

L. Roberto Lomas P.E.

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Manufacturer: Masonite
Report #: 514014A
Date: 10/10/2017

Test Report: N/A

Product: Single door 3'x6'8" (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, NDS 2015, 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
q _m = 636.5 lbs/in	q _s = 1900 lbs/in	A: 0.0005	A: 0.00066	A: 0.00092	A: 0.00105
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: -681.799	C: -253.623	C: -521.824	C: -93.6
Z _m = 302 lbs	Z _s = 792 lbs	P = 510 lbs	Ms = 46.8 in-lbs	Mm = 46.8 in-lbs	P = 299 lbs
		K _D = 2.400	P = 324 lbs	P = 529 lbs	K _D = 2.400
Min. Design value:	Z = 125 lbs	Z = 212 lbs	K _D = 2.400	K _D = 2.400	Z = 125 lbs
Duration Factor:	C _D = 1.6		Z = 135 lbs	Z = 221 lbs	
Allowable Design Value (Z_{C_D}):	Z' = 199 lbs/anchor				

Fastener type: **1/4 ITW Tapcon**

Tabulated values

N.O.A. 16-1222.06

Substrate: Hollow block

Minimum embedment: 1.25 in

Actual edge distance: 2.50 in

Actual C To C spacing: 3.00 in

Allowable Design Value: Z'' = 155 lbs/anchor (per interpolation when needed)

edge distance	spacing (in)	
	2.00	4.00
2.00	130	161
4.00	163	202

Fastener type: **#10 Self tapping screw**

(Calculations per 2015 Aluminum Design Manual, section J.5.5)

Nominal screw diameter: D: 0.190 in

Screw root area: A_r 0.0151 in²

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: t₁ 1.000 in

Thickness: t₂ 0.052 in

Ultimate tensile strength: F_{tut1} 14 ksi

Ultimate tensile strength: F_{tut2} 22 ksi

Nominal strength per bearing (side member): R_n = 2Dt₁F_{tut1}

R_{n1} = 5320 lbs (Eq J.5-12)

Nominal strength per bearing (main member): R_n = 2Dt₂F_{tut2}

R_{n2} = 435 lbs (Eq J.5-12)

Nominal strength per tilting: R_n = 4.2(t₂³D)^{1/2}F_{tut2}

R_n = 478 lbs (Eq J.5-13)

Nominal screw shear strength: R_n = A_rF_{su}/1.25

R_n = 654 lbs (Eq J.5-14)

Safety factor: Ω = 3

Allowable shear and bearing capacity: P_{es} 145 lbs/anchor

Fastener type: **#10 Self tapping screw**

(Calculations per AISI-S100-12, 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 in²

Per table J3.2 of 2010 Steel Construction Manual 14th Edition

Side member material: Vinyl PVC

Main member material: Metal framing

Thickness: t₁ 1.000 in

Thickness: t₂ 0.048 in

Ultimate tensile strength: F_{tut1} 14 ksi

Ultimate tensile strength: F_{tut2} 22 ksi

Nominal strength per tilting: R_n = 4.2(t₂³D)^{1/2}F_{tut2}

R_n = 1001 lbs (Eq E4.3.1-1)

Nominal strength per bearing (side member): R_n = 2.7Dt₁F_{tut1}

R_{n1} = 7182 lbs (Eq E4.3.1-2 and -4)

Nominal strength per bearing (main member): R_n = 2.7Dt₂F_{tut2}

R_{n2} = 1280 lbs (Eq E4.3.1-3 and -5)

Nominal screw shear strength: R_n = A_rF_{su}/1.25

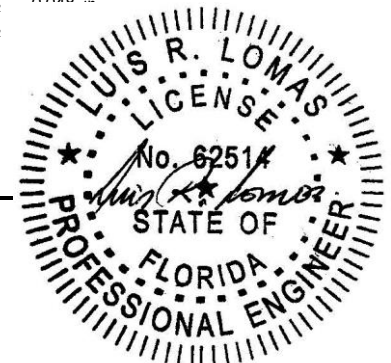
R_n = 654 lbs

Safety factor: Ω = 3

Allowable shear and bearing capacity: P_{es} 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.



