Glazing and Fastener Analysis

Glass Glazed Skylight

Report K6544.01-122-34

Rendered to:

SOLATUBE INTERNATIONAL, INC.
2210 Oak Ridge Way
Vista, California 92081

Prepared by:
Daniel C. Culbert, P.E.
Abhishek Jain

Architectural Testing, Inc.
130 Derry Court
York, Pennsylvania 17406
(717) 764-7700

March 6, 2020

DANIEL C. CULBERT LICENSE No. 83035 STATE OF FLORIDA PROFESSIONAL ENGINEER

Digitally Signed by: Daniel Craig Culbert

Daniel C. Culbert, P.E.
Engineer Team Leader
2020.03.06 15:03:09 -05'00'

Digitally Signed by: Abhishek Jain

Abhishek Jain

Scope

Architectural Testing, Inc., an Intertek company, was contracted by Solatube International, Inc. to perform glazing and fastener analyses for the exterior glass glazed skylight units. The analysis has been done for the design pressure at which the skylight had been tested per Intertek-ATI report K6415.01-303-44 dated 02/14/20. Solatube's glass glazed skylight are evaluated as shown in the project shop drawings (attached).

The analyses performed satisfy the methods and requirements of the following:

Aluminum Design Manual 2015, The Aluminum Association, Inc., 2015.

ESR-1976, *ITW Buildex TEKS Self-Drilling Fasteners*. ICC Evaluation Service, LLC. July, 2018.

Tapcon Anchor Technical Manual. ITW Buildex.

AISI S100-2016, North American Specification for the Design of Cold-Formed Steel Structural Members, American Iron and Steel Institute, 2016.

The calculations presented herein are for the integrity of the skylight installations based on wind load only. The weather tightness of the installation is not addressed by this report. The air/water/structural performance of the individual products is not proven by this report.

The building substrate is assumed to have the integrity to resist the anchor loads developed by the products. Furthermore, the results of the analyses present a solution that satisfies the scope of the project, but other feasible solutions may exist.

Analyses

Design Pressure Analysis

The glass glazed skylight were tested in accordance with AAMA/WDMA/CSA 101/I.S.2/A440 testing as documented in Intertek-ATI test report K6415.01-303-44 dated 02/14/20. The two test samples (fixed and operable) of 51-3/4" x 51-3/4" sizes were tested. The operable skylight has been tested for a maximum design pressure of **+/-35.09 psf** and the fixed skylight has been tested for a maximum design pressure of **+/-75.19 psf**.

Both specimen were installed into a Spruce-Pine-Fir (SPF)wood buck. The test bucks had a rough opening that allowed for a 1/4" shim space.

The glazing analysis has been performed using E1300 glazing methods to qualify the glazing for the skylights of different sizes against the acting maximum design pressure. Also, the anchorage analysis has been done for various substrates specified by client to resist the maximum design pressure.

Glazing Analysis

The glazing analysis is conducted using ASTM E1300 *Standard Practice for Determining Load Resistance of Glass in Buildings*. A summary of the glazing types is presented in the table below.

Table 1 Glazing Type Summary

Glazing Type	Overall Layup	Outboard Lite	Air Space	Inboard Lite
G1	1" Insulating Glass	4 mm (0.157") Tempered	14 mm (0.550")	3 mm (0.120") Annealed 0.76 mm (0.030") PVB 3 mm (0.120") Annealed

ASTM E1300 calculations for representative glazed panels are presented on page 10 through page 11 and summarized in the table below.

Table 2 Calculated Glazing Load Resistance

Skylight Size (ft)	Glazing Type	Glazing DLO (width x height)	Short Load Glazing Resistance
1.5 x 1.5 (O & F)	G1	19.806" x 19.806"	> 313 psf
1.5 x 2 (O & F)	G1	19.806" x 27.306"	260 psf
1.5 x4 (O & F)	G1	19.806" x 51.306"	143 psf
2 x 2 (O & F)	G1	27.306" x 27.306"	196 psf
2 x 3 (O & F)	G1	27.306" x 35.806"	159 psf
2 x 3.5 (O & F)	G1	27.306" x 42.806"	133 psf
2 x 4 (O & F)	G1	27.306" x 51.306"	112 psf
3 x 3 (O & F)	G1	35.806" x 35.806"	135 psf
3 x 4 (O & F)	G1	35.806" x 51.306"	94.8 psf

Table 2 Calculated Glazing Load Resistance (Continued)

Skylight Size (ft)	Glazing Type	Glazing DLO (width x height)	Glazing Resistance
3.5 x 3.5 (O & F)	G1	42.806" x 42.806"	105 psf
3.5 x 4 (O & F)	G1	42.806" x 51.306"	84.7 psf
4 x 4 (O & F)	G1	48.740" x 48.740"	83.9 psf

Note(s):

1. O = Operable, F = Fixed

For the evaluated glazed panels, the glazing capacity exceeds the acting worst-case design pressure thereby validating the glazing.

Anchor Capacities

Capacities of the various anchorage details are calculated as shown on page 12 through page 21. These capacities are compared to reactions induced by design pressures. The calculated anchorage capacities are summarized in the table below.

Table 3 Allowable Anchor Capacities

Substrate	Connection	Capacity	Comments
Steel	#10-16 TEKS Screw connecting Aluminum Base Flange to Steel	158 lb	1. Limited by Anchor Bending 2. Full Penetration + 3 Threads 3. Maximum 1/4" Shim Space 4. Minimum 20 Gauge (0.0359") thick ASTM A653 Grade 33 Steel Substrate 5. Qualifies the steel with larger thickness and higher strength
Wood Blocking	#10 Wood Screw connecting Aluminum Base Flange to 2x Wood Blocking	71 lb	1. Limited by Anchor Bending 2. Minimum 1-1/2" Penetration in Wood Blocking 3. Minimum AISI 1018 Steel Screw 4. Maximum 1/4" Shim Space 5. Minimum 1-1/2" thick, Minimum Spruce Pine Fir (SPF), G= 0.42 Wood Blocking Substrate
Concrete	3/16" ITW Redhead Tapcon Anchor connecting Aluminum Base Flange to Concrete	172 lb	1. Limited by Bearing 2. Minimum 2" Embedment 3. Minimum 2" Edge Distance 4. Minimum 4" Spacing 5. Maximum 1/4" Shim Space 6. Minimum 6" thick, Minimum f'_c = 3,000 Un-Cracked Normal Weight Concrete

Notes:

1. The building substrate is assumed to have the integrity to resist the anchor loads developed by the products.

Perimeter Anchorage Requirements

Anchorage requirements are established by comparing anchorage capacities and anchorage load as calculated on page 22 through page 25. Anchorage requirements are summarized in the following table.

Table 4 Perimeter Anchor Requirements for Operable Skylights at 35.09 psf

Skylight Sizes	Connection Type	Number of Fasteners Needed Per Side
1.5 x 1.5 1.5 x 2 1.5 x 4 2 x 2 2 x 3 2 x 3.5 2 x 4 3 x 3 3 x 4 3.5 x 3.5 3.5 x 4	#10-16 TEKS Screw to Steel	Two (2)
	#10 Wood Screw to Wood Blocking	Two (2)
	3/16" Tapcon Anchor to Concrete	Two (2)
4 x 4	#10-16 TEKS Screw to Steel	Two (2)
	#10 Wood Screw to Wood Blocking	Three (3)
	3/16" Tapcon Anchor to Concrete	Two (2)

Notes:

1. Place perimeter anchorages within 12" of corner, then per number of fasteners per side in the table above, spaced equally.
2. 3/16" Tapcon Anchor shall have minimum 2" embedment, minimum 2" edge distance and minimum 4" spacing in Concrete.
3. The building substrate is assumed to have the integrity to resist the anchor loads developed by the products.

