

**Micah Swartz, P.E.**

Project Number: MS24-05001

Project Name: LaCantina 99x120

Date: 6/29/2024 Page: 1 of 8

**Product Approval Supporting Calculations  
Alternative Anchorage Analysis & Design**

**Project Number:** MS24-05001

**Drawing Number:** D1000834

**Reference Test Report:** q9099.01-303-44-r1

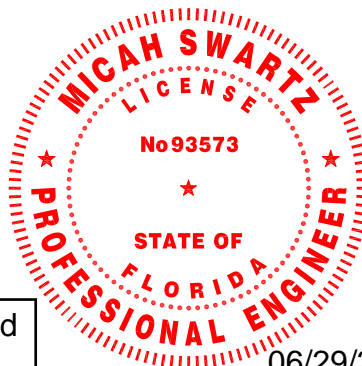
**Product Name:** LaCantina - Aluminum Swinging Door

**Prepared for:**

Jeld-Wen Windows & Doors

3737 Lakeport Blvd.

Klamath Falls, OR



Prepared by:

Micah Swartz, P.E.

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, PE

06/29/24 Florida License No. PE 93573

**Scope:**

Micah Swartz, P.E. is contracted by Jeld-Wen Windows & Doors to evaluate alternative anchorage for the product: LaCantina - Aluminum Swinging Door. This evaluation is based on testing performed by Intertek in Lake Forest, CA, test report no.: q9099.01-303-44-r1 and dated 1/30/2024.

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:**

*Florida Building Code, Building, 2023 Edition*

*ANSI/AWC NDS 2018 - National Design Specification (NDS) for Wood Construction*

*ANSI S100-16 (2020) North American Specification for the Design of Cold-Formed Steel Structural Members*

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

*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: MS24-05001

Project Name: LaCantina 99x120

Date: 5/31/2024

Page: 3 of 8

## Design Summary:

The table below summarizes the product: LaCantina - Aluminum Swinging Door 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
LaCantina - Aluminum Swinging Door	q9099.01-303-44-r1 (1/30/24)	99 x 120	+ 40 psf / - 50 psf

## As Tested Design:

### Screw Information:

Screw Size: 10 Screw Embed: 1.5 in Edge Distance: 3/4 in (minimum)

Wood Screw Lateral: 149 lbs

## Alternative Fasteners:

### Screw Information:

Screw Size: 10 Screw Embed: 1.5 in Edge Distance: 3/4 in (minimum)

Wood Screw Lateral: 149 lbs

### Tapcon Information:

Tapcon Size: 1/4 Embedment: 1-1/4 in (minimum) Edge Distance: 2-1/2 in (minimum)

Tapcon Lateral (Concrete): 203 lbs

Tapcon Lateral (CMU): 161 lbs

**Subject:** As Tested - 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: PVC

G: N/A

 $F_{es}$ : 13,750 psi thickness ( $t_s$ ): 0.125 in

**Lateral Design Factors - Table 12.3.1A (NDS 2018)**

D:	0.152	in	Diameter
$F_{yb}$ :	90	ksi	Dowel Bending Yield Strength
$F_{em}$ :	3,350	psi	Main Member dowel bearing strength
$F_{es}$ :	13,750	psi	Side Member dowel bearing strength
$l_m$ :	1.5	in	Main Member dowel bearing length
$l_s$ :	0.125	in	Side Member dowel bearing length
$R_d$ :	2.2		Reduction term - Table 12.3.1B (NDS 2018)
$R_e$ :	0.2436		$= F_{em}/F_{es}$
$R_t$ :	12.0		$= l_m/l_s$
$k_1$ :	1.135		See Table
$k_2$ :	0.662		See Table

**Reference Lateral Design Values - Table 12.3.1A (NDS 2018)**

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

$$Z_{II}: 135 \text{ lbs} \quad Z_{II} = \frac{k_1 D l_s F_{es}}{R_d} \text{ (EQ 12.3 - 3)}$$

$$Z_{III_m}: 154 \text{ lbs} \quad Z_{III_m} = \frac{k_2 D l_m F_{em}}{(1 + 2R_e) R_d} \text{ (EQ 12.3 - 4)}$$

$$Z_{IV}: 134 \text{ lbs} \quad Z_{IV} = \frac{D^2}{R_d} \sqrt{\frac{2F_{em}F_{yb}}{3(1 + R_e)}} \text{ (EQ 12.3 - 6)}$$

$$Z_{MIN}: 134 \text{ lbs}$$

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

$$Z' = Z * C_D * C_M * C_t * C_g * C_{\Delta} - \text{As per table 11.3.1 NDS 2018}$$

