Product Approval Supporting Calculations
Alternative Anchorage Analysis & Design

Project Number: SCE 26-09018

Drawing Number: D015786

Reference Test Report: TEL 01681762

Product Name: Architectural Fiberglass Swinging Door ISW 4 Panel OXXO 115.125 x 81.75

Impact: No

Design Pressure: +50 psf / -50 psf

Prepared for:
Jeld-Wen Windows & Doors
3737 Lakeport Blvd.
Klamath Falls, OR

MICAH SWARTZ
LICENSE
No 93573
STATE OF
FLORIDA
PROFESSIONAL ENGINEER

10/05/26

This item has been digitally signed and sealed by Micah Swartz, P.E. on the date adjacent to the seal.

Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronic copies.

Prepared by:
Swartz Consulting Engineers LLC

Micah Swartz, PE
Florida License No. PE 93573
Florida Registry No. 38420

Scope:

Swartz Consulting Engineers LLC is contracted by Jeld-Wen Windows & Doors to evaluate alternative anchorage for the product: Architectural Fiberglass Swinging Door ISW 4 Panel OXXO 115.125 x 81.75. This evaluation is based on testing observed by Testing Evaluation Laboratories in Ontario Canada, test report no.: TEL 01681762 and dated 03/11/17.
This evaluation does not include the air infiltration, water resistance or water penetration of the installation method or the installed product. In addition, the design of the building substrate to resist the superimposed loads is by others.

Reference Standards:

Current edition of the Florida Building Code, Building

ANSI/AWC NDS - National Design Specification (NDS) for Wood Construction

AISI S100 North American Specification for the Design of Cold-Formed Steel Structural Members

ICC-ES Report ESR-1976 ITW Buildex TEKS Self-Drilling Fasteners

ICC-ES Report ESR-2196 Hilti Self Drilling Screws to connect cold-formed steel

NOA 24-0102.06 Tapcon Concrete and Masonry Anchors with Advanced Threadform Technology

Certification of Independence:

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

(1) Swartz Consulting Engineers 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.

(2) Swartz Consulting Engineers LLC is not owned, operated or controlled by any company manufacturing or distributing products it tests or labels.

(3) Micah Swartz, 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.

(4) Micah Swartz, P.E. does not have, nor will acquire, a financial interest in any other entity involved in the approval process of the product.

Design Summary:

The table below summarizes the product: Architectural Fiberglass Swinging Door ISW 4 Panel OXXO 115.125 x 81.75 and their corresponding performance levels as established by testing.

Table 1: Summary of Test Results

Series/Model	Test Report Number	Size (W x H)	Performance
Architectural Fiberglass Swinging Door ISW 4 Panel OXXO 115.125 x 81.75	TEL 01681762 (03/11/17)	115.125 x 81.75	+50 psf / -50 psf

As Tested Design:

Screw Information:

Screw Size:	10	Screw Embed:	1	in	Edge Distance:	3/4	in	(minimum)
qty:	1	Spacing:	14	in O.C. (Nail Fin)				
qty:	1	Spacing:	14	in O.C. (Thru Frame)				

Wood Screw Withdrawal:	152	lbs	Per ft. Capacity: 130	plf
Wood Screw Lateral:	149	lbs	Per ft. Capacity: 127	plf

Alternative Fasteners:

Screw Information:

Screw Size:	10	Screw Embed:	1.5	in	Edge Distance:	3/4	in	(minimum)
qty:	1	Spacing:	14	in O.C. (Nail Fin)				
qty:	1	Spacing:	14	in O.C. (Thru Frame)				

Wood Screw Withdrawal:	228	lbs	Per ft. Capacity: 195	plf	Unity:	0.65
Wood Screw Lateral:	149	lbs	Per ft. Capacity: 127	plf	Unity:	1.00

Tapcon Information:

Tapcon Size:	1/4	Embedment:	1-1/4	in (minimum)	Edge Distance:	2-1/2	in	(minimum)
qty:	1	Spacing:	14	in O.C.				