Table 5 Perimeter Anchor Requirements for Fixed Skylights at 75.19 psf

Skylight Sizes	Connection Type	Number of Fasteners Needed Per Side
1.5 x 1.5 1.5 x 2 1.5 x 4 2 x 2 2 x 3	#10-16 TEKS Screw to Steel	Two (2)
	#10 Wood Screw to Wood Blocking	Two (2)
	3/16" Tapcon Anchor to Concrete	Two (2)
2 x 3.5 2 x 4 3 x 3	#10-16 TEKS Screw to Steel	Two (2)
	#10 Wood Screw to Wood Blocking	Three (3)
	3/16" Tapcon Anchor to Concrete	Two (2)
3 x 4 3.5 x 3.5	#10-16 TEKS Screw to Steel	Two (2)
	#10 Wood Screw to Wood Blocking	Four (4)
	3/16" Tapcon Anchor to Concrete	Two (2)
3.5 x 4	#10-16 TEKS Screw to Steel	Two (2)
	#10 Wood Screw to Wood Blocking	Five (5)
	3/16" Tapcon Anchor to Concrete	Two (2)
4 x 4	#10-16 TEKS Screw to Steel	Three (3)
	#10 Wood Screw to Wood Blocking	Five (5)
	3/16" Tapcon Anchor to Concrete	Two (2)

Notes:

1. Place perimeter anchorages within 12" of corner, then per number of fasteners per side in the table above, spaced equally.
2. 3/16" Tapcon Anchor shall have minimum 2" embedment, minimum 2" edge distance and minimum 4" spacing in Concrete.
3. The building substrate is assumed to have the integrity to resist the anchor loads developed by the products.

Attached Drawings

The attached drawings are the basis of the analysis presented herein and may not reflect the requirements established by this analysis.

Insulated Glass Assembly. Solatube, Revision A, 09/14/2019. (2 Pages)

Curb Mount Operable Skylight. Solatube, Revision 1, 07/08/2019. (1 Page)

Curb Mount Fixed Skylight. Solatube, Revision 1, 07/08/2019. (1 Page)

Base Flange Bent. Solatube, Revision B, 09/24/2019. (2 Pages)

Bent Flange Material. Solatube, Revision B, 07/10/2019. (1 Page)

Wood Screw. Solatube, Revision H, 08/27/2013. (1 Page)

Multiple Lite Input Printout -- Skylight

Width (Unsupported)	Height (Supported)	Wind Load	Snow Load (30 day)	Glazing Angle	Edge Support	Lite Description	Short Duration Load Resistance	Long Duration Load Resistance	Results	Design Standard
(in.)	(in.)	(psf)	(psf)	(degrees)			(psf)	(psf)		(ASTM E-1300)
19.8	19.8	75.2	0	0	4 Sides	G1	> 313	284	OK	
19.8	27.3	75.2	0	0	4 Sides	G1	260	217	OK	
19.8	51.3	75.2	0	0	4 Sides	G1	143	120	OK	
27.3	27.3	75.2	0	0	4 Sides	G1	196	164	OK	
27.3	35.8	75.2	0	0	4 Sides	G1	159	133	OK	
27.3	42.8	75.2	0	0	4 Sides	G1	133	111	OK	
27.3	51.3	75.2	0	0	4 Sides	G1	112	93.9	OK	
35.8	35.8	75.2	0	0	4 Sides	G1	135	113	OK	
35.8	51.3	75.2	0	0	4 Sides	G1	94.8	79.2	OK	
42.8	42.8	75.2	0	0	4 Sides	G1	105	87.5	OK	
42.8	51.3	75.2	0	0	4 Sides	G1	84.7	70.8	OK	
48.7	48.8	75.2	0	0	4 Sides	G1	83.9	70.2	OK	

Representative Calculations for Worst Case Glazing Type G1 at Skylight Size 4 ft x 4 ft

Glass Load Resistance Report -- Skylight

Friday, March 6, 2020

Glazing Information

Edge Supports: 4 Sides
Glazing Angle: 0°
Lite Dimensions:
Width: 48.7 in.
Height: 48.8 in.

Project Details

Project Name: Skylight
Location:
Comments: Glazing and Fastener Analysis
Glass Glazed Skylight
Report K6544.01-122-34
SOLATUBE INTERNATIONAL, INC.

Glass Construction (Rectangular)

Double Glazed Insulating Unit

Air Space: 0.55 in.

	Outboard Lite	Inboard Lite
Glass Type:	Fully Tempered	Annealed
Nominal Thickness:	5/32 in.	1/4 in.
Interlayer Type:		PVB

Short Load Duration, Resistance, and Deflection Data

Load (~ 3 sec.) + Glass Weight:	80.0 psf
Load Resistance:	83.9 psf
Approximate center of glass deflection:	0.59 in.

Long Load Duration, Resistance, and Deflection Data

Load (~ 30 days) + Glass Weight:	4.84 psf
Load Resistance:	70.2 psf
Approximate center of glass deflection:	0.14 in.

Conclusion

Based on your design information, the load resistance is greater than or equal to the specified loading.

Statement of Compliance

Procedures followed in determining the resistance of this window glass are in accordance with ASTM E1300-09/12.

Disclaimer:

This software can be used to determine the load resistance of specified glass types exposed to uniform lateral loads of short or long duration subject to the following conditions:

- The glass is free of edge and surface damage and has been properly glazed in the opening in conformance with the manufacturer's recommendations.
- Procedures exist to determine load resistance for rectangular glass assemblies that are:
  a. Continuously supported along all four edges,
  b. Continuously supported along three edges,
  c. Continuously supported along two parallel edges, and
  d. Continuously supported along one edge.
- The software user has the responsibility of selecting the correct procedures for the required application from the software.
- The stiffness of members supporting any glass edge shall be sufficient that under design load, edge deflections shall not exceed L/175, where L denotes that length of the supported edge.
- The manufacturer states that the Safety Plus II 0.090 Polyurethane Large Missile Resistant interlayer is comparable to the PVB interlayer.
- The non-factored load values for laminated glass are representative of test data and calculations performed for an interlayer at a temperature of 50° C (122° F).

For other limiting conditions that may apply, refer to Section 5 of ASTM E1300 and local building codes.

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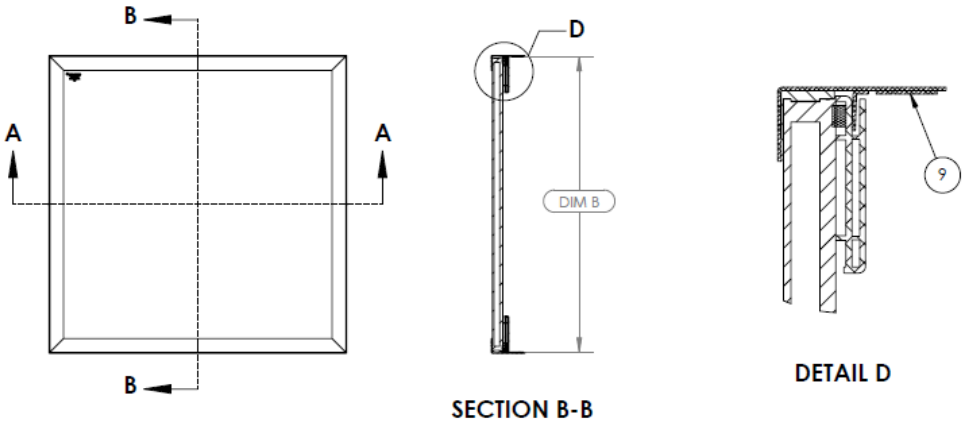
Prepared by: AJ on 3/2/2020

Fastener Analysis:

Steel Substrate



Connection from Base Flange to Steel

#10-16 TEKS Screw (Full Penetration + 3 Threads)

