

Micah Swartz, P.E.	Project Number:	MS24-09004
	Project Name:	LaCantina V2 Aluminum 2 Panel (ISW)
	Date:	12/4/2024

**Product Approval Supporting Calculations
Alternative Anchorage Analysis & Design
Revision 1 - Opening Size Revision**

Project Number: MS24-09004

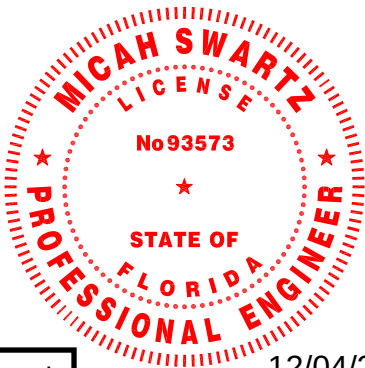
Drawing Number: D1000384

Reference Test Report: R1986.01-303-44 R1

Product Name: LaCantina V2 Aluminum 2 Panel (ISW) 90.16 x 144.33

Prepared for:

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



Prepared by:
Micah Swartz, P.E.

Micah Swartz

12/04/24

Micah Swartz, PE
Florida License No. PE 93573

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Scope:

Micah Swartz, P.E. is contracted by Jeld-Wen Windows & Doors to evaluate alternative anchorage for the product: LaCantina V2 Aluminum 2 Panel (ISW) 90.16 x 144.33. This evaluation is based on testing performed by Intertek Building & Construction in Lake Forest, CA, test report no.: R1986.01-303-44 R1 and dated 7/16/24, revised 11/1/24.

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.

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Design Summary:

The table below summarizes the product: LaCantina V2 Aluminum 2 Panel (ISW) 90.16 x 144.33 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 V2 Aluminum 2 Panel (ISW) 90.16 x 144.33	R1986.01-303-44 R1 (7/16/24, revised 11/1/24)	90.16" x 144.33"	+30 psf / -30 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: 8 Screw Embed: 1.5 in Edge Distance: 3/4 in (minimum)

Wood Screw Lateral: 106 lbs Screw Qty: 2 in Total Wood Screw Lateral: 211 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

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

Input:
 Calculation:

Screw Information:

Screw Size: 10
 Screw Embed: 1.5 in

Root Diameter: 0.152 in

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

Side Member Type: Steel G: N/A F_{es}: 36,000 psi thickness (t_s): 0.06 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} :	36,000	psi	Side Member dowel bearing strength
l _m :	1.5	in	Main Member dowel bearing length
l _s :	0.06	in	Side Member dowel bearing length
R _d :	2.2		Reduction term - Table 12.3.1B (NDS 2018)
R _e :	0.0931		= F _{em} /F _{es}
R _t :	25.0		= l _m /l _s
k ₁ :	0.939		See Table
k ₂ :	0.551		See Table

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

Z_{I_m}: 347 lbs

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

Z_{II}: 140 lbs

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

Z_{III_m}: 161 lbs

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

Z_{IV}: 142 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}: 140 lbs

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

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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 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 _Δ :	1.0	Geometry Factor - Section 12.5.1.1 (NDS 2018)

Z': 224 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

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

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

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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): 1.25 in

Lateral Design Factors - Table 12.3.1A (NDS 2018)

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 :	1.25	in	Side Member dowel bearing length
R _d :	2.2		Reduction term - Table 12.3.1B (NDS 2018)
R _e :	1		= F _{em} /F _{es}
R _t :	1.2		= l _m /l _s
k ₁ :	0.459		See Table
k ₂ :	1.111		See Table

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

Z_{I_m}: 299 lbs

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

Z_{II}: 114 lbs

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

Z_{III_m}: 111 lbs

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

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_{III_s} are not applicable to the calculation.

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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 _Δ :	1.0	Geometry Factor - Section 12.5.1.1 (NDS 2018)

Z': 132 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

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

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

Z_n/Ω: 106 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}/Ω: 140 lbs

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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
D _{sh} :	0.19	in Shank Diameter of Tapcon
F _{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: 539 lbs

Bearing Strength of Masonry Straps - AISI S100

Size:	1/4	Tapcon Size
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

Ω: 3.00

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

P_{nv}/Ω: 203 lbs