L. Roberto Lomas P.E.

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Manufacturer: Masonite
Report #: 514013
Date: 05/01/2017

Test Report: N/A
Product: Single door 3'x8' (Composite frame)

Scope:

This analysis provides calculations, quantities, and spacing requirements for installing product to substrate, and it applies only to the product described herein. These calculations comply with requirements of the Florida Building Code.

Anchor capacity in shear condition:

Solid members w/ & w/out gap:

a. With threads present in shear plane

Fastener type: **#10 wood screw** (NDS 2012, TR12)

Nominal diameter:	D:	0.190 in	Gap:	g:	0.0000 in
Root diameter:	Dr:	0.152 in	Moment arm:		0.0000 in
Minimum required penetration:	p:	1.140 in	Screw bending yield strength:	F_{yb} =	80,000 psi
Side member:	PVC		Main member:		Spruce-Pine-Fir (G=0.42)
Side member thickness:	t_s =	1.000 in	Main member thickness:	t_m =	1.500 in
Side member dowel bearing strength:	F_{es} =	10,000 psi	Main member dowel bearing strength:	F_{em} =	3,350 psi
Side member dowel bearing length:	l_s =	1.000 in	Main member dowel bearing length:	l_m =	1.140 in

Mode I_m		Mode I_s		Mode II		Mode III_m		Mode III_s		Mode IV	
qm =	636.5 lbs/in	qs =	1900 lbs/in	A:	0.0005	A:	0.00066	A:	0.00092	A:	0.001
P =	725.61 lbs	P =	1900 lbs	B:	1.07	B:	0.57	B:	0.5	B:	0.000
K_D =	2.400	K_D =	2.400	C:	-681.8	C:	-253.62	C:	-521.82	C:	-93.6
Z_m=	**302 lbs**	**Z_s=**	**792 lbs**	P =	510 lbs	Ms =	46.8 in-lbs	Mm =	46.8 in-lbs		
				K_D =	2.400	P =	324 lbs	P =	529 lbs	P =	299 lbs
Min. Design value:	Z=	125 lbs		**Z=**	**212 lbs**	K_D =	2.400	K_D =	2.400	K_D =	2.400
Duration Factor:	C_D =	1.6				**Z=**	**135 lbs**	**Z=**	**221 lbs**	**Z=**	**125 lbs**
Allowable Design Value (ZC_D):		**Z'=**	**199 lbs/anchor**								

Fastener type: **1/4" ITW Tapcon** N.O.A. 16-1222.06

Substrate:	Hollow block		Minimum embedment:		1.25 in
Edge distance:	4.00 in		Tabulated shear design value:	**Z =**	**202 lbs**
Edge distance:	2.00 in		Tabulated shear design value:	**Z =**	**161 lbs**
Actual edge distance:	2.50 in		Reduction factor:		0.85
Spacing:	4.00 in		Tabulated shear design value:	**Z =**	**202 lbs**
Spacing:	2.00 in		Tabulated shear design value:	**Z =**	**164 lbs**
Actual spacing:	3.00 in		Reduction factor:		0.91
Allowable Design Value (Zf_{AN}):	**Z''=**	**155 lbs/anchor**			

Fastener type: **#10 Self tapping screw** (Calculations per 2010 Aluminum Design Manual, section J.5.6)

Nominal screw diameter:	D:	0.190 in	Screw root area:	A_r	0.0151 in^2
Actual edge distance:	de:	1.085 in	Screw shear ultimate strength:	F_{su}	54.0 ksi
			Per table J3.2 of 2010 Steel Construction Manual 14th Edition		
Side member material:	**Vinyl PVC**		**Main member material:**	**6063-T5 aluminum**	
Thickness:	t_1	1.000 in	Thickness:	t_2	0.052 in
Ultimate tensile strength:	F_{tu1}	14 ksi	Ultimate tensile strength:	F_{tu2}	22 ksi