1/16" thick ASTM B209-2014, 3105-H24 Aluminum Base Flange

Minimum 20 Gauge (0.0359") thick ASTM A653 Grade 33 Steel Substrate (Assumed)
(Qualifies the steel with larger thickness and higher strength)

Maximum 1/4" Shim Space

Allowable Shear Capacity of #10-16 TEKS Screw

V_a = 573 lb (ICC ES ESR-1976)

Bearing Capacity of #10-16 TEKS Screw on Aluminum Base Flange

$V_a = 2DtF_{tu}/\Omega$ (Aluminum Design Manual 2015, Eq. J.5-12)
V_a = (2)(0.19")(0.0625")(22,000 psi)/3.00
V_a = 174 lb

Bearing Capacity of #10-16 TEKS Screw on Steel Substrate

$V_a = 2.7t_2dF_{u2}/\Omega$ (AISI S100-16, Eq. J4.3.1-3)
V_a = (2.7)(0.0359")(0.19")(45,000 psi)/3.0
V_a = 276 lb

Structural Steel Substrate (Continued)

Tilting Capacity of #10-16 TEKS Screw

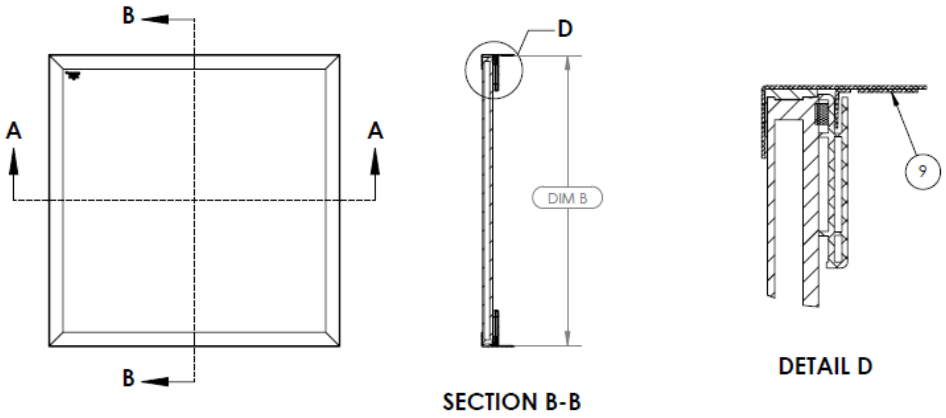
$V_a = (4.2)(t_2^3 d)^{1/2} F_{u2}/\Omega$ (AISI S100-16, Eq. J4.3.1-1)
$V_a = (4.2)\{(0.0359")^3 \times 0.19"\}^{1/2}(45{,}000 \text{ psi})/3.0$
$V_a = 186$ lb

Bending Capacity of #10-16 TEKS Screw

L = 1/4"
$S = \pi d^3/32 = \pi(0.141")^3/32 = 0.0002752 \text{ in}^3$
$F_b = (1.3)(0.6F_y) = (1.3)(0.6)(92{,}000 \text{ psi}) = 71{,}760$ psi (1.3 factor for weak axis bending)
$F_b = M/S = (VL/2)/S$ (L/2 for guided bending)
$V = 2SF_b/L = (2)(0.0002752 \text{ in}^3)(71{,}760 \text{ psi})/(0.25") = 158$ lb

Capacity of #10-16 TEKS Screw is 158 lb

Wood Blocking Substrate



Connection from Base Flange to Wood Blocking

#10 Wood Screw (Minimum AISI 1018 Steel Material Composition)
(Minimum 1-1/2" Penetration in Wood Blocking)

1/16" thick ASTM B209-2014, 3105-H24 Aluminum Base Flange

Minimum 1-1/2" thick, Minimum Spruce Pine Fur (SPF), G= 0.42 Wood Blocking Substrate or Better (Assumed)

Maximum 1/4" Shim Space

Allowable Shear Capacity of #10 Wood Screw

V_a = 86 lb (See Next Page)

Bearing Capacity of #10 Wood Screw on Aluminum Base Flange

$V_a = 2DtF_{tu}/\Omega$ (Aluminum Design Manual 2015, Eq. J.5-12)
V_a = (2)(0.19")(0.0625")(22,000 psi)/3.00
V_a = 174 lb

Bending Capacity of #10 Wood Screw

L = 1/4", $S = \pi d^3/32 = \pi(0.1295")^3/32 = 0.0002132$ in^3
$F_b = (1.3)(0.6F_y)$ = (1.3)(0.6)(53,700 psi) = 41,886 psi (1.3 factor for weak axis bending)
$F_b = M/S = (VL/2)/S$ (L/2 for guided bending)
$V = 2SF_b/L$ = (2)(0.0002132 in^3)(41,886 psi)/(0.25") = 71 lb

Capacity of #10 Wood Screw is 71 lb

Wood Blocking Substrate (Continued)

Lateral Design Strength of Wood Connections

Data

Fastener

Fastener	=	#10 Wood Screw, AISI 1018	
Shank Dia	=	0.188	in.
Root Dia.	=	0.126	in.
F_{yb}	=	53,700	psi
Fastener length	=	2.000	in.

Main Member

Material	=	SPF	
G	=	0.42	
θ	=	90	<= (Angle of load to grain $0^o \leq \theta \leq 90^o$)
F_e	=	3,350	psi
Thickness	=	1.500	in.

Side Member

Material	=	3105-H24 Aluminum	
G	=	N/A	
θ	=	0	<= (Angle of load to grain $0^o \leq \theta \leq 90^o$)
F_{es}	=	27,500	psi
Thickness	=	0.063	in.

Calculations

Lateral Bearing Factors

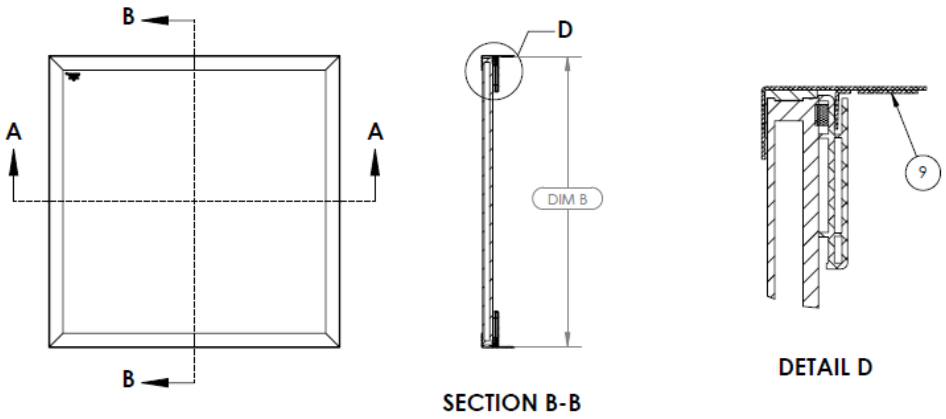
D	=	0.126	in.
ℓ_m	=	1.500	in.
K_θ	=	1.25	
K_D	=	2.20	
R_e	=	0.122	
R_t	=	23.81	
k_1	=	1.1615	
k_2	=	0.5289	
k_3	=	9.45	

Yield Mode	R_d
I_m, I_s	2.20
II	2.20
III_m, III_s, IV	2.20

Lateral Design Values, Z

Mode I_m	=	288	lbf	
Mode I_s	=	99	lbf	
Mode II	=	115	lbf	
Mode III_m	=	122	lbf	
Mode III_s	=	54	lbf	<=== Minimum Value
Mode IV	=	75	lbf	
C_D	=	1.6		
Wet Service Factor				
Fabrication/In-Service		Dry/Dry		
C_M	=	1.0		
In service temperature		T≤100˚F		
C_t	=	1.0		
C_g	=	1.0		
C_Δ	=	1.0		
Is fastener installed in end grain?		No		
C_{eg}	=	1.00		
Is fastener part of a diaphragm?		No		
C_{di}	=	1.0		
Is fastener toe-nailed?		No		
C_{tn}	=	1.00		
Z'	=	**86**	**lbf**	

