JAMES F HEIDT PE LLC
CIVIL & STRUCTURAL ENGINEERING

STRUCTURAL CALCULATIONS

For

Wind Load Analysis (120 mph)

43' x 14' CSA-4.5 Fold-Tite Stacker System Door

for

FoldTite Systems, Inc.
P.O. Box 2283 Malta, New York, 12020

by

James F. Heidt, PE, LLC
Civil & Structural Engineering
2543 Laundale Drive, Beloit, Wisconsin 53511
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COLUMBIA COUNTY BUILDING DEPARTMENT
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Code Compliance
PLANS EXAMINER

STEPHEN P. MASLAN
LICENSE
No. 0038400
STATE OF FLORIDA
PROFESSIONAL ENGINEER

JAN 2 9 2014

Date 11/06/13 for 120 mph
Rev 11/19/13 for 110 mph
Rev 01-1014 for 2010 FBC
Rev 01/28/14 title block & hanger

Seal: James F. Heidt, PE
WI Reg. No. 15489
Exp. 7/31/2014

Job No. 13-133 Pages: 11

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Project: 43'x14' Fold-Tite Systems
Location 252 SW Voyager CT Lake City FL
Owner: Mr Joel Doroshenko

Fold-Tite Door 43'- 0" x 14' w/ 12 panels

Job No 13-133
Date 11/04/13
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Develop Design Parameters: This proceedure follows the American Society of Civil Engineers (ASCE) *Minimum Design Loads for Buildings and Other Structures- ASCE 7* Method 2 Analytical Proceedure for the development of design wind loads which is adopted by most building codes in the United States This analysis is based on the Component & Cladding provisions of the code

Door Width = 43 00 ft Door Height = 14 00 ft

Wind Load Calculations.	**Sym**	**Units**	**Wind Coefficients**			
Basic Wind Speed	V	mph	120	120	Wind speed is from 2010 FBC, Figure A	Input design wind speed
Wind Directionality	Kd	n/d	0 85	0 85		ASCE 6 5 4
Importance Factor	I	n/d	1 00	1 00		ASCE 6 5 5
Exposure Category	C D E	n/d	C	C		ASCE 6 5 6 3
Exposure Factor	Kh	n/d	0 85	0 85	Based on height of 0-15'	ASCE 6 5 6, Table 6-3
Topographic Factor	Kzt	n/d	1 00	1 00		ASCE 6 5 7
Gust Factor	Gf	n/d	0 85	0 85		ASCE 6 5 8
Enclosure Classification			Part Enc	Part Enc		ASCE 6 5 9
Computed Velocity Pressure	qz	psf	22 64	22 64		ASCE 6 5 10
Internal Pressure Coeff	GCpi	n/d	-0 55	0 55		ASCE 6 5 11 1
External Pressure Coeff	+GCp	n/d	1 00			ASCE 6 5 11 2 Ca
	-GCp	n/d		-1 15		ASCE 6 5 11 2
			Wind Pressure	**Wind Suction**		
Computed Design Wind Load						ASCE 6 5 12 4
wind pressure	**p+**	**psf**	**35.09**			ASCE Eq 6-22
wind suction	**p-**	**psf**		**-38.49**		ASCE Eq 6-22
DOOR PANEL DESIGN:			**MBCI**			Insert Panel Data
Door Panel Parameters based on			**Stormproof (3/4")**			
			P+	**P-**		
Thickness	t	in	0 015	0 015		From Panel Manf
Strength	Fy	ksi	60 00	60 00		From Panel Manf
Moment of Inertia	Ix	in^4	0 0102	0 0070		From Panel Manf
Section Modulus	Sx	in^3	0 0157	0 0221		From Panel Manf
	Ma	kip-in	0 5651	0 4994		From Panel Manf
Modulus of Elasticity	E	ksi	29,000	29 000		From Panel Manf
Weight	w	psf	0 630	0 630		From Panel Manf
Door height	h	in	168 00	168 00		
Number of panel spans	n	ea	4	4		The # of panel spans
Panel clear span length	L	in	42 00	42 00		Computed panel span
Allowable panel deflection L/180	Δ	in	0 23	0 23		Panel Industry Standard