Nominal strength per bearing (side member):	$Rn = 2Dt_1F_{tu1}$	Rn1 = 5320 lbs	(Eq J.5-12)
Nominal strength per bearing (main member):	$Rn = 2Dt_2F_{tu2}$	Rn2 = 435 lbs	(Eq J.5-12)
Nominal strength per tilting:	$Rn = 4.2(t_2^3D)^{1/2}F_{tu2}$	Rn = 478 lbs	(Eq J.5-13)
Nominal screw shear strength:	$Rn = A_rF_{su}/1.25$	Rn = 654 lbs	(Eq J.5-14)
Safety factor:	Ω = 3		
Allowable shear and bearing capacity:	**P_{as}**	**145 lbs/anchor**	

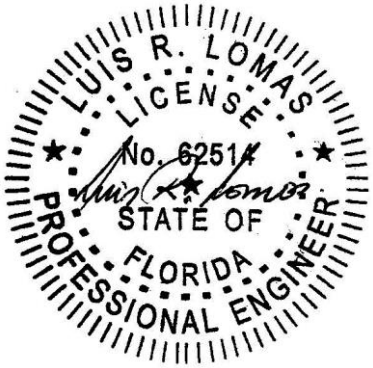
Fastener type: **#10 Self tapping screw** (Calculations per AISI-S100-07, sections A2.3.2 and E4.3.1)

Nominal screw diameter:	D:	0.190 in	Screw shear ultimate strength:	F_{su}	54.0 ksi
Screw root area:	A_r	0.0151 in^2	Per table J3.2 of 2010 Steel Construction Manual 14th Edition		
Side member material:	**Vinyl PVC**		**Main member material:**	**Metal fram**	
Thickness:	t_1	0.125 in	Thickness:	t_2	
Ultimate tensile strength:	F_{u1}	14 ksi	Ultimate tensile strength:	F_{u2}	

Nominal strength per tilting:	$Rn = 4.2(t_2^3D)^{1/2}F_{u2}$	Rn = 1001 lbs	(Eq E4.3.1-1)
Nominal strength per bearing (side member):	$Rn = 2.7Dt_1F_{u1}$	Rn1 = 898 lbs	(Eq E4.3.1-2 and -4)
Nominal strength per bearing (main member):	$Rn = 2.7Dt_2F_{u2}$	Rn2 = 1280 lbs	(Eq E4.3.1-3 and -5)
Nominal screw shear strength:	$Rn = A_rF_{su}/1.25$	Rn = 654 lbs	
Safety factor:	Ω = 3		
Allowable shear and bearing capacity:	**P_{as}**	**218 lbs/anchor**	

Minimum anchor capacity: **145 lbs/anchor**

Note: Anchors with the least capacity is used for calculations to qualify anchors with higher capacity.



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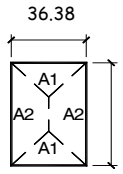
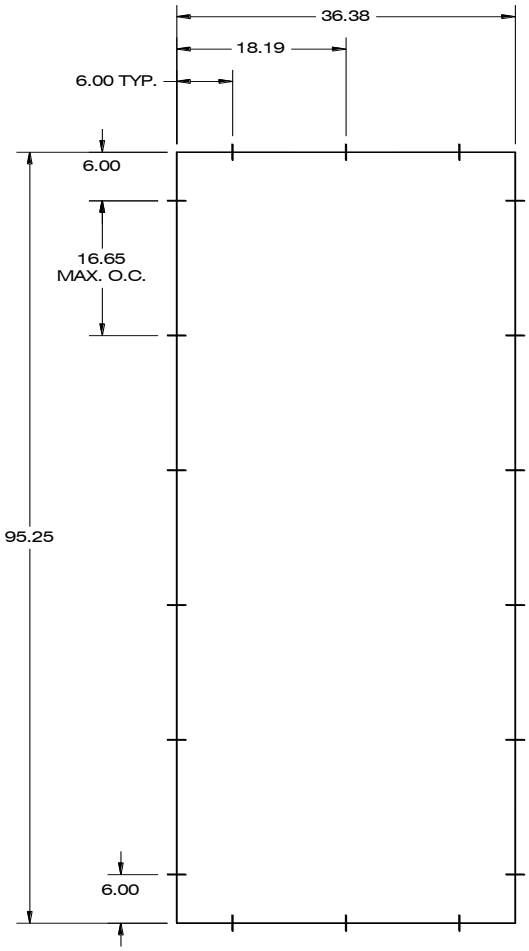
Anchor calculations, minimum required anchors