Concrete Substrate



SECTION B-B

DETAIL D

Connection from Base Flange to Concrete

3/16" ITW Redhead Tapcon Anchor

Minimum 2" Edge Distance, Minimum 4" Spacing, Minimum 2" Embedment

1/16" thick ASTM B209-2014, 3105-H24 Aluminum Base Flange

Minimum 6" thick, Minimum f'_c = 3,000 Un-Cracked Normal Weight Concrete (Assumed)

Maximum 1/4" Shim Space

Allowable Shear Capacity of 3/16" Tapcon Anchor

V_a = (800 lb) / {(0.94 Utilization)(2 anchors)(1.6 for ASD)} = 266 lb (See Next Five (5) Pages)

Bearing Capacity of 3/16" Tapcon Anchor on Aluminum Base Flange

$V_a = 2DtF_{tu}/\Omega$ (Aluminum Design Manual 2015, Eq. J.5-12)
V_a = (2)(0.1875")(0.0625")(22,000 psi)/3.00
V_a = 172 lb

Bending Capacity of 3/16" Tapcon Anchor

L = 1/4", $S = \pi d^3/32 = \pi(0.15")^3/32 = 0.0003313\ in^3$
$F_b = (1.3)(0.6F_y)$ = (1.3)(0.6)(100,000 psi) = 78,000 psi (1.3 factor for weak axis bending)
F_b = M/S = (VL/2)/S (L/2 for guided bending)
$V = 2SF_b/L$ = (2)(0.0003313 in^3)(78,000 psi)/(0.25") = 206 lb

Capacity of 3/16" ITW Redhead Tapcon Anchor is 172 lb

Concrete Substrate (Continued)

Ref : 3/2/2020 9:48 AM / Software version: 6 Page : 1/5

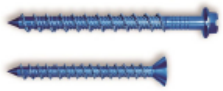
CALCULATION SHEET FOR REDHEAD ANCHORS

Company name: Intertek	Carried out by: AJ
Phone number: 7177647700	e-mail address: abhishek.jain@intertek.com

Project:

Company name:	Project name: Glass Glazed Skylight
Contact name:	Location:
Phone number:	Fastening point: Concret Substrate
e-mail address:	Comment:

Recommended anchors:
Tapcon Anchors Carbon Steel with Blue Climaseal 3/16



Concrete member:

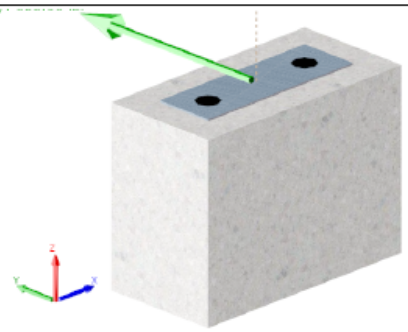
Concrete strength: 3000 psi	Conditions of concrete: Uncracked concrete
Thickness of concrete: 6 in	Tension load conditions: Conditon B Tension
Edge reinforcement: None or < no. 4 bar	Shear load conditions: Condition B Shear

Longitudinal reinforcement should be provided along the edge of the member.

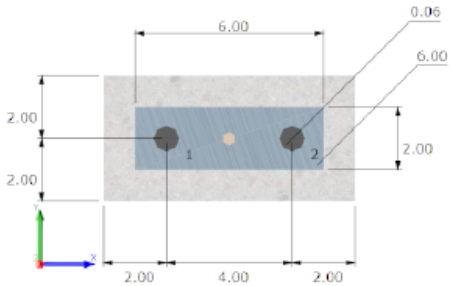
Part to be anchored:	**Conditions:**
Thickness of part to be anchored: 0.1 in	Installation conditions: Dry concrete
Clearance diameter: 0.2 in	Short term temperature: 130 °F
The base plate thickness has not been checked	Long term temperature: 110 °F

Calculation hypothesis:
- The anchoring plate is assumed to be sufficient to resist deformation imposed by the load actions!
- Connection between profile and base plate has not been checked

Calculation model:
Profile family (Section type) : No profile
Profile position: Ex: 0, Ey: 0
Stand-off not defined



Geometry:



Design loading : Design and Combined Loading
Nz: 0 lbf Mx: 0 lbf ft
Vx: 0 lbf My: 0 lbf ft
Vy: 800 lbf Mz: 0 lbf ft

Concrete Substrate (Continued)

Ref : 3/2/2020 9:48 AM / Software version: 6 Page : 2/5

Design loading Design and Combined Loading

Tensile forces per anchor:

Loads on anchors:

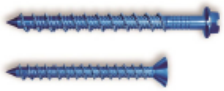
Anchor	Tensile	Shear[x]	Shear[y]
1	0 lbf	0 lbf	400 lbf
2	0 lbf	0 lbf	400 lbf

Recommended anchors:

Tapcon Anchors Carbon Steel with Blue Climaseal 3/16

ESR 2202

Issue: 10/01/2015 / Validity: 10/01/2016



Design resistance according to ACI 318 / AC 193:

TENSILE

Pullout strength

Failure mode not decisive

Concrete breakout strength

Failure mode not decisive

Steel strength:

Failure mode not decisive

SHEAR

Concrete edge failure:

l_e = 1.5 in; d_a = 0.2 in; λ_a = 1; f'_c = 3000 psi;

c_{a1} = 2 in; c_{a2} = 2 in;

A_Vc / A_{Vc0} = 1.33; A_Vc = 24 in²; A_{Vc0} = 18 in²;

V_b = 725.7 lbf;

$e_{c,V}$ = 0 in; $\psi_{ec,V}$ = 1.00 ; $\psi_{c,V}$ = 1.40 ;

$\psi_{parallel}$ = 1.00 ; $\psi_{h,V}$ = 1.00 ; $\psi_{ed,V}$ = 0.90 ;

V_{cbg} = 1219.1 lbf;

ΦV_{cbg} = 853 lbf; $\Phi_{concrete}$ = 0.7;

V_{ua} = 800 lbf;

β_V = 0.94;

Pryout strength

k_{cp} = 1;

h_{ef} = 1.5 in; c_{ac} = 3.6 in; $c_{a,min}$ = 2 in;

f'_c = 3000 psi; k_c = 24; $\psi_{c,N}$ = 1.00 ;

N_b = 2416 lbf;

A_{Nc} / A_{Nc0} = 2; $A_N c$ = 32.3 in²; A_{Nc0} = 16 in²;

$e_{c1,N}$ = 0 in; $e_{c2,N}$ = 0 in; $\psi_{c1,N}$ = 1; $\psi_{c2,N}$ = 1;

$\psi_{ed,N}$ = 1.00 ; $\psi_{cp,N}$ = 0.63 ;

V_{cpg} = 3057.8 lbf;

ΦV_{cpg} = 2140 lbf; $\Phi_{concrete}$ = 0.7;

V_{ua} = 800 lbf

β_V = 0.37

Steel strength

Without level arm

V_{sa} = 715 lbf

ΦV_{sa} = 429 lbf; Φ_{steel} = 0.60 ;