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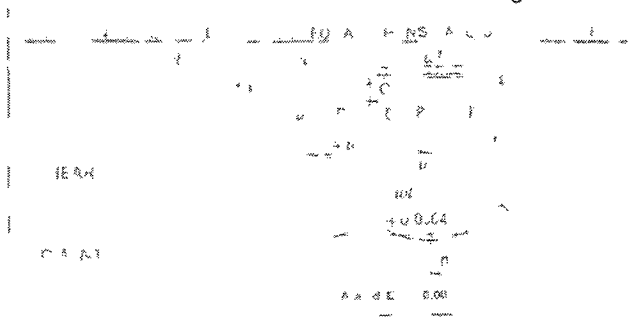
	Compute Panel Reactions based on	V	mph	120 Wind Pressure	120 Wind Suction	From line 14 above
				35.09		
					-38.49	From line 27 above
						From line 28 above
	Door Panel Calculations			Three Panel Door		AISC Diagram #39
	wall panels spanning min 3 supports	Ra	lbs/ft	48 27	-52 94	Top
60		Rb	lbs/lf	140 38	-153 97	Middle
		Rc	lbs/lf	113 97	-125 00	Middle
		Rd	lbs/lf	140 38	-153 97	Middle
		Re	lbs/lf	48 27	-52 94	Bottom
	Compute Panel Shears					
		V1	lbs/lf	48 27	-52 94	AISC Diagram #39
		V2	lbs/lf	65 83	-72 20	
		V3	lbs/lf	74 55	-81 76	
		V4	lbs/lf	56 99	-62 50	
		V5	lbs/lf	56 99	-62 50	
70		V6	lbs/lf	74 55	-81 76	
		V7	lbs/lf	65 83	-72 20	
		V8	lbs/lf	48 27	-52 94	
	Maximum Shear	**V**	**lbs/ft**	**74.55**	**-81.76**	
	Maximum Shear Stress	fv	psi	414 17	-454 25	
	Compute Panel Moment					
	Positive Moment	Mmax	kip-in	0 51	-0 56	
	Negative Moment	Mmax	kip-in	-0 28	0 30	AISC Diagram #39
	Maximum Moment	**Mmax**	**kip-in**	**0.51**	**-0.56**	
80	Section Modulus Required S=M/Fy	Sreq	in^3	0 0130	0 0142	
	Is Bending Criteria Met?			YES	YES	
	Compute Panel Deflection	Δmax	in	0 0177	-0 0283	-Δ = Deflection outward
	Is Deflection Criteria Met?			YES	YES	+Δ = Deflection inward



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Location 252 SW Voyager CT Lake City, FL | Date 11/04/13

Owner Mr Joel Doroshenko | By JFH

Fold-Tite Door 43'- 0" x 14' w/ 12 panels

				Wind Pressure	Wind Suction		
	DOOR FRAMING DESIGN:						
100	**Horizontal Girt Members**			35.09	-38.49		From line 27 above / From line 28 above
	Panel Width = Member Clear Span	L	in	47 950	47 950	Maximum panel width some narrower	Input girt length (in)
	Member Type			Steel Girt #235	Steel Girt #235		
	Member Properties	t	in	0 0350	0 0350		Insert girt properties
		A	in^2	0 3420	0 3420		
		Ix-x	in^4	0 1468	0 1468		
	wind in this direction >>	Iy-y	in^4	0 5410	0 5410		
110		Sx-x	in^3	0 1957	0 1957		
	wind in this direction >>	Sy-y	in^4	0 3092	0 3092		
		Fy	psi	30 000	30,000		
		E	ksi	29,000	29 000		
	Allowable deflection L/180	Δ	in	0 27	0 27		
	Allowable deflection L/240	Δ	in	0 20	0 20		
	Allowable deflection L/360	Δ	in	0 13	0 13		
	Wind Load on Frame Member	w	lbs/lf	140 4	-154 0		
	Member End Reactions	R	lbs	280 5	-307 6		Maximum girt reaction
120	Moment M=wl^2/8	M	ft-lbs	280 2	-307 3		Maximum girt moment
	Section Modulus Req S=M/Fy	S	in^3	0 1698	0 1862		Required section modulus
	Is Bending Criteria Met?			YES	YES		
	Deflection Δ=(5wl^4)/(384EI)	Δ	in	0 051	-0 056		-Δ = Deflection outward
	Is Deflection Criteria OK?	L/240		YES	YES		+Δ = Deflection inward

