

SWARTZ
CONSULTING ENGINEERS LLC

Project Number:	SCE 26-09023
Project Name:	um Atlantic Vinyl Horizontal Slider 2 Pa
Date:	10/5/2026
Page:	1 of 18

Product Approval Supporting Calculations Alternative Anchorage Analysis & Design

Project Number: SCE 26-09023

Drawing Number: D009346

Reference Test Report: NCTL 210-3895-1

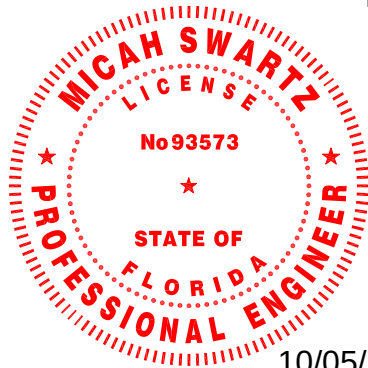
Product Name: Premium Atlantic Vinyl Horizontal Slider 2 Panel XO 74 x 62

Impact: Yes - HVHZ

Design Pressure: +50 psf / -50 psf

Prepared for:

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



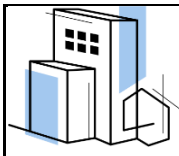
10/05/26

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

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: Premium Atlantic Vinyl Horizontal Slider 2 Panel XO 74 x 62. This evaluation is based on testing observed by National Certified Testing Laboratories in Klamath Falls, OR, test report no.: NCTL 210-3895-1 and dated 08/11/13.

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:

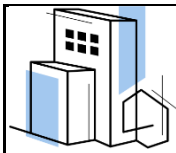
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(1) Swartz Consulting Engineers LLC does not have, nor does it intend to acquire or will it acquire, a financial interest in any company manufacturing or distributing products tested or labeled by the agency.

(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: Premium Atlantic Vinyl Horizontal Slider 2 Panel XO 74 x 62 and their corresponding performance levels as established by testing. The test report was signed and sealed by Gerard J. Ferrara, P.E. (FL License No.: 11985)

Table 1: Summary of Test Results

Series/Model	Test Report Number	Size (W x H)	Performance
Premium Atlantic Vinyl Horizontal Slider 2 Panel XO 74 x 62	NCTL 210-3895-1 (08/11/13)	74 x 62	+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: 13.25 in O.C. (Nail Fin)
qty: 1 Spacing: 17 in O.C. (Thru Frame)

Wood Screw Withdrawal: 152 lbs Per ft. Capacity: 138 plf
Wood Screw Lateral: 149 lbs Per ft. Capacity: 105 plf

Alternative Fasteners:

Screw Information:

Screw Size: 10 Screw Embed: 1.5 in Edge Distance: 3/4 in (minimum)
qty: 1 Spacing: 16.25 in O.C. (Nail Fin)
qty: 1 Spacing: 15.75 in O.C. (Thru Frame)

Wood Screw Withdrawal: 228 lbs Per ft. Capacity: 168 plf Unity: 0.62
Wood Screw Lateral: 149 lbs Per ft. Capacity: 113 plf Unity: 0.93



Project Number: SCE 26-09023
Project Name: im Atlantic Vinyl Horizontal Slider 2 Pa
Date: 10/5/2026 Page: 4 of 18

Design Summary Continued:

Nail Information:

Nail Size: 6d Nail Type: Common Edge Distance: 3/4 in (minimum)
qty: 1 Spacing: 6 in O.C. (Nail Fin)
qty: 2 Spacing: 15.75 in O.C. (Strap)

Nail Withdrawal: 55 lbs Per ft. Capacity: 111 plf Unity: 0.95
Nail Lateral: 113 lbs Per ft. Capacity: 173 plf Unity: 0.61

TEK Screw Information:

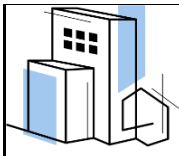
Screw Size: 10-16 qty: 1 Spacing: 15.75 in O.C. (Thru Frame)
qty: 1 Spacing: 16.25 in O.C. (Nail Fin)

TEK Withdrawal: 145 lbs Per ft. Capacity: 107 plf Unity: 0.98
TEK Lateral: 147 lbs Per ft. Capacity: 112 plf Unity: 0.94

Tapcon Information:

Tapcon Size: 1/4 Embedment: 1-1/4 in (minimum) Edge Distance: 2-1/2 in (minimum)
qty: 1 Spacing: 15.75 in O.C.