V_{ua} = 400 lbf

β_V = 0.93

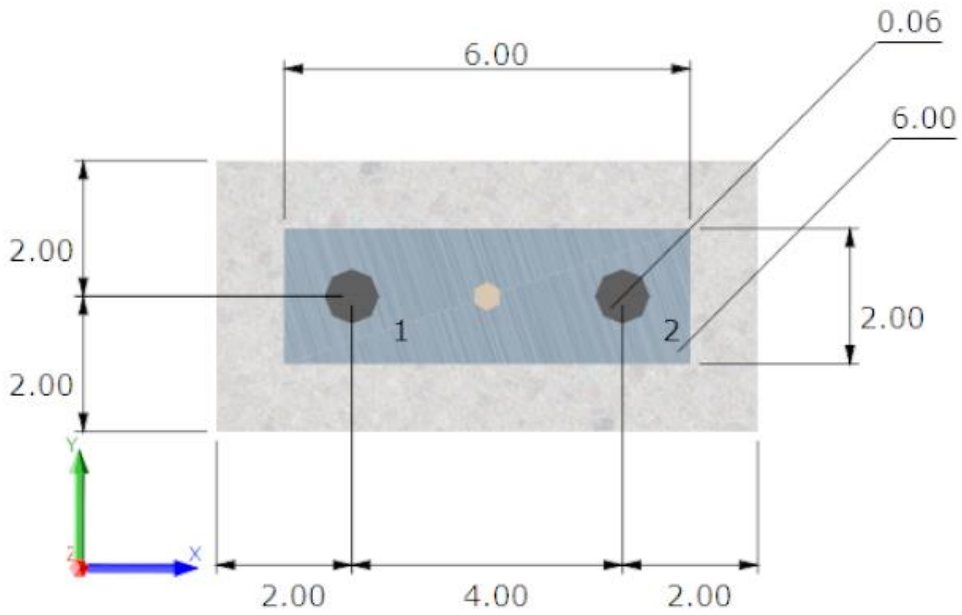
Utilization equation:

$\beta = 0.94 \leq 1$

Concrete Substrate (Continued)

Ref : 3/2/2020 9:48 AM / Software version: 6 Page : 3/5

Dimensions of the base plate



Concrete Substrate (Continued)

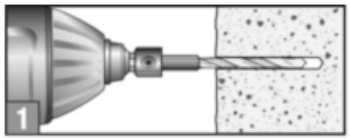
Ref : 3/2/2020 9:48 AM / Software version: 6 Page : 4/5

Recommended anchors: Tapcon Anchors Carbon Steel with Blue Climaseal 3/16
Product Code: / ESR 2202 / Issue: 10/01/2015 / Issue: 10/01/2016

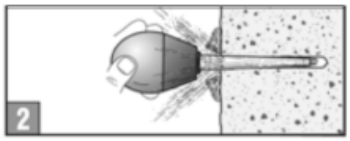
Installation data:	
Effective depth:	1.5 in
Nominal embedment	2 in
Minimum thickness of base material:	4 in
Hole diameter in the base material:	0.2 in
Hole depth in the base material:	2.2 in
Installation torque:	\
Anchor plate, steel quality :	ASTM A36
Base plate thickness:	0.1 in
Profile family (Section type) :	No profile
Clearance diameter:	0.2 in

Installation method:

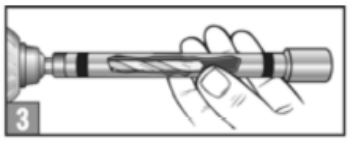
Tapcon Installation Instructions



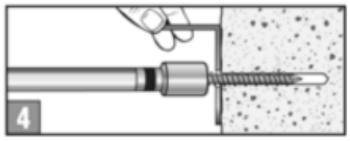
Step 1: Using a Tapcon® drill bit, drill the hole 1/4" deeper than anchor embedment.



Step 2: Clean hole with compressed air or vacuum to remove any excess dust/debris.



Step 3: Place Condrive® tool with drive socket over drill bit.



Step 4: Drive anchor thru fixture and into hole until nut driver spins free from head of anchor.

RED HEAD

Cleaning:

See installation method belows

Concrete Substrate (Continued)

Ref : 3/2/2020 9:48 AM / Software version: 6 Page : 5/5

Page : 5/5

Design resistance : According to ACI 318-11 or ACI 318-14 (Mechanical)

TENSILE

Bond Strength :

$N_{pn,f'c} = N_{p,2500} . \lambda_a . \sqrt{\frac{f_c'}{2500}}$	Info provided in ICC-ES Evaluation report	
$\Phi N_{pn,f'c} \geq N_{ua}$	ACI 318-11 Tab. D.4.1.1	ACI 318-14 Tab. 17.4.1.1

Concrete breakout Strength :

$N_{cbg} = \left(\frac{A_{Nc}}{A_{Nc0}}\right) . \Psi_{ec1,N} . \Psi_{ec2,N} . \Psi_{ed,N} . \Psi_{cp,N} . N_b$	ACI 318-11 Eq. (D-4)	ACI 318-14 Eq. (17.4.2.1b)
$\Phi N_{cbg} \geq N_{ua}$	ACI 318-11 Tab. D.4.1.1	ACI 318-14 Tab. 17.3.1.1
A_{Nc}	ACI 318-11 Part D.5.2.1, Fig. RD.5.2.1(b)	ACI 318-14 Part 17.4.2.1, Fig. R17.4.2.1(b)
$A_{Nc0} = 9 . h_{ef}^2$	ACI 318-11 Eq. (D-5)	ACI 318-14 Eq. (17.4.2.1c)
$\Psi_{ec,N} = \left(\frac{1}{1+\frac{2 e'_N}{3 h_{ef}}}\right) \leq 1,0$	ACI 318-11 Eq. (D-8)	ACI 318-14 Eq. (17.4.2.4)
$\Psi_{ed,N} = 0.7 + 0.3 . \left(\frac{c_{a,min}}{1,5 . h_{ef}}\right) \leq 1,0$	ACI 318-11 Eq. (D-10)	ACI 318-14 Eq. (17.4.2.5b)
$\Psi_{cp,N} = \max\left(\frac{c_{a,min}}{c_{ac}} ; \frac{1,5 . h_{ef}}{c_{ac}}\right) \leq 1,0$	ACI 318-11 Eq. (D-12)	ACI 318-14 Eq. (17.4.2.7b)
$N_b = k_c . \lambda_a . \sqrt{f'c} . h_{ef}^{1,5}$	ACI 318-11 Eq. (D-6)	ACI 318-14 Eq. (17.4.2.2a)

Steel Strength :

N_{sa}	Info provided in ICC-ES Evaluation report	
$\Phi N_{sa} \geq N_{ua}$	ACI 318-11 Tab.D.4.1.1	ACI 318-14 Tab.17.3.1.1

SHEAR

Concrete edge failure :

$V_{cbg} = \left(\frac{A_{Vc}}{A_{Vc0}}\right) . \Psi_{ec1,V} . \Psi_{ec2,V} . \Psi_{ed,V} . \Psi_{c,V} . \Psi_{h,V} . \Psi_{parall}$	ACI 318-11 Eq. (D-31)	ACI 318-14 Eq.(17.5.2.1b)
$\Phi V_{cbg} \geq V_{ua}$	ACI 318-11 Tab. D.4.1.1	ACI 318-14 Tab. 17.3.1.1
A_{Vc}	ACI 318-11 Part D.6.2.1, Fig. RD.6.2.1(b)	ACI 318-14 Part 17.5.2.1, Fig. R17.5.2.1(b)
$A_{Vc0} = 4.5 . c_{a1}^2$	ACI 318-11 Eq. (D-32)	ACI 318-14 Eq. (17.5.2.1c)
$\Psi_{ec,V} = \left(\frac{1}{1+\frac{2 e'_V}{3 c_{a1}}}\right) \leq 1,0$	ACI 318-11 Eq. (D-36)	ACI 318-14 Eq. (17.5.2.5)
$\Psi_{ed,V} = 0.7 + 0.3 . \left(\frac{c_{a2}}{1,5 . c_{a1}}\right) \leq 1,0$	ACI 318-11 Eq. (D-38)	ACI 318-14 Eq. (17.5.2.6b)
$\Psi_{h,V} = \sqrt{\frac{1,5 . c_{a1}}{h_a}} \geq 1,0$	ACI 318-11 Eq. (D-39)	ACI 318-14 Eq. (17.5.2.8)
$V_b = 7 . \left(\frac{l_e}{d_a}\right)^{0,2} \sqrt{d_a} . \lambda_a . \sqrt{f'c} . c_{a1}^{1,5}$	ACI 318-11 Eq. (D-33)	ACI 318-14 Eq. (17.5.2.2a)