$C_D$ :	1.6	Load Duration Factor - Table 2.3.2 (NDS 2018)
$C_M$ :	1.0	Wet Service Factor - Table 11.3.3 (NDS 2018)
$C_t$ :	1.0	Temperature Factor - Table 11.3.4 (NDS 2018)
$C_g$ :	1.0	Group Action Factor - Section 11.3.6 (NDS 2018)
$C_{\Delta}$ :	1.0	Geometry Factor - Section 12.5.1.1 (NDS 2018)

$$Z': \quad 214 \text{ lbs}$$

**Fastener Bending Across Shim Space**

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

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

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

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

**Bearing on Masonry Strap**

$\Omega$ :	3.00	
$F_u$ :	33	ksi Tensile Strength of strap
t:	20	GA
t:	0.036	in thickness of strap
D:	0.152	in

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

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

# Micah Swartz, P.E.

Project Number: MS24-05001

Project Name: LaCantina 99x120

Date: 5/31/2024

Page: 6 of 8

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: PVC

G: N/A

$F_{es}$ : 13,750 psi thickness ( $t_s$ ): 0.125 in

## Lateral Design Factors - Table 12.3.1A (NDS 2018)

D:	0.152 in	Diameter
$F_{yb}$ :	90 ksi	Dowel Bending Yield Strength
$F_{em}$ :	3,350 psi	Main Member dowel bearing strength
$F_{es}$ :	13,750 psi	Side Member dowel bearing strength
$l_m$ :	1.5 in	Main Member dowel bearing length
$l_s$ :	0.125 in	Side Member dowel bearing length
$R_d$ :	2.2	Reduction term - Table 12.3.1B (NDS 2018)
$R_e$ :	0.2436	$= F_{em}/F_{es}$
$R_t$ :	12.0	$= l_m/l_s$
$k_1$ :	1.135	See Table
$k_2$ :	0.662	See Table

## Reference Lateral Design Values - Table 12.3.1A (NDS 2018)

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

$$Z_{II}: 135 \text{ lbs} \quad Z_{II} = \frac{k_1 D l_s F_{es}}{R_d} \text{ (EQ 12.3 - 3)}$$

$$Z_{III_m}: 154 \text{ lbs} \quad Z_{III_m} = \frac{k_2 D l_m F_{em}}{(1 + 2R_e) R_d} \text{ (EQ 12.3 - 4)}$$

$$Z_{IV}: 134 \text{ lbs} \quad Z_{IV} = \frac{D^2}{R_d} \sqrt{\frac{2F_{em}F_{yb}}{3(1 + R_e)}} \text{ (EQ 12.3 - 6)}$$

$$Z_{MIN}: 134 \text{ lbs}$$

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** $Z' = Z * C_D * C_M * C_t * C_g * C_{\Delta}$  – As per table 11.3.1 NDS 2018

$C_D$ :	1.6	Load Duration Factor - Table 2.3.2 (NDS 2018)
$C_M$ :	1.0	Wet Service Factor - Table 11.3.3 (NDS 2018)
$C_t$ :	1.0	Temperature Factor - Table 11.3.4 (NDS 2018)
$C_g$ :	1.0	Group Action Factor - Section 11.3.6 (NDS 2018)
$C_{\Delta}$ :	1.0	Geometry Factor - Section 12.5.1.1 (NDS 2018)

 $Z'$ : 214 lbs**Fastener Bending Across Shim Space**

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

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

Where  $M = \frac{ZL}{2}$  (Guided Bending) $Z_n/\Omega$ : 149 lbs**Bearing on Masonry Strap**

$\Omega$ :	3.00	
$F_u$ :	33	ksi Tensile Strength of strap
t:	20	GA
t:	0.036	in thickness of strap
D:	0.152	in

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

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

# Micah Swartz, P.E.

Project Number: MS24-05001

Project Name: LaCantina 99x120

Date: 5/31/2024

Page: 8 of 8

Subject: Tapcon Lateral Design

Input:

Calculation:

## Tapcon Size:

Size: 1/4  
D: 0.25 in Nominal Diameter  
D<sub>sh</sub>: 0.19 in Shank Diameter

## Fastener Shear Capacity - 3,000 psi Concrete

P<sub>nv</sub>/Ω: 237 lbs See Table 1B of NOA 24-0102.06

## Fastener Shear Capacity - Medium-Weight CMU

P<sub>nv</sub>/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  
D<sub>sh</sub>: 0.19 in Shank Diameter of Tapcon  
F<sub>yb</sub>: 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<sub>n</sub>/Ω: 539 lbs

## Bearing Strength of Masonry Straps - AISI S100

Size: 1/4 Tapcon Size  
D<sub>sh</sub>: 0.19 in Shank Diameter of Tapcon Screw  
F<sub>u</sub>: 33 ksi Tensile Strength of Masonry Strap  
t: 20 GA  
t: 0.0359 in Thickness of Masonry Strap

Ω: 3.00

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

P<sub>nv</sub>/Ω: 203 lbs