

**SWARTZ**  
CONSULTING ENGINEERS LLC

|                 |                                     |       |        |
|-----------------|-------------------------------------|-------|--------|
| Project Number: | SCE 26-08024                        |       |        |
| Project Name:   | -2500) Steel Wood Swinging Door Ins |       |        |
| Date:           | 8/20/2026                           | Page: | 1 of 8 |

## Product Approval Supporting Calculations Alternative Anchorage Analysis & Design

**Project Number:** SCE 26-08024

**Drawing Number:** D1000364

**Reference Test Report:** SJW2009-199

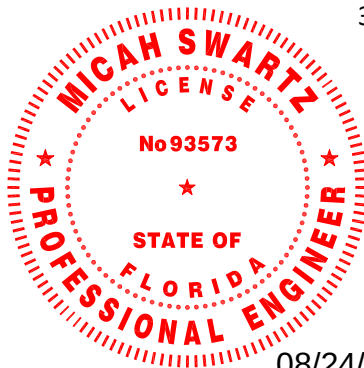
**Product Name:** Contours (S-2500) Steel Wood Swinging Door Inswing 2 Panel 74 x 81.75

**Impact:** WZ4 - Level D Missile

**Design Pressure:** +55 psf / -55 psf

**Prepared for:**

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



08/24/26

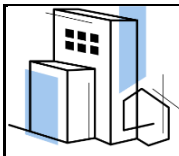
This item has been digitally signed and sealed by Micah Swartz, P.E. on the date adjacent to the seal.

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: Contours (S-2500) Steel Wood Swinging Door Inswing 2 Panel 74 x 81.75. This evaluation is based on testing observed by Quality Testing, Inc. in Klamath Falls, OR, test report no.: SJW2009-199 and dated 01/18/2010.

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:**

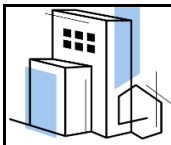
In accordance with Rule 61G20-3 Florida Administrative Code, Swartz Consulting Engineers LLC hereby certifies the following:

(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.

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(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: Contours (S-2500) Steel Wood Swinging Door Inswing 2 Panel 74 x 81.75 and their corresponding performance levels as established by testing.

**Table 1:** Summary of Test Results

| Series/Model                                                                      | Test Report Number       | Size<br>(W x H) | Performance          |
|-----------------------------------------------------------------------------------|--------------------------|-----------------|----------------------|
| Contours (S-2500)<br>Steel Wood<br>Swinging Door<br>Inswing 2 Panel 74 x<br>81.75 | SJW2009-199 (01/18/2010) | 74 x 81.75      | +55 psf / -55<br>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. (Thru Frame)

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

**Alternative Fasteners:**

**Screw Information:**

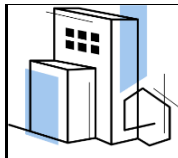
Screw Size: 10 Screw Embed: 1.5 in Edge Distance: 3/4 in (minimum)  
qty: 1 Spacing: 14 in O.C. (Thru Frame)

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:  Root Diameter:  in  
Screw Embed:  in

Main Member Type:  G:   $F_{em}$ :  psi thickness ( $t_m$ ):  in

Side Member Type:  G:   $F_{es}$ :  psi thickness ( $t_s$ ):  in

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

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

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

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

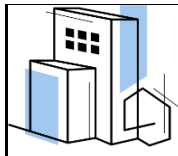
$Z_{II}$ :  lbs  $Z_{II} = \frac{k_1 D l_s F_{es}}{R_d}$  (EQ 12.3 - 3)

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

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

$Z_{MIN}$ :  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

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

|                |     |                                            |
|----------------|-----|--------------------------------------------|
| $C_D$ :        | 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) |
| $C_{\Delta}$ : | 1.0 | Geometry Factor - Section 12.5.1.1 (NDS)   |

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

### 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 |

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

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

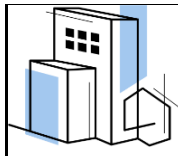
$$Z_n/\Omega: \boxed{149} \text{ lbs}$$

### 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                            |

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

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



**Subject:** Wood Screw Lateral Design - Single Shear

Input:   
Calculation:

**Screw Information:**

Screw Size:  Root Diameter:  in  
Screw Embed:  in

Main Member Type:  G:   $F_{em}$ :  psi thickness ( $t_m$ ):  in

Side Member Type:  G:   $F_{es}$ :  psi thickness ( $t_s$ ):  in

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

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

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

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

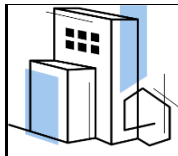
$Z_{II}$ :  lbs  $Z_{II} = \frac{k_1 D l_s F_{es}}{R_d}$  (EQ 12.3 - 3)

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

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

$Z_{MIN}$ :  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) |
| $C_{\Delta}$ : | 1.0 | Geometry Factor - Section 12.5.1.1 (NDS)   |

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

### 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 |

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

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

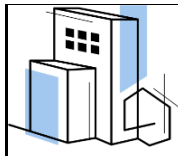
$$Z_n/\Omega: \boxed{149} \text{ lbs}$$

### 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                            |

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

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



Subject: Tapcon Lateral Design

Input:   
Calculation:

**Tapcon Size:**

Size:   
D:  in Nominal Diameter  
D<sub>sh</sub>:  in Shank Diameter

**Fastener Shear Capacity - 3,000 psi Concrete**

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

**Fastener Shear Capacity - Medium-Weight CMU**

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

**Bearing Strength of Masonry Straps - AISI S100**

Size:  Tapcon Size  
D<sub>sh</sub>:  in Shank Diameter of Tapcon Screw  
F<sub>u</sub>:  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<sub>nv</sub>/Ω:  lbs