Pryout strength :

$V_{cpg} = k_{cp} . \left(\frac{A_{Nc}}{A_{Nc0}}\right) . \Psi_{ec1,N} . \Psi_{ec2,N} . \Psi_{ed,N} . \Psi_{cp,N} . N_b$	ACI 318-11 Eq. (D-41)	ACI 318-14 Eq. 17.5.3.1b)
$\Phi V_{cpg} \geq V_{ua}$	ACI 318-11 Tab. D.4.1.1	ACI 318-14 Tab. 17.3.1.1
A_{Nc}	ACI 318-11 Part D.5.2.1, Fig. RD.5.2.1(b)	ACI 318-14 Part 17.4.2.1, Fig. R17.4.2.1(b)
$A_{Nc0} = 9 . h_{ef}^2$	ACI 318-11 Eq. (D-5)	ACI 318-14 Eq. (17.4.2.1c)
$\Psi_{ec,N} = \left(\frac{1}{1+\frac{2 e'_N}{3 h_{ef}}}\right) \leq 1,0$	ACI 318-11 Eq. (D-8)	ACI 318-14 Eq. (17.4.2.4)
$\Psi_{ed,N} = 0.7 + 0.3 . \left(\frac{c_{a,min}}{1,5 . h_{ef}}\right) \leq 1,0$	ACI 318-11 Eq. (D-10)	ACI 318-14 Eq. (17.4.2.5b)
$\Psi_{cp,N} = \max\left(\frac{c_{a,min}}{c_{ac}} ; \frac{1,5 . h_{ef}}{c_{ac}}\right) \leq 1,0$	ACI 318-11 Eq. (D-12)	ACI 318-14 Eq. (17.4.2.7b)
$N_b = k_c . \lambda_a . \sqrt{f'c} . h_{ef}^{1,5}$	ACI 318-11 Eq. (D-6)	ACI 318-14 Eq. (17.4.2.2a)

Steel Strength (With no level arm)

V_{sa}	Info provided in ICC-ES Evaluation report	
$\Phi V_{sa} \geq V_{ua}$	ACI 318-11 Tab.D.4.1.1	ACI 318-14 Tab.17.3.1.1

Number of Anchor Needed for Operable Windows

Skylight Size	Tested DP	Skylight Dimension A	Skylight Dimension B	Total Load Acting	Load Acting per Skylight Edge	Substrate	Number of Fasteners Needed	Load Taken by Each Anchor	Anchor Capacity	Analysis Result
1.5' x 1.5' (Opearble)	35.09 psf	20.0	20.0	97.5 lb	24.4 lb	Steel	2	12.2 lb	158 lb	OK
						Wood	2	12.2 lb	71 lb	OK
						Concrete	2	12.2 lb	172 lb	OK
1.5' x 2' (Opearble)	35.09 psf	20.0	27.5	134.0 lb	33.5 lb	Steel	2	16.8 lb	158 lb	OK
						Wood	2	16.8 lb	71 lb	OK
						Concrete	2	16.8 lb	172 lb	OK
1.5' x 4' (Opearble)	35.09 psf	20.0	51.5	251.0 lb	62.7 lb	Steel	2	31.4 lb	158 lb	OK
						Wood	2	31.4 lb	71 lb	OK
						Concrete	2	31.4 lb	172 lb	OK
2' x 2' (Opearble)	35.09 psf	27.5	27.5	184.3 lb	46.1 lb	Steel	2	23.0 lb	158 lb	OK
						Wood	2	23.0 lb	71 lb	OK
						Concrete	2	23.0 lb	172 lb	OK
2' x 3' (Opearble)	35.09 psf	27.5	36.0	241.2 lb	60.3 lb	Steel	2	30.2 lb	158 lb	OK
						Wood	2	30.2 lb	71 lb	OK
						Concrete	2	30.2 lb	172 lb	OK
2' x 3.5' (Opearble)	35.09 psf	27.5	43.0	288.2 lb	72.0 lb	Steel	2	36.0 lb	158 lb	OK
						Wood	2	36.0 lb	71 lb	OK
						Concrete	2	36.0 lb	172 lb	OK

Number of Anchor Needed for Operable Windows (Continued)

Skylight Size	Tested DP	Skylight Dimension A	Skylight Dimension B	Total Load Acting	Load Acting per Skylight Edge	Substrate	Number of Fasteners Needed	Load Taken by Each Anchor	Anchor Capacity	Analysis Result
2' x 4' (Opearble)	35.09 psf	27.5	51.5	345.1 lb	86.3 lb	Steel	2	43.1 lb	158 lb	OK
						Wood	2	43.1 lb	71 lb	OK
						Concrete	2	43.1 lb	172 lb	OK
3' x 3' (Opearble)	35.09 psf	36.0	36.0	315.8 lb	79.0 lb	Steel	2	39.5 lb	158 lb	OK
						Wood	2	39.5 lb	71 lb	OK
						Concrete	2	39.5 lb	172 lb	OK
3' x 4' (Opearble)	35.09 psf	36.0	51.5	451.8 lb	112.9 lb	Steel	2	56.5 lb	158 lb	OK
						Wood	2	56.5 lb	71 lb	OK
						Concrete	2	56.5 lb	172 lb	OK
3.5' x 3.5' (Opearble)	35.09 psf	43.0	43.0	450.6 lb	112.6 lb	Steel	2	56.3 lb	158 lb	OK
						Wood	2	56.3 lb	71 lb	OK
						Concrete	2	56.3 lb	172 lb	OK
3.5' x 4' (Opearble)	35.09 psf	43.0	51.5	539.6 lb	134.9 lb	Steel	2	67.5 lb	158 lb	OK
						Wood	2	67.5 lb	71 lb	OK
						Concrete	2	67.5 lb	172 lb	OK
4' x 4' (Opearble)	35.09 psf	51.5	51.5	646.3 lb	161.6 lb	Steel	2	80.8 lb	158 lb	OK
						Wood	3	53.9 lb	71 lb	OK
						Concrete	2	80.8 lb	172 lb	OK

Number of Anchor Needed for Fixed Windows

Skylight Size	Tested DP	Skylight Dimension A	Skylight Dimension B	Total Load Acting	Load Acting per Sidelight Edge	Substrate	Number of Fasteners Needed	Load Taken by Each Anchor	Anchor Capacity	Analysis Result
1.5' x 1.5' (Fixed)	75.19 psf	20.0	20.0	208.9 lb	52.2 lb	Steel	2	26.1 lb	158 lb	OK
						Wood	2	26.1 lb	71 lb	OK
						Concrete	2	26.1 lb	172 lb	OK
1.5' x 2' (Fixed)	75.19 psf	20.0	27.5	287.2 lb	71.8 lb	Steel	2	35.9 lb	158 lb	OK
						Wood	2	35.9 lb	71 lb	OK
						Concrete	2	35.9 lb	172 lb	OK
1.5' x 4' (Fixed)	75.19 psf	20.0	51.5	537.8 lb	134.5 lb	Steel	2	67.2 lb	158 lb	OK
						Wood	2	67.2 lb	71 lb	OK
						Concrete	2	67.2 lb	172 lb	OK
2' x 2' (Fixed)	75.19 psf	27.5	27.5	394.9 lb	98.7 lb	Steel	2	49.4 lb	158 lb	OK
						Wood	2	49.4 lb	71 lb	OK
						Concrete	2	49.4 lb	172 lb	OK
2' x 3' (Fixed)	75.19 psf	27.5	36.0	516.9 lb	129.2 lb	Steel	2	64.6 lb	158 lb	OK
						Wood	2	64.6 lb	71 lb	OK
						Concrete	2	64.6 lb	172 lb	OK
2' x 3.5' (Fixed)	75.19 psf	27.5	43.0	617.4 lb	154.4 lb	Steel	2	77.2 lb	158 lb	OK
						Wood	3	51.5 lb	71 lb	OK
						Concrete	2	77.2 lb	172 lb	OK