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				Wind Pressure	Wind Suction	
Vertical edge members				35.09	-38.49	From line 27 above / From line 28 above
Door Height = Span	L	in		168 000	168 000	
Member Type				Alum. Side Rail #391	Alum. Side Rail #391	
Member Properties	A	n^2		0 7477	0 7477	Copy vertical properties
	Ix-x	in^4		0 3982	0 3982	
wind in this direction >>	Iy-y	n^4		2 2880	2 2880	
	Sx-x	n^3		0 2366	0 2366	
wind in this direction >>	Sy-y	n^4		0 8932	0 8932	
	Fy	ps		30 000	30 000	
	E	ksi		10 000	10 000	
Allowable deflection L/120	Δ	in		1 40	1 40	
Allowable deflection L 180	Δ	in		0 93	0 93	
Loads on Frame Member	P	lbs		280 5	-307 6	From line D118 above
Member End Reactions	R	lbs		420 7	-461 4	Computed
Moment M=PL	M	ft-lbs		981 6	-1 076 6	AISC Diagram #9
Section Modulus Req	S	in^3		0 5949	0 6525	
Is Bending Criteria Met?				YES	YES	
Deflection Δ=(Pa/24EI)*(3l^2-4a^2)	Δ	n		1 665	-1 826	A SC Diagram #9
Is Deflection Criteria OK?				NO	NO	-Δ = Deflection outward / +Δ = Deflection inward

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Loading on Hanger

Door Width =	43 00	ft	No of Pins =	12	ea	
Door Height =	14 00	ft	Door Weight =	1 99	psf	Framing & skin
Hanger Spacing =	6 67	ft	Wind Loading =	38 49	psf	From calculation at line 29
Lock Pin Spacing =	6 67	ft	Dead Load / Hanger =	186 1	lbs	Note Hangers & lock pins are
Drop Pin Spacing =	6 67	ft	Wind Load @ Verts =	965 4	lbs	alternately spaced

Check hanger bolts and Lock Pins loading & size — Loads on each trolley hanger for 120 mph wind — From input at line 14

Load capacity of threaded hanger rods are indicated in the the table below based on an allowable bolt stress of 9 000 ps

Bolt Length (in)	Bolt Dia (in)	Bolt Area (in^2)	Max Load lbs
7 00	1/2	0 13	1100

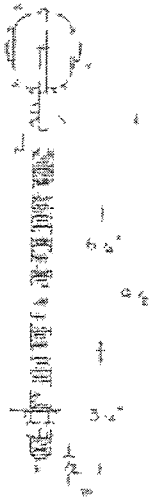
Compute Bolt Stresses for loads shown

		Allowable Bolt Stresses (ps)		
		Grade 2	Grade 5	Grade 8
Axial Tension Stress = fa = Pt/a =	1 432 psi	9 000	20 250	32,500
Shear Stress = fv = Ph/a =	7 426 psi	9,000	20 250	32 500
Check combined stresses = fa/Fa + fv/Fa < 1 0 =		0 984	0 437	0 273
		OK	OK	OK