Tapcon Lateral (Concrete):	203	lbs	Per ft. Capacity: 174	plf	Unity:	0.73
Tapcon Lateral (CMU):	161	lbs	Per ft. Capacity: 138	plf	Unity:	0.92

Subject: As Tested - Wood Screw Lateral Design - Single Shear

Input:
Calculation:

Screw Information:

Screw Size: 10 Root Diameter: 0.152 in
Screw Embed: 1 in

Main Member Type: S-P-F G: 0.42 F_{em}: 3,350 psi thickness (t_m): 1.5 in

Side Member Type: S-P-F G: 0.42 F_{es}: 3,350 psi thickness (t_s): 1.25 in

Lateral Design Factors - Table 12.3.1A (NDS)

D:	0.152	in	Diameter
F_{yb}:	90	ksi	Dowel Bending Yield Strength
F_{em}:	3,350	psi	Main Member dowel bearing strength
F_{es}:	3,350	psi	Side Member dowel bearing strength
l_m:	1	in	Main Member dowel bearing length
l_s:	1.25	in	Side Member dowel bearing length
R_d:	2.2		Reduction term - Table 12.3.1B (NDS)
R_e:	1		$= F_{em}/F_{es}$
R_t:	0.8		$= l_m/l_s$
k_1:	0.377		See Table
k_2:	1.289		See Table

Reference Lateral Design Values - Table 12.3.1A (NDS)

Note: Side member is part of the Jeld-Wen assembly and verified during testing. Modes Z_{Is} and Z_{IIIs} are not applicable to the calculation.

Z_{Im}: 231 lbs $$Z_{I_m} = \frac{D l_m F_{em}}{R_d} \text{ (EQ } 12.3-1)$$

Z_{II}: 109 lbs $$Z_{II} = \frac{k_1 D l_s F_{es}}{R_d} \ (EQ\ 12.3-3)$$

Z_{IIIm}: 99 lbs $$Z_{III_m} = \frac{k_2 D l_m F_{em}}{(1+2R_e)R_d} \text{ (EQ } 12.3-4)$$

Z_{IV}: 105 lbs $$Z_{IV} = \frac{D^2}{R_d}\sqrt{\frac{2F_{em}F_{yb}}{3(1+R_e)}} \ (EQ\ 12.3-6)$$

Z_{MIN}: 99 lbs

Subject: As Tested - Wood Screw Lateral Design - Single Shear Cont.

Adjusted Lateral Design Values

$$Z' = Z * C_D * C_M * C_t * C_g * C_\Delta \ - As\ per\ table\ 11.3.1\ NDS$$

C_D:	1.6	Load Duration Factor - Table 2.3.2 (NDS)
C_M:	1.0	Wet Service Factor - Table 11.3.3 (NDS)
C_t:	1.0	Temperature Factor - Table 11.3.4 (NDS)
C_g:	1.0	Group Action Factor - Section 11.3.6 (NDS)
C_Δ:	1.0	Geometry Factor - Section 12.5.1.1 (NDS)

Z': **159** lbs

Fastener Bending Across Shim Space

Ω:	1.67		
L:	0.25	in	Maximum Shim Gap
D:	**0.152**	in	Diameter
F_{yb}:	**90**	ksi	Dowel Bending Yield Strength

$$\frac{F_{yb}}{\Omega} = \frac{M}{S} = \frac{16ZL}{\pi D^3} \Leftrightarrow Z = \frac{F_{yb}\pi D^3}{16\Omega L} \qquad Where\ M = \frac{ZL}{2}\ (Guided\ Bending)$$

Z_n/Ω: **149** lbs

Bearing on Masonry Strap

Ω:	3.00		
F_u:	33	ksi	Tensile Strength of strap
t:	20	GA	
t:	**0.036**	in	thickness of strap
D:	**0.152**	in	

$$\frac{P_{nv}}{\Omega} = 2.7 * t * D * F_u \ - (EQ.J4.3.1 - 4, AISI\ S100)$$

P_{nv}/Ω: **162** lbs

Subject: Wood Screw Lateral Design - Single Shear

Input:
Calculation:

Screw Information:

Screw Size: 10 Root Diameter: 0.152 in
Screw Embed: 1.5 in

Main Member Type: S-P-F G: 0.42 F_{em}: 3,350 psi thickness (t_m): 1.5 in

Side Member Type: S-P-F G: 0.42 F_{es}: 3,350 psi thickness (t_s): 1.25 in

Lateral Design Factors - Table 12.3.1A (NDS)

D:	0.152	in	Diameter
F_{yb}:	90	ksi	Dowel Bending Yield Strength
F_{em}:	3,350	psi	Main Member dowel bearing strength
F_{es}:	3,350	psi	Side Member dowel bearing strength
l_m:	1.5	in	Main Member dowel bearing length
l_s:	1.25	in	Side Member dowel bearing length
R_d:	2.2		Reduction term - Table 12.3.1B (NDS)
R_e:	1		$= F_{em}/F_{es}$
R_t:	1.2		$= l_m/l_s$
k_1:	0.459		See Table
k_2:	1.133		See Table