<u>Number of Anchor Needed for Fixed Windows</u> (Continued)

Skylight Size	Tested DP	Skylight Dimension A	Skylight Dimension B	Total Load Acting	Load Acting per Sidelight Edge	Substrate	Number of Fasteners Needed	Load Taken by Each Anchor	Anchor Capacity	Analysis Result
2' x 4' (Fixed)	75.19 psf	27.5	51.5	739.5 lb	184.9 lb	Steel	2	92.4 lb	158 lb	OK
						Wood	3	61.6 lb	71 lb	OK
						Concrete	2	92.4 lb	172 lb	OK
3' x 3' (Fixed)	75.19 psf	36.0	36.0	676.7 lb	169.2 lb	Steel	2	84.6 lb	158 lb	OK
						Wood	3	56.4 lb	71 lb	OK
						Concrete	2	84.6 lb	172 lb	OK
3' x 4' (Fixed)	75.19 psf	36.0	51.5	968.1 lb	242.0 lb	Steel	2	121.0 lb	158 lb	OK
						Wood	4	60.5 lb	71 lb	OK
						Concrete	2	121.0 lb	172 lb	OK
3.5' x 3.5' (Fixed)	75.19 psf	43.0	43.0	965.5 lb	241.4 lb	Steel	2	120.7 lb	158 lb	OK
						Wood	4	60.3 lb	71 lb	OK
						Concrete	2	120.7 lb	172 lb	OK
3.5' x 4' (Fixed)	75.19 psf	43.0	51.5	1156.3 lb	289.1 lb	Steel	2	144.5 lb	158 lb	OK
						Wood	5	57.8 lb	71 lb	OK
						Concrete	2	144.5 lb	172 lb	OK
4' x 4' (Fixed)	75.19 psf	51.5	51.5	1384.9 lb	346.2 lb	Steel	3	115.4 lb	158 lb	OK
						Wood	5	69.2 lb	71 lb	OK
						Concrete	2	173.1 lb	172 lb	<1% Over-Capacity, OK

Revision Log

Rev. #	Date	Page(s)	Revision(s)
0	03/06/20	N/A	Original report issue

REVISIONS					
REV.	ECO	DATE	REVISED	CHECKED	APPROVED
A	3132-1	9/14/2019	STEVENS		

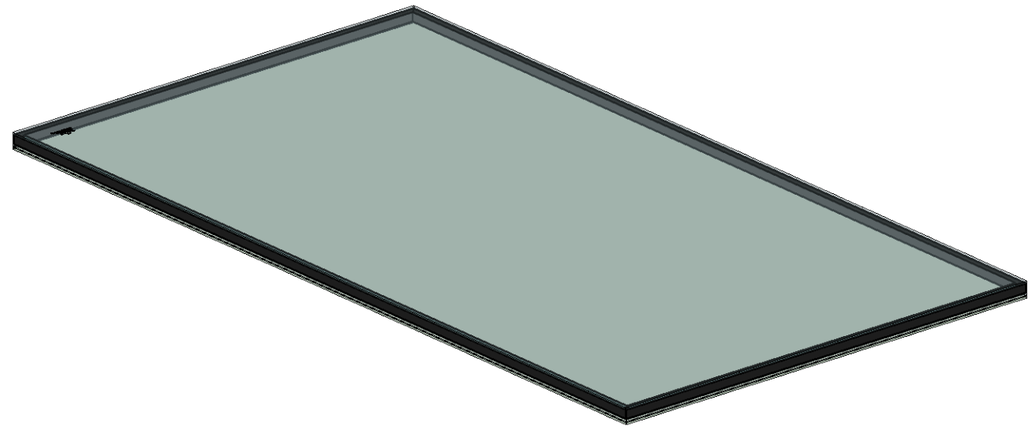
INSULATED GLAZING ASSEMBLY SPECIFICATION

PERFORMANCE CHARACTERISTICS
- U-FACTOR: ≤ 0.5 (BTU/H FT2 °F) OR ≤ 2.84 (W/M2 °C)
- SHGC: ≤ 0.28
- VT: 60% MIN
- UV PROTECTION: 95% BLOCKAGE MIN

MATERIAL / CONSTRUCTION
- REFERENCE INTERNAL DOCUMENT 990885

SUPPLIER REQUIREMENTS
- NAFS SPECIFICATIONS REQUIRE THAT IGUS SHALL BE EVALUATED FOR CONFORMANCE WITH ASTM E2190, STANDARD SPECIFICATION FOR INSULATING GLASS UNIT PERFORMANCE AND EVALUATION. NFRC 706-2010 PROVIDES DETAILS FOR CERTIFICATION PROGRAMS.
- NFRC 700 AND NFRC 705 REQUIRE THAT IGUS BE CERTIFIED WITH A PARTICIPATING IG CERTIFICATION PROGRAM. SUPPLIER PF IGU MUST BE LISTED IN THE "IGC DIRECTORY."
-

MARKING & ETCHING
- SOLATUBE LOGO (FONT SIZE: AS DIMENSIONED)
- MARKINGS PER ANSI STANDARDS (WILL COMPLY WITH ANSI Z97.1 - 2015); FONT SIZE PER MANUFACTURER STANDARD
- INSULATED GLASS WILL HAVE A GAS CONTENT INITIAL AND AFTER WEATHERING (GCIA) REPORT



UNLESS OTHERWISE SPECIFIED:	PROPRIETARY AND CONFIDENTIAL	
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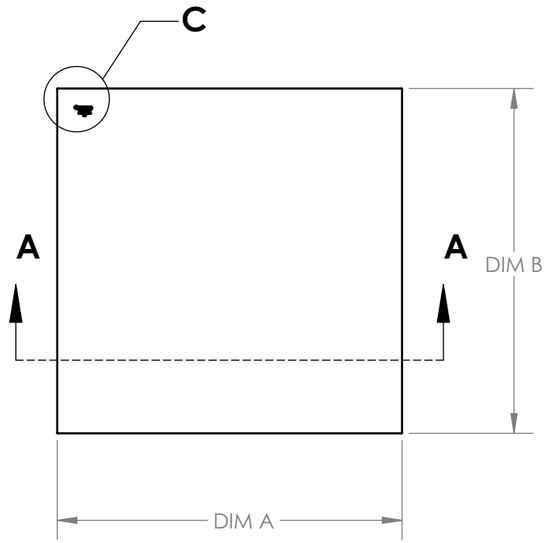
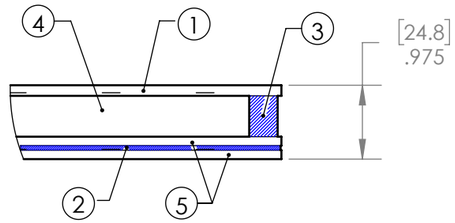
SOLATUBE®
2210 OAK RIDGE WAY
VISTA, CALIFORNIA 92081-8341
PH (760) 597-4400