Bolt Bending Moment =M= Pl/4 = 1 689 in-lbs

Bolt Section Modulus = S = (Πd^3)/32 = 0 0123 in^3

Bolt Bending Stress = fb = M/S = 137 664 psi



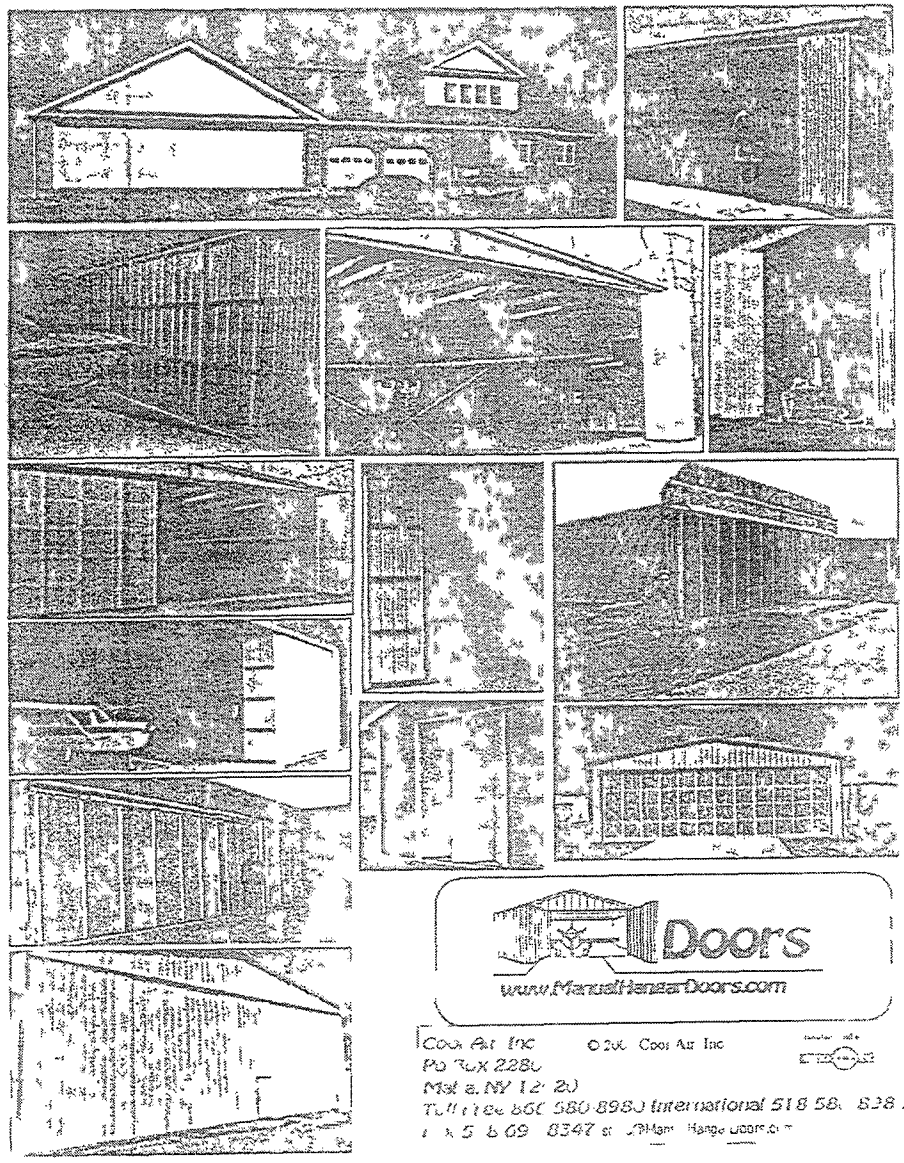
965 lbs Wind Load/bolt

Check Drop Pin Bolts

Bolt Dia	Bolt Area	No of Bolts	Fv Allow
1/2	0 13	6	9 000 psi

Shear Stress = fv = Ph/a = 2 475 psi — OK

186 lbs Dead Load / bolt

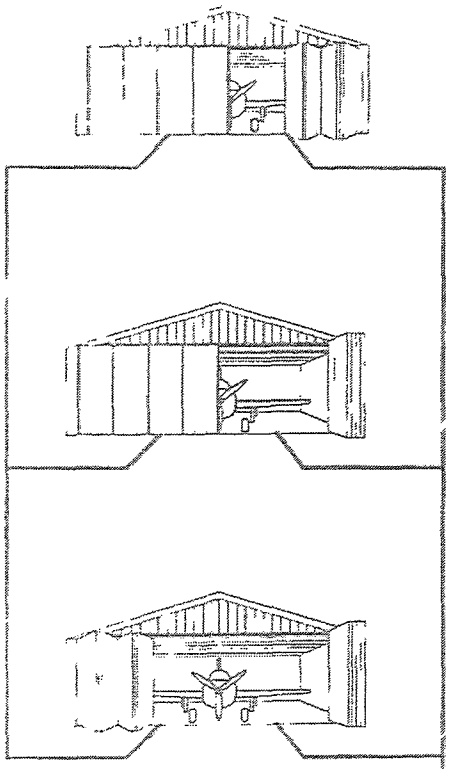


Doors
www.ManualHangarDoors.com

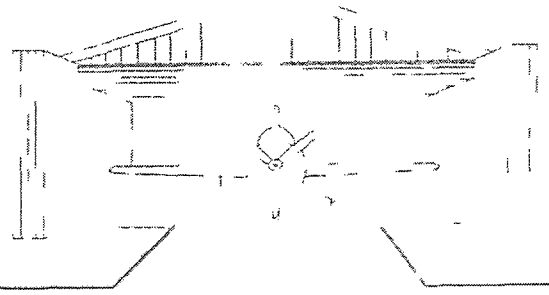
Cool Air Inc
PO Box 2280
Mal e, NY 12 20
Toll Free 800 580-8980 International 518 58 838
Fax 5 6 09 8347 sl @Manl Hangardoors.com

Doors
www.ManualHangarDoors.com

CSA-2.5 FT Fold-Tite Stacker Folding Door System From Cool-Air



Folds Tightly in
Two Panel Sets
Fully Outside Building.
Multiple Locks
Top and Bottom.
Strong Easy Operation
And Wind Resistant Door

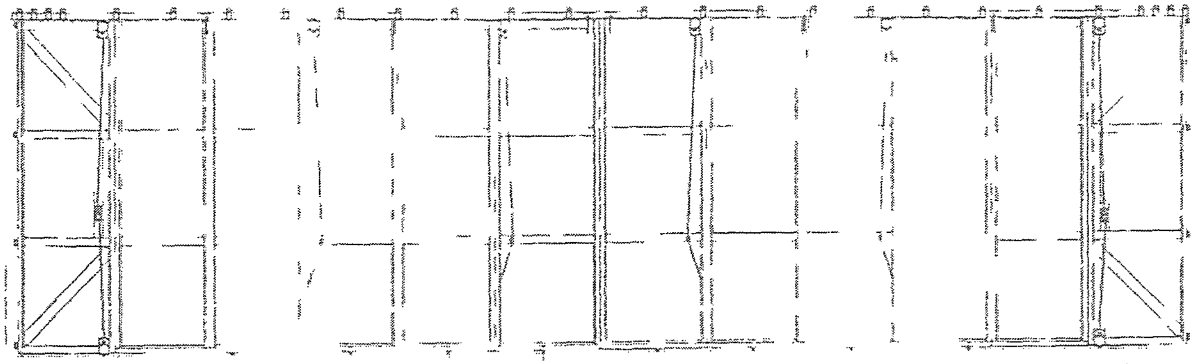


Cool-Air, Inc CSA 2.5 FT Fold-Tite Stacker Door System

Doors

www.MaxairDoors.com

I is ... e door is designe... to provide easy straigh... forward operation and strong ... wind resist... nt stability – open, closed and when moving ... hinging the truss like starter ... nel ... housing colum... the Fold Tite Do... ... and Absolutely al... e building ... ening he...ght ... sable. The ... ld-Tite stack ... var... es by the ope... ng width and only ... ches is needed to s...ore this 40' x 12 ... on each side. The door can be ... the opening and stack past the opening ... ugh building wall ... s available. The ... op mounted guide track requires Six inche... e the ... pening offering the prospect of a ... w profile building desig... No need to ha... e ... three more feet of building he... as ... ecessary ... or the vertical bi-fold doo... ... our cost in building design as ... g an economical door.