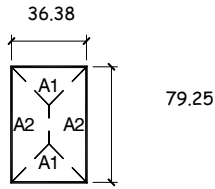
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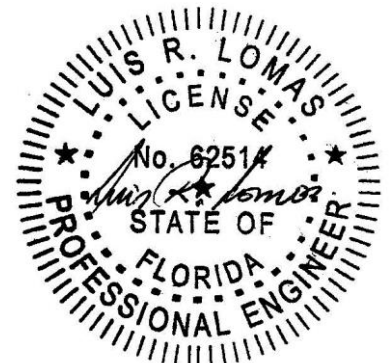
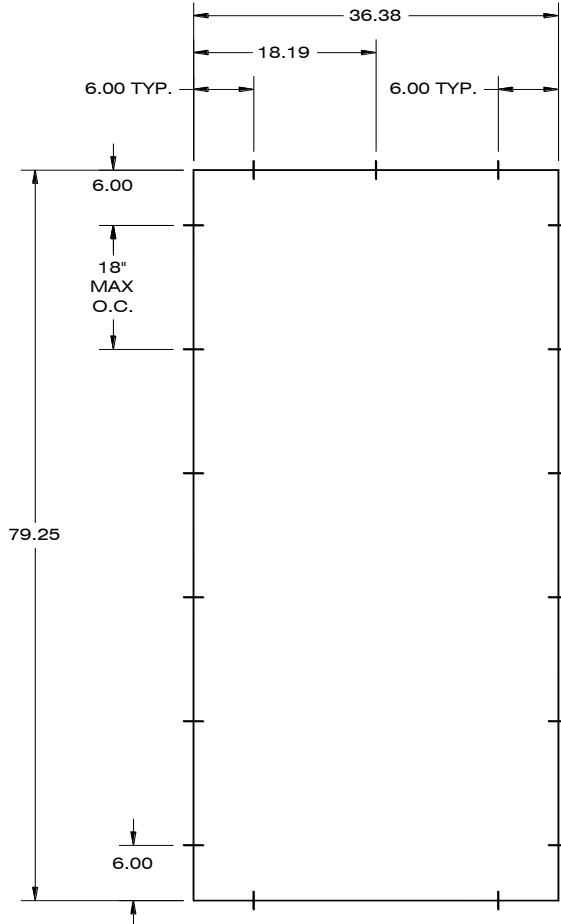
Anchor calculations, minimum required anchors



Design pressure: 85.0 psf

Zone	Area (ft ²)	Load (lbs)	Ind. (in)	Max. O.C. (in)	Anchor			Result
					Cap. (lbs)	Qty	Load (lbs)	
A ₁	2.3	195	N/A	N/A	145	2	98	OK
A ₂	7.7	656	6.00	18.00	145	5	131	OK

Anchor Locations:



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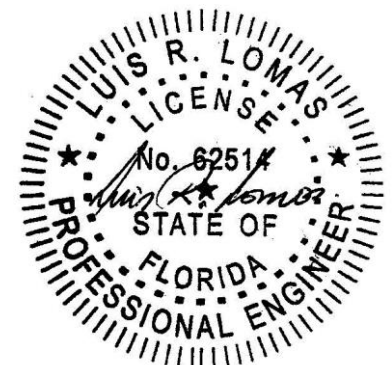
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Installation instructions:

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 1/4" 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.
7. WOOD FRAMING AND MASONRY OPENING TO BE DESIGNED AND ANCHORED TO PROPERLY TRANSFER ALL LOADS TO STRUCTURE. FRAMING AND MASONRY OPENING IS THE RESPONSIBILITY OF THE ARCHITECT OR ENGINEER OF RECORD.
8. 1X BUCK OVER MASONRY/CONCRETE IS OPTIONAL.
9. WHERE SHIM OR BUCK THICKNESS IS LESS THAN 1-1/2" UNITS MUST BE ANCHORED THROUGH FRAME IN ACCORDANCE WITH MANUFACTURER'S PUBLISHED INSTALLATION INSTRUCTIONS. ANCHORS SHALL BE SECURELY FASTENED DIRECTLY INTO MASONRY, CONCRETE OR OTHER STRUCTURAL SUBSTRATE MATERIAL.
10. WHERE WOOD BUCK THICKNESS IS 1-1/2" OR GREATER, BUCK SHALL BE SECURELY FASTENED TO MASONRY, CONCRETE OR OTHER STRUCTURAL SUBSTRATE. UNITS MAY BE ANCHORED THROUGH FRAME TO SECURED WOOD BUCK IN ACCORDANCE WITH MANUFACTURER'S PUBLISHED INSTALLATION INSTRUCTIONS.
11. WHERE 1X BUCK IS NOT USED DISSIMILAR MATERIALS MUST BE SEPARATED WITH APPROVED COATING OR MEMBRANE. SELECTION OF COATING OR MEMBRANE IS THE RESPONSIBILITY OF THE ARCHITECT OR ENGINEER OF RECORD.
12. BUCKS SHALL EXTEND BEYOND WINDOW INTERIOR FACE SO THAT FULL FRAME SUPPORT IS PROVIDED.



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