

Micah Swartz, P.E.

Project Number:	MS24-10003		
Project Name:	Arch. F.G. Inswing Full Lite Double		
Date:	9/8/25	Page:	1 of 8

**Product Approval Supporting Calculations
Alternative Anchorage Analysis & Design
R1 - Admin Update**

Project Number: MS24-10003

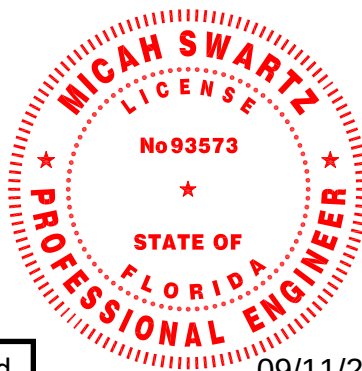
Drawing Number: D015590

Reference Test Report: L7734.01-301-47-R0

Product Name: Arch. F.G. Inswing Double 73 3/4" x 81 11/16"

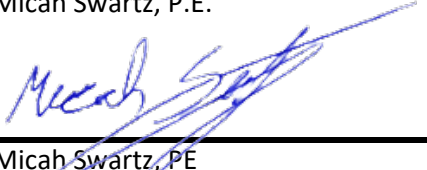
Prepared for:

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



09/11/25

Prepared by:
Micah Swartz, P.E.



Micah Swartz, PE
Florida License No. PE 93573

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.

Micah Swartz, P.E.	Project Number:	MS24-10003
	Project Name:	Arch. F.G. Inswing Full Lite Double
	Date:	9/8/25
	Page:	2 of 8

Scope:

Micah Swartz, P.E. is contracted by Jeld-Wen Windows & Doors to evaluate alternative anchorage for the product: Arch. F.G. Inswing Double 73 3/4" x 81 11/16". This evaluation is based on testing observed by Intertek at Jeld-Wen's test facility in Klamath Falls, OR, test report no.: L7734.01-301-47-R0 and dated 02/25/21.

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, Micah Swartz, P.E. hereby certifies the following:

(1) Micah Swartz, P.E. 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) Micah Swartz, P.E. 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.

Micah Swartz, P.E.	Project Number:	MS24-10003	
	Project Name:	Arch. F.G. Inswing Full Lite Double	
	Date:	9/8/25	Page: 3 of 8

Design Summary:

The table below summarizes the product: Arch. F.G. Inswing Double 73 3/4" x 81 11/16" 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
Arch. F.G. Inswing Double 73 3/4" x 81 11/16"	L7734.01-301-47-R0 (02/25/21)	73 3/4 x 81 11/16	+50 psf / -50 psf

As Tested Design:

Screw Information:

Screw Size: 8

Screw Embed: 1.5 in

Edge Distance: 3/4 in (minimum)

Wood Screw Lateral: 106 lbs

Alternative Fasteners:

Screw Information:

Screw Size: 8

Screw Embed: 1.5 in

Edge Distance: 3/4 in (minimum)

Wood Screw Lateral: 106 lbs

Tapcon Information:

Tapcon Size: 3/16

Embedment: 1-1/4 in (minimum)

Edge Distance: 2-1/2 in (minimum)

Tapcon Lateral (Concrete): 155 lbs

Tapcon Lateral (CMU): 135 lbs

Micah Swartz, P.E.	Project Number:	MS24-10003
	Project Name:	Arch. F.G. Inswing Full Lite Double
	Date:	9/8/25 Page: 4 of 8

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

Input:
 Calculation:

Screw Information:

Screw Size: 8
 Screw Embed: 1.5 in

Root Diameter: 0.131 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): 0.75 in

Lateral Design Factors - Table 12.3.1A (NDS)

D:	0.131	in	Diameter
F _{yb} :	100	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 :	0.75	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 :	2.0		= l _m /l _s
k ₁ :	0.679		See Table
k ₂ :	1.111		See Table

Reference Lateral Design Values - Table 12.3.1A (NDS)

Z_{I_m}: 299 lbs

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

Z_{II}: 102 lbs

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

Z_{III_m}: 111 lbs

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

Z_{IV}: 82 lbs

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

Z_{MIN}: 82 lbs

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

Micah Swartz, P.E.	Project Number:	MS24-10003
	Project Name:	Arch. F.G. Inswing Full Lite Double
	Date:	9/8/25
	Page:	5 of 8

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)

$$Z': \quad 132 \text{ lbs}$$

Fastener Bending Across Shim Space

Ω:	1.67	
L:	0.25	in Maximum Shim Gap
D:	0.131	in Diameter
F _{yb} :	100	ksi Dowel Bending Yield Strength

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

$$Z_n/\Omega: \quad 106 \text{ lbs}$$

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:	0.131	in

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

$$P_{nv}/\Omega: \quad 140 \text{ lbs}$$

Micah Swartz, P.E.	Project Number:	MS24-10003
	Project Name:	Arch. F.G. Inswing Full Lite Double
	Date:	9/8/25 Page: 6 of 8

Subject: Wood Screw Lateral Design - Single Shear

Input:
 Calculation:

Screw Information:

Screw Size: 8
 Screw Embed: 1.5 in

Root Diameter: 0.131 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): 0.75 in

Lateral Design Factors - Table 12.3.1A (NDS)

D:	0.131 in	Diameter
F _{yb} :	100 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 :	0.75 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 :	2.0	= l _m /l _s
k ₁ :	0.679	See Table
k ₂ :	1.111	See Table

Reference Lateral Design Values - Table 12.3.1A (NDS)

Z_{I_m}: 299 lbs

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

Z_{II}: 102 lbs

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

Z_{III_m}: 111 lbs

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

Z_{IV}: 82 lbs

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

Z_{MIN}: 82 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**

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

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)

$$Z': \boxed{132} \text{ lbs}$$

Fastener Bending Across Shim Space

Ω :	1.67	
L :	0.25	in Maximum Shim Gap
D :	0.131	in Diameter
F_{yb} :	100	ksi Dowel Bending Yield Strength

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

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

$$Z_n/\Omega: \boxed{106} \text{ lbs}$$

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 :	0.131	in

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

$$P_{nv}/\Omega: \boxed{140} \text{ lbs}$$

Micah Swartz, P.E.

Project Number: MS24-10003

Project Name: Arch. F.G. Inswing Full Lite Double

Date: 9/8/25

Page: 8 of 8

Subject: Tapcon Lateral Design

Input:

Calculation:

Tapcon Size:

Size: 3/16

D: 0.1875 in Nominal Diameter

D_{sh}: 0.145 in Shank Diameter**Fastener Shear Capacity - 3,000 psi Concrete**P_{nv}/Ω: 181 lbs See Table 1B of NOA 24-0102.06**Fastener Shear Capacity - Medium-Weight CMU**P_{nv}/Ω: 135 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

D_{sh}: 0.145 in Shank Diameter of TapconF_{yb}: 100 ksi Yield Strength of Tapcon

Ω: 3.00

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

Where $M = \frac{P_n L}{2}$ (Guided Bending)P_n/Ω: 239 lbs**Bearing Strength of Masonry Straps - AISI S100**

Size: 3/16 Tapcon Size

D_{sh}: 0.145 in Shank Diameter of Tapcon ScrewF_u: 33 ksi Tensile Strength of Masonry Strap

t: 20 GA

t: 0.0359 in Thickness of Masonry Strap

Ω: 3.00

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

P_{nv}/Ω: 155 lbs