} / 144) = 1,757 \text{ lb}$

Individual Anchor Load = $1,757 \text{ lb} / 30 \text{ anchors} = 58.6 \text{ lb}$

Least Anchor Capacity = 104 lb (Steel Stud) > 58.6 lb **Tested Anchor Spacing Governs**

Revision Log

Rev. #	Date	Page(s)	Revision(s)
0	10/16/2024	All	Original Report Issue
1	11/18/2024	All	Included ASTM E1300 Glass Analysis
2	4/23/2026	All	Added 1/8" thick aluminum as a substrate
		All	Added test results and anchor calculations for nail fin installation method