Reference Lateral Design Values - Table 12.3.1A (NDS)

Z_{Im}: 347 lbs $$Z_{I_m} = \frac{D l_m F_{em}}{R_d} \text{ (EQ } 12.3-1)$$

Z_{II}: 133 lbs $$Z_{II} = \frac{k_1 D l_s F_{es}}{R_d} \ (EQ\ 12.3-3)$$

Z_{IIIm}: 131 lbs $$Z_{III_m} = \frac{k_2 D l_m F_{em}}{(1+2R_e)R_d} \text{ (EQ } 12.3-4)$$

Z_{IV}: 105 lbs $$Z_{IV} = \frac{D^2}{R_d}\sqrt{\frac{2F_{em}F_{yb}}{3(1+R_e)}} \ (EQ\ 12.3-6)$$

Z_{MIN}: 105 lbs

Note: Side member is part of the Jeld-Wen assembly and verified during testing. Modes Z_{Is} and Z_{IIIs} are not applicable to the calculation.

Subject: Wood Screw Lateral Design - Single Shear Cont.

Adjusted Lateral Design Values

$$Z' = Z * C_D * C_M * C_t * C_g * C_\Delta \ - As\ per\ table\ 11.3.1\ NDS$$

C_D:	1.6	Load Duration Factor - Table 2.3.2 (NDS)
C_M:	1.0	Wet Service Factor - Table 11.3.3 (NDS)
C_t:	1.0	Temperature Factor - Table 11.3.4 (NDS)
C_g:	1.0	Group Action Factor - Section 11.3.6 (NDS)
C_Δ:	1.0	Geometry Factor - Section 12.5.1.1 (NDS)

Z': **168** lbs

Fastener Bending Across Shim Space

Ω:	1.67		
L:	0.25	in	Maximum Shim Gap
D:	**0.152**	in	Diameter
F_{yb}:	**90**	ksi	Dowel Bending Yield Strength

$$\frac{F_{yb}}{\Omega} = \frac{M}{S} = \frac{16ZL}{\pi D^3} \Leftrightarrow Z = \frac{F_{yb}\pi D^3}{16\Omega L} \qquad Where\ M = \frac{ZL}{2}\ (Guided\ Bending)$$

Z_n/Ω: **149** lbs

Bearing on Masonry Strap

Ω:	3.00		
F_u:	33	ksi	Tensile Strength of strap
t:	20	GA	
t:	**0.036**	in	thickness of strap
D:	**0.152**	in	

$$\frac{P_{nv}}{\Omega} = 2.7 * t * D * F_u \ - (EQ.J4.3.1 - 4, AISI\ S100)$$

P_{nv}/Ω: **162** lbs

Subject: Tapcon Lateral Design

Input:
Calculation:

Tapcon Size:

Size:	1/4		
D:	0.25	in	Nominal Diameter
D_{sh}:	0.19	in	Shank Diameter

Fastener Shear Capacity - 3,000 psi Concrete

P_{nv}/Ω: 237 lbs See Table 1B of NOA 24-0102.06

Fastener Shear Capacity - Medium-Weight CMU

P_{nv}/Ω: 161 lbs See Table 3 of NOA 24-0102.06

Note:
- Critical anchor spacing is 16D
- Minimum Anchor Embedment is 1-1/4"
- Minimum Edge Distance is 2-1/4"

Fastener Bending Across Shim Space

L:	0.25	in	Maximum Shim Gap	Ω: 3.00
D_{sh}:	0.19	in	Shank Diameter of Tapcon	
F_{yb}:	100	ksi	Yield Strength of Tapcon	

$$\frac{F_{yb}}{\Omega} = \frac{M}{S} = \frac{16P_nL}{\pi D^3} \Leftrightarrow P_n = \frac{F_{yb}\pi D^3}{16\Omega L}$$

$$Where\ M = \frac{P_nL}{2}\ (Guided\ Bending)$$

P_n/Ω: 539 lbs

Bearing Strength of Masonry Straps - AISI S100

Size:	1/4		Tapcon Size	Ω: 3.00
D_{sh}:	0.19	in	Shank Diameter of Tapcon Screw	
F_u:	33	ksi	Tensile Strength of Masonry Strap	
t:	20	GA		
t:	0.0359	in	Thickness of Masonry Strap	

$$\frac{P_{nv}}{\Omega} = 2.7 * t * D * F_u\ - (EQ.J4.3.1 - 3, AISI\ S100)$$

P_{nv}/Ω: 203 lbs