TITLE:
INSULATED GLASS ASSEMBLY

SIZE	PROJECTION	DWG. NO.	REV
B	(3rd)	VARIES	A
	UNIT MM[INCH]	SCALE: 1:8	SHEET 1 OF 2

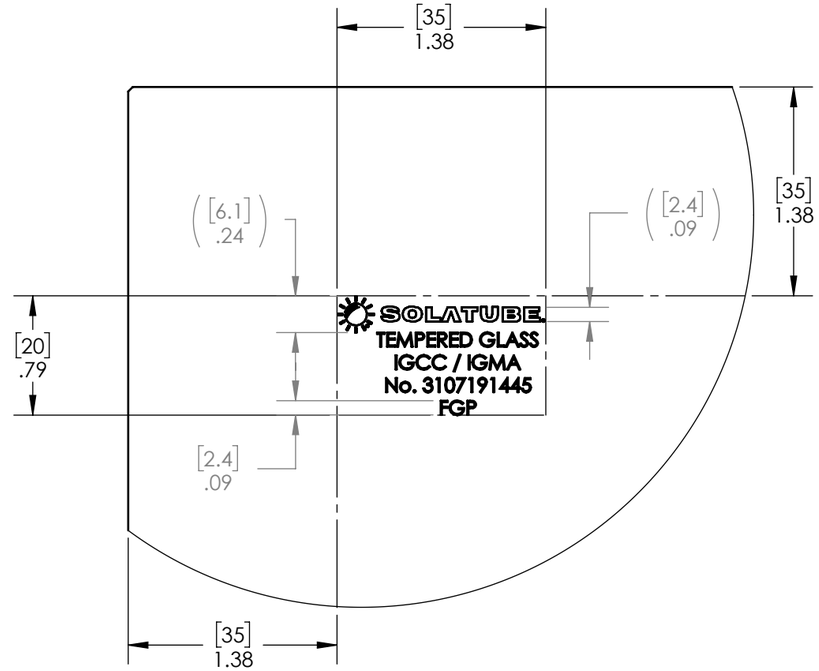


SECTION A-A



DETAIL B
SCALE 1 : 2

ITEM	DESCRIPTION	THICKNESS
1	LOW-E; TEMPERED GLASS	4 mm (0.157 in.)
2	PVB	.76 mm (0.03 in.)
3	WARM EDGE SPACER	14 mm (0.55 in.)
4	ARGON GAS	-
5	FLOAT GLASS	3 mm (0.12 in.)



DETAIL C
SCALE 1 : 1

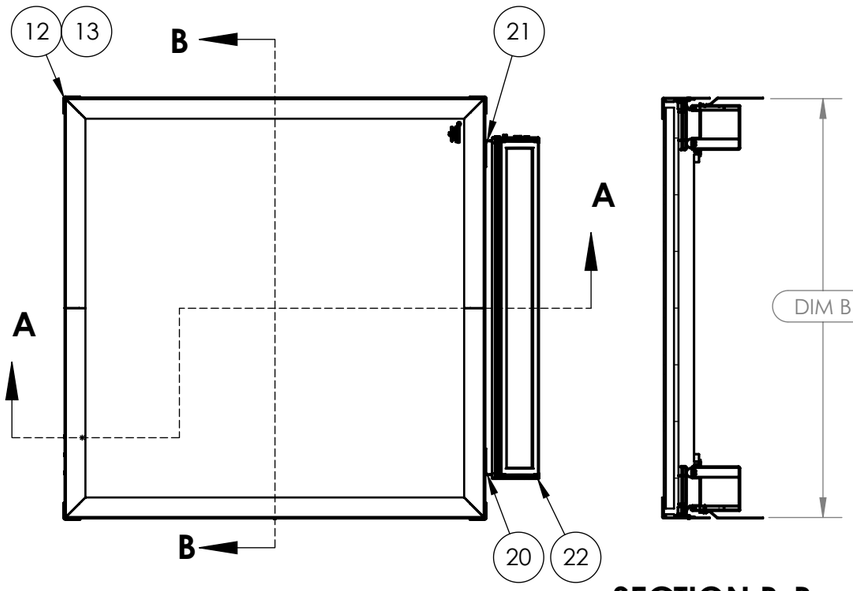
Nom. (ft)	PN	DIM A (INCH)	DIM B (INCH)	DIM A (MM)	DIM B (MM)
1.5 x 1.5	381515	19.806	19.806	503	503
1.5 x 2	381520	19.806	27.306	503	694
1.5 x 4	381540	19.806	51.306	503	1303
2 x 2	382020	27.306	27.306	694	694
2x3	382030	27.306	35.806	694	909
2 x 3.5	382035	27.306	42.806	694	1087
2 x 4	382040	27.306	51.306	694	1303
3 x 3	383030	35.806	35.806	909	909
3 x 4	383040	35.806	51.306	909	1303
3.5x 3.5	383535	42.806	42.806	1087	1087
3.5 x 4	383540	42.806	51.306	1087	1303
4 x 4	384040	51.306	51.306	1303	1303

TITLE:
INSULATED GLASS ASSEMBLY

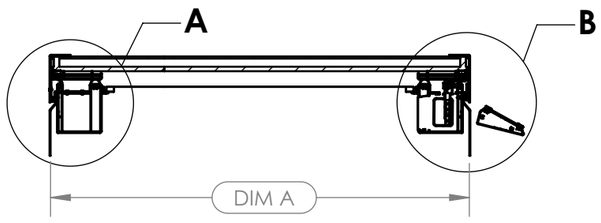
SIZE	DWG. NO.	REV
B	VARIES	A
	SCALE: 1:1	SHEET 2 OF 2

HSE OPERABLE SERIES

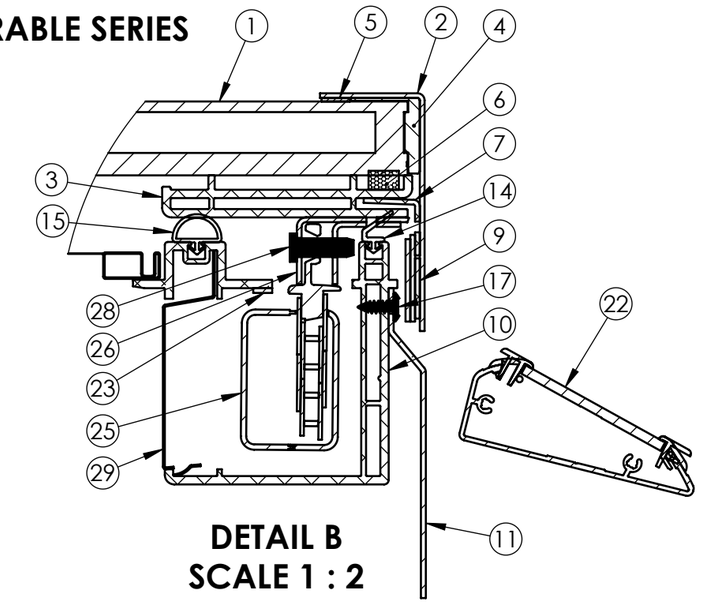
STANDARD OPERABLE SIZES (I.D.)				
PART NO.	MODEL	NOM.	DIM A	DIM B
382430	2020	1.5' x 1.5'	20.00"	20.00"
382510	2028	1.5' x 2'	20.00"	27.50"
382690	2052	1.5' x 4'	20.00"	51.50"
382730	2828	2' x 2'	27.50"	27.50"
382860	2836	2' X 3'	27.50"	36.00"
382980	2843	2' x 3.5'	27.50"	43.00"
383020	2852	2' x 4'	27.50"	51.50"
383170	3636	3' x 3'	36.00"	36.00"
383280	3652	3' x 4'	36.00"	51.50"
383350	4343	3.5' x 3.5'	43.00"	43.00"
384060	4352	3.5' x 4'	43.00