Design pressure: 70.0 psf

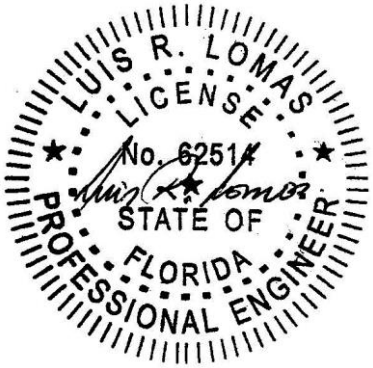
Zone	Area (ft^2)	Load (lbs)	Ind. (in)	Max. O.C. (in)	Anchor			Result
					Cap. (lbs)	Qty	Load (lbs)	
A_1	2.3	161	N/A	N/A	145	2	80	OK
A_2	9.7	681	6.00	18.00	145	6	114	OK

Anchor Locations:



Installation instructions:

1. FOR ANCHORING THROUGH FRAME INTO WOOD FRAMING OR 2X BUCK USE #10 WOOD SCREWS WITH SUFFICIENT LENGTH TO ACHIEVE A 1 1/4" MINIMUM EMBEDMENT INTO SUBSTRATE WITH 1/2" MINIMUM EDGE DISTANCE. LOCATE ANCHORS AS SHOWN BELOW.
2. FOR ANCHORING THROUGH FRAME INTO MASONRY/CONCRETE USE 3/16" TAPCONS WITH SUFFICIENT LENGTH TO ACHIEVE A 1 1/4" MINIMUM EMBEDMENT INTO SUBSTRATE WITH 2 1/2" MINIMUM EDGE DISTANCE. LOCATE ANCHORS AS SHOWN BELOW.
3. FOR ANCHORING THROUGH FRAME INTO METAL STRUCTURE USE #10 SMS OR SELF DRILLING SCREWS WITH SUFFICIENT LENGTH TO ACHIEVE 3 THREADS MINIMUM BEYOND STRUCTURE INTERIOR WALL WITH 1/2" MINIMUM EDGE DISTANCE. LOCATE ANCHORS AS SHOWN BELOW.
4. ALL FASTENERS TO BE CORROSION RESISTANT.
5. INSTALLATION ANCHORS SHALL BE INSTALLED IN ACCORDANCE WITH ANCHOR MANUFACTURER'S INSTALLATION INSTRUCTIONS AND ANCHORS SHALL NOT BE USED IN SUBSTRATES WITH STRENGTHS LESS THAN THE MINIMUM STRENGTH SPECIFIED BELOW:
   A. WOOD: MINIMUM SPECIFIC GRAVITY OF G=0.42
   B. CONCRETE: MINIMUM COMPRESSIVE STRENGTH OF 2,000 PSI.
   C. MASONRY: HOLLOW/FILLED BLOCK PER ASTM C90 WITH Fm=2,000PSI MINIMUM.
   D. METAL STRUCTURE: STEEL 18GA (.048") FY=33KSI/FU=52KSI OR ALUMINUM 6063-T5 FU=30KSI .052" THICK MINIMUM
6. ANCHOR LOCATIONS SHOWN IN THIS DOCUMENT ARE THE MINIMUM REQUIRED FOR THE DESCRIBED PRODUCT EXPOSED AT THE DESIGN PRESSURE INDICATED HEREIN.



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