

SWARTZ
CONSULTING ENGINEERS LLC

Project Number:	SCE 26-09020		
Project Name:	ectural Fiberglass Swinging Door ISW 2		
Date:	10/5/2026	Page:	1 of 8

Product Approval Supporting Calculations Alternative Anchorage Analysis & Design

Project Number: SCE 26-09020

Drawing Number: D014722

Reference Test Report: TEL 01681715

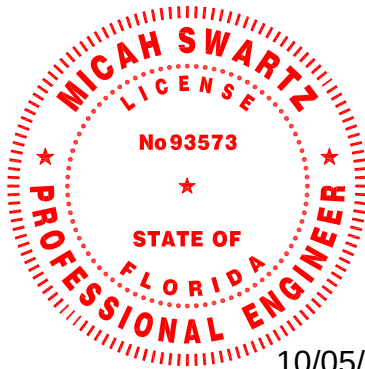
Product Name: Architectural Fiberglass Swinging Door ISW 2 Panel 74 x 97.875

Impact: WZ3 - Level D Missile

Design Pressure: +50 psf / -50 psf

Prepared for:

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



10/05/26

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

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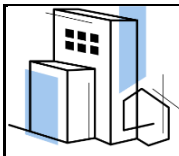
Prepared by:

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 2 Panel 74 x 97.875. This evaluation is based on testing observed by Testing Evaluation Laboratories in Ontario Canada, test report no.: TEL 01681715 and dated 02/10/17.

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:

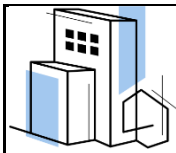
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(1) Swartz Consulting Engineers LLC does not have, nor does it intend to acquire or will it acquire, a financial interest in any company manufacturing or distributing products tested or labeled by the agency.

(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 2 Panel 74 x 97.875 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 2 Panel 74 x 97.875	TEL 01681715 (02/10/17)	74 x 97.875	+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:

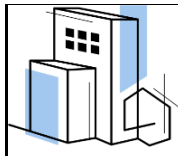
Screw Size: 10 Screw Embed: 1.5 in Edge Distance: 3/4 in (minimum)
qty: 1 Spacing: 14 in O.C. (Nail Fin)
qty: 1 Spacing: 14 in O.C. (Thru Frame)

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)

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

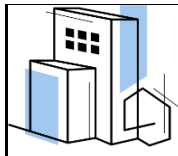
Z_{II} : 109 lbs $Z_{II} = \frac{k_1 D l_s F_{es}}{R_d}$ (EQ 12.3 - 3)

Z_{III} : 99 lbs $Z_{III} = \frac{k_2 D l_m F_{em}}{(1 + 2R_e)R_d}$ (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

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

Adjusted Lateral Design Values

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

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)

$$Z': \boxed{159} \text{ lbs}$$

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

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

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

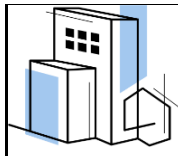
$$Z_n/\Omega: \boxed{149} \text{ lbs}$$

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

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

$$P_{nv}/\Omega: \boxed{162} \text{ lbs}$$



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)

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

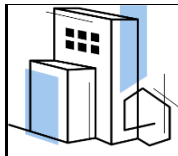
$$Z_{II}: 133 \text{ lbs} \quad Z_{II} = \frac{k_1 D l_s F_{es}}{R_d} \text{ (EQ 12.3 - 3)}$$

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

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

$$Z_{MIN}: 105 \text{ lbs}$$

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



Subject: Wood Screw Lateral Design - Single Shear Cont.

Adjusted Lateral Design Values

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

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)

$$Z': \boxed{168} \text{ lbs}$$

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

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

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

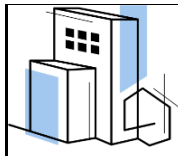
$$Z_n/\Omega: \boxed{149} \text{ lbs}$$

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

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

$$P_{nv}/\Omega: \boxed{162} \text{ lbs}$$



Subject: Tapcon Lateral Design

Input:
Calculation:

Tapcon Size:

Size:
D: in Nominal Diameter
D_{sh}: in Shank Diameter

Fastener Shear Capacity - 3,000 psi Concrete

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

Fastener Shear Capacity - Medium-Weight CMU

P_{nv}/Ω: 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: in Maximum Shim Gap
D_{sh}: in Shank Diameter of Tapcon
F_{yb}: ksi Yield Strength of Tapcon

Ω:

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

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

P_n/Ω: lbs

Bearing Strength of Masonry Straps - AISI S100

Size: Tapcon Size
D_{sh}: in Shank Diameter of Tapcon Screw
F_u: ksi Tensile Strength of Masonry Strap
t: GA
t: in Thickness of Masonry Strap

Ω:

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

P_{nv}/Ω: lbs