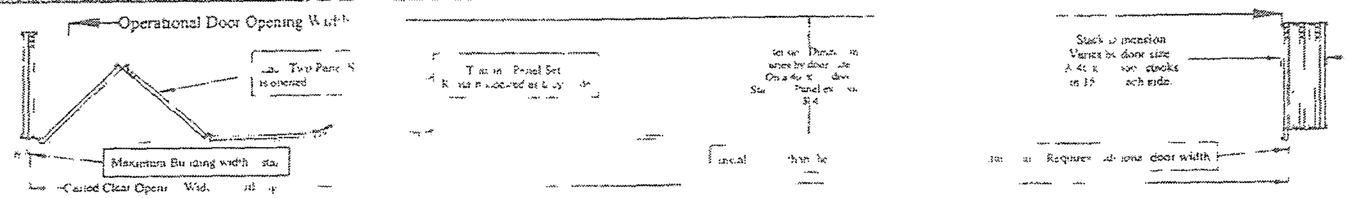
The Fold Tite Door Panel width is standard 40" which will accommodate either steel or poly ... sheeting without cutting to width. The extruded ... trim on each side of the panel provides a finished trim and the addition width ... standard 36" corrugated ... poly pane... ... height is desirable. Center panels are 44" wide and one or two panel ... width may be ... to fit the door to the ... ilding opening.

The Outboard Brace panel ... top lock pin ... Standard keyed lock ... door. The door is operated in two panel sets, one panel is an active panel with ... an inactive panel. The panel sets are generally opened half ... though the stack may be ... the center of the opening or the door can be operated from mode ...

The Door ... be fac... of a ... type ... existing building is easy and ... construction doe... not required additional ... eight to get the opening ... The door load is supported by the over... h the starter panel hinged to the building ... stability. Wind load is ... through trolleys ... the header mounted ... ack. Concealed stay ... secure the bottom of the door ... the aluminum bottom ... into a recessed guide channel ... cut into the concrete ... bottom sea... pack and ... are usually self-sealing. Center A... upported.

Typical 40 x 12 Door ... Narrow ... Stack ... Secure Easy Operation

CSA-2.5 Complex Structural Alum... extruded from 6063 ...



Bottom Guide S...

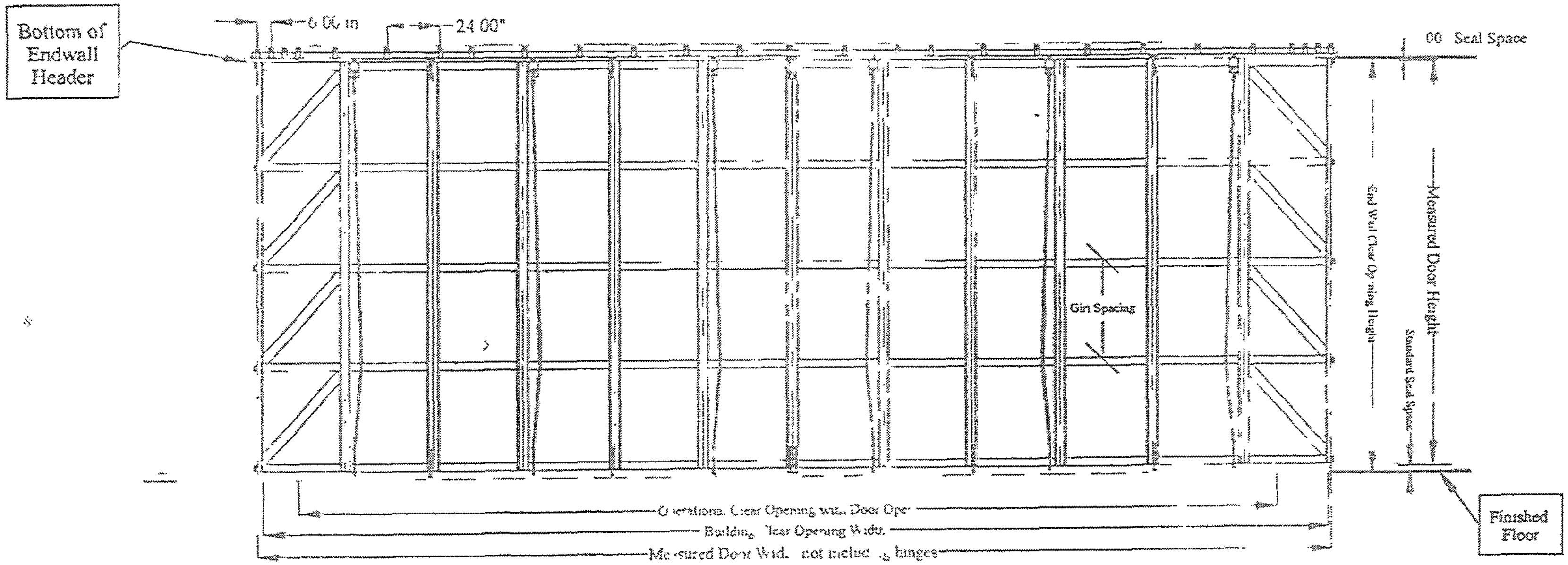
The Standard ...

CSA	
Panel	Width
3	40
48	4
40	5n
24	
44	6
4	9
	8

8/11

FoldTite Systems

Not To Scale



Feet	Inches	Specifications for Print Dimensions		
43	0	Bu lding Clear Opening Width	Door Series	CSA-4 5
14	0	End Wal Clear Opening Height	Total Panels	12
3	4 25	Outboard Hinged Panel	Panel Qty	2
3	4 25	Standard Slid ng Panel Width	Panel Qty	4
3	8 25	Center Panels	Panel Qty	2
3	11 95	Excess panel	Panel Qty	4
4	10 5	Fold T e Stack Dimension		
43	6 3	Measu ed Door Wid h w th 2 75" Lap and 1/2 between center are s		
44	4 05	Overall W dth requ red for door operat on		
39	5 55	One at ona Clea Opening with Door Open (overa width m nus s ack)		
	1 5	Seal Space Under Door		
	6	Space re ed for Door Installation on Front face of Heade		
13	9 5	Measured Door Height		
13	7	S ce in g r Covering Supplied By Others Co f nal of		
13	7	ctual t f vertica as shipped		
3	4 5	h pa (Top to Top o Grt	Gir Qty	4

Rollers for recesse d a concrete required

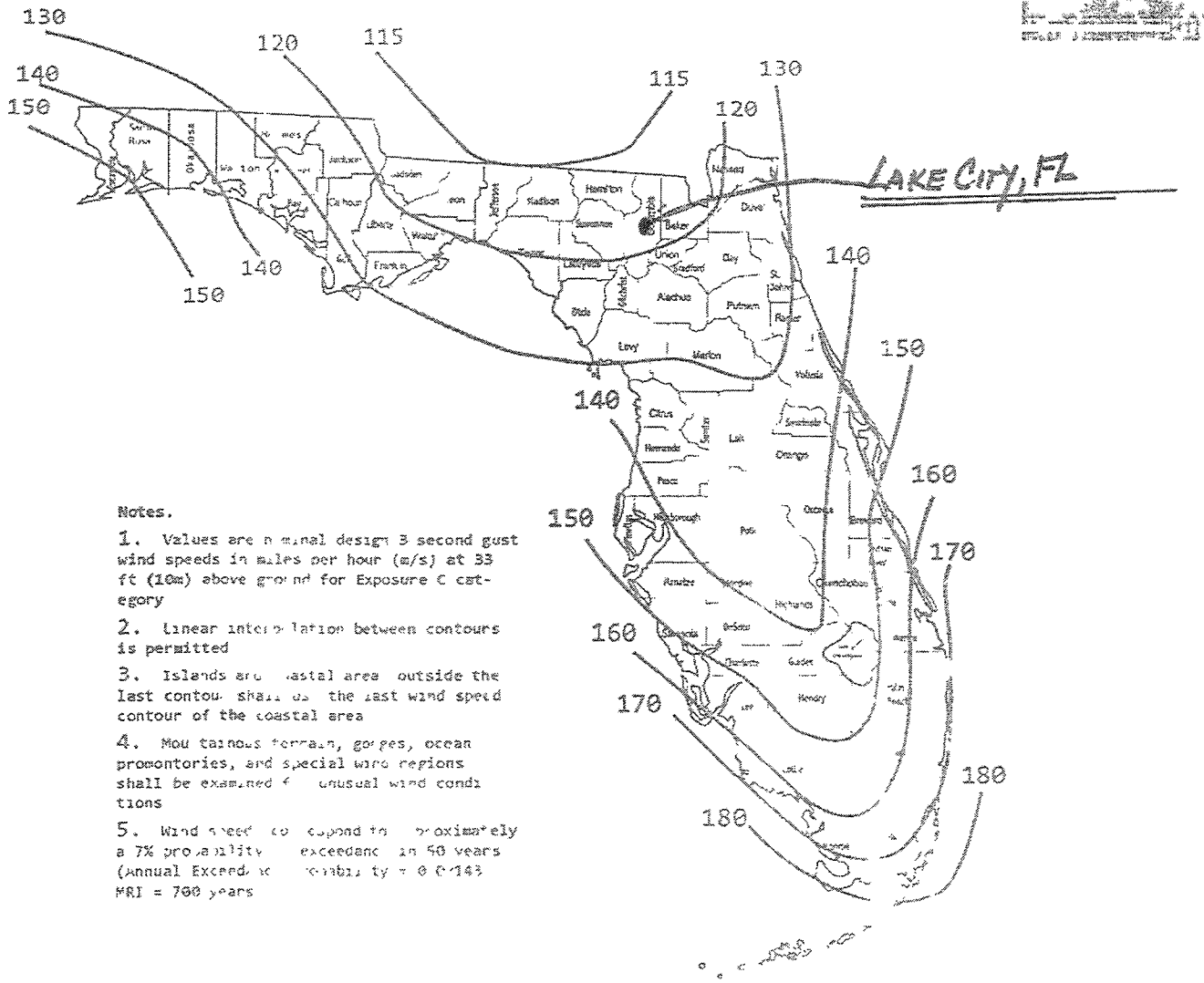
Approved as Is

Date______

Approved with Changes Noted

Date______

Fold Tite Systems Inc	Fold-Tite Locker System
Actual System 12 Pane Gr 10 4 3 Plus Bottom Ra	
Door S CSA-4	



FINAL FIGURE A

Notes.

1. Values are nominal design 3 second gust wind speeds in miles per hour (m/s) at 33 ft (10m) above ground for Exposure C category

2. Linear interpolation between contours is permitted

3. Islands and coastal areas outside the last contour shall use the last wind speed contour of the coastal area

4. Mountainous terrain, gorges, ocean promontories, and special wind regions shall be examined for unusual wind conditions

5. Wind speeds correspond to approximately a 7% probability of exceedance in 50 years (Annual Exceedance Probability = 0.0143, MRI = 700 years

1/1

ASCE 7 – 05 VS. ASCE 7 – 10 Design Wind Loads

The new maps, when used in combination with the 1.0 load factor on wind for strength design and the 0.6 factor on wind for allowable stress design, result in a net decrease in design wind loads in Hurricane-Prone Regions. Parts of southern Florida (due to the re-introduction of Exposure D for coastal areas) are approximately the same when compared to previous editions of the maps. In the remainder of the Hurricane-Prone Regions of Florida, the design wind pressures are on average approximately *20% less* than the loads determined from ASCE 7-05.