Tapcon Lateral (Concrete): 203 lbs Per ft. Capacity: 154 plf Unity: 0.68
Tapcon Lateral (CMU): 161 lbs Per ft. Capacity: 123 plf Unity: 0.86

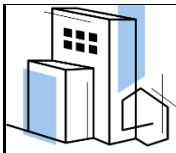


Summary of Test Results - Plastics Checklist

Table 2: Summary of Test Results - Plastics Checklist

Product	Test Report Number	Test Standard	Performance
White PVC 1476 5110	P6504.04-106-18 R0	ASTM D638 (before and after G155)	+9.5%
		ASTM D1929	824 °F (440 °C)
		ASTM D2843	71.8
		ASTM D635	Classification CC1
		ASTM 256	-3.3%
White PVC 1476 5290	P6504.04-106-18 R0	ASTM D638 (before and after G155)	+9.5%
		ASTM D1929	806 °F (430 °C)
		ASTM D2843	72.6
		ASTM D635	Classification CC1
		ASTM 256	-35.5%

The testing summarized in the table above was conducted by Intertek in York, PA dated 08/23/23 and meets the requirements listed in Miami-Dade County Checklist #0445, For the approval of: Plastic and Foam Plastic.



Subject: As Tested - Wood Screw Withdrawal

Input:
Calculation:

Screw Information:

Screw Size: Root Diameter: in
Screw Embed: in

Main Member Type: G: F_{em}: psi

$$W' = W * C_D * C_M^2 * C_t - \text{As per table 11.3.1 NDS}$$

C_D: Load Duration Factor - Table 2.3.2 (NDS)

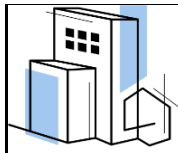
C_M: Wet Service Factor - Table 11.3.3 (NDS)

C_t: Temperature Factor - Table 11.3.4 (NDS)

W: lbs/in - Table 12.2B (NDS)

W: lbs

W': lbs



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

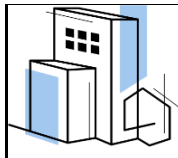
Z_{II} : lbs $Z_{II} = \frac{k_1 D l_s F_{es}}{R_d}$ (EQ 12.3 - 3)

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_{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

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

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

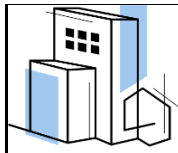
$$Z_n/\Omega: \boxed{149} \text{ lbs}$$

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 Withdrawal

Input:
Calculation:

Screw Information:

Screw Size: Root Diameter: in
Screw Embed: in

Main Member Type: G: F_{em}: psi

$$W' = W * C_D * C_M^2 * C_t - \text{As per table 11.3.1 NDS}$$

C_D: Load Duration Factor - Table 2.3.2 (NDS)

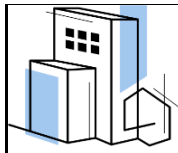
C_M: Wet Service Factor - Table 11.3.3 (NDS)

C_t: Temperature Factor - Table 11.3.4 (NDS)

W: lbs/in - Table 12.2B (NDS)

W: lbs

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

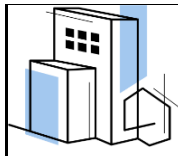
Z_{II} : lbs $Z_{II} = \frac{k_1 D l_s F_{es}}{R_d}$ (EQ 12.3 - 3)

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: 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

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

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

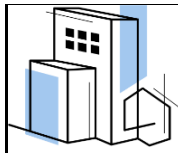
$$Z_n/\Omega: \boxed{149} \text{ lbs}$$

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: Nail Withdrawal

Input:
Calculation:

Nail Information:

Nail Size: Nail Length: in
Nail Type: Nail Diameter: in Nail Embedment: in

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

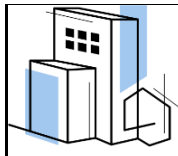
Side Member Type: G: F_{es} : psi thickness (t_s): in

$$W' = W * C_D * C_M^2 * C_t - \text{As per table 11.3.1 NDS}$$

C_D : Load Duration Factor - Table 2.3.2 (NDS)
 C_M : Wet Service Factor - Table 11.3.3 (NDS)
 C_t : Temperature Factor - Table 11.3.4 (NDS)

W : lbs/in $W = 1380G^{5/2}D$ - Carbon Steel Nails (EQ. 12.2 - 3, NDS)
 W : lbs

W' : lbs



Subject: Nail Lateral Design - Single Shear

Input:
Calculation:

Nail Information:

Nail Size: Nail Length: in
Nail Type: Nail Diameter: in Nail Embedment: 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:	0.113 in	Diameter
F_{yb} :	100 ksi	Dowel Bending Yield Strength
F_{em} :	3,350 psi	Main Member dowel bearing strength
F_{es} :	21,000 psi	Side Member dowel bearing strength
l_m :	1.6875 in	Main Member dowel bearing length
l_s :	0.0625 in	Side Member dowel bearing length
R_d :	2.2	Reduction term - Table 12.3.1B (NDS)
R_e :	0.1595	$= F_{em}/F_{es}$
R_t :	27.0	$= l_m/l_s$
k_1 :	1.713	See Table
k_2 :	0.561	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)

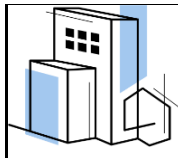
Z_{II} : lbs $Z_{II} = \frac{k_1 D l_s F_{es}}{R_d}$ (EQ 12.3 - 3)

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_{IIIs} are not applicable to the calculation.



Subject: Nail 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)

$$Z': 129 \text{ lbs}$$

Fastener Bending Across Shim Space

Ω :	1.67	
L:	0.25	in Maximum Shim Gap
D:	0.113	in Diameter
F_{yb} :	100	ksi Dowel Bending Yield Strength

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

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

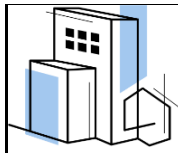
$$Z_n/\Omega: 113 \text{ lbs}$$

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:	0.113	in

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

$$P_{nv}/\Omega: 120 \text{ lbs}$$



Subject: TEK Withdrawal

Input:

Calculation:

Shear Strength of Fastener - ESR 1976

Screw Size: 10-16

P_{nv}/Ω : 885 lbs See ESR 2196

Tensile Pullout - ESR 1976

Screw Size: 10-16

F_u : 45 ksi

Tensile Strength of material NOT in contact with screw head

t: 16 GA

t: 0.0598 in

Thickness of material NOT in contact with screw head

P_{nv}/Ω : 145 lbs See ESR 2196

Tensile Pullover

Note: The tensile pullover analysis checks the material IN contact with the screw head. This material is part of the Jeld-Wen assembly and has been verified by testing. Below is a check to ensure the head size of the TEK screw is equal to or larger than the head of the tested fastener, ensuring compliance.

Tested Fastener Head Size:

Screw Size: 8

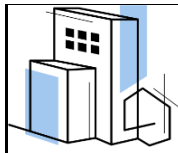
Tested fastener is a

Head Size: 0.312 in

TEK Screw Head Size:

Screw Size: 10-16

Head Size: 0.365 in



Subject: TEK Lateral Design

Input:
Calculation:

Shear Strength of Fastener - ESR 1976

Screw Size: 10-16

P_{nv}/Ω : 573 lbs See ESR 2196

Bearing Strength of Material NOT in Contact with Screw Head - AISI S100

Screw Size: 10-16

Ω : 3.00

D: 0.138 in Root Diameter of TEK Screw
 F_u : 45 ksi Tensile Strength of material NOT in contact with screw head
t: 18 GA
t: 0.0478 in Thickness of material NOT in contact with screw head

$$\frac{P_{nv1}}{\Omega} = 2.7 * t * D * F_u - (EQ. J4.3.1 - 3, AISI S100)$$

$$\frac{P_{nv2}}{\Omega} = 4.2 \sqrt{t^3 * D} * F_u - (EQ. J4.3.1 - 1, AISI S100)$$

P_{nv1}/Ω : 267 lbs

P_{nv2}/Ω : 245 lbs

P_{nv}/Ω : 245 lbs $\frac{P_{nv}}{\Omega} = \text{smallest of } \frac{P_{nv1}}{\Omega} \text{ and } \frac{P_{nv2}}{\Omega}$

Bearing Strength of Material IN in Contact with Screw Head

Note: Material IN contact with the screw head is part of the Jeld-Wen assembly and has been verified by testing.

Fastener Bending Across Shim Space

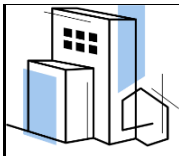
L: 0.25 in Maximum Shim Gap
D: 0.138 in Root Diameter of TEK Screw
 F_{yb} : 100 ksi Yield Strength of TEK Screw

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 : 206 lbs



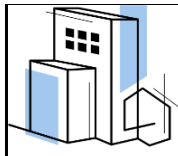
Bearing Strength of Masonry Straps - AISI S100

Screw Size: 10-16 TEK Screw
D: 0.138 in Root Diameter of TEK 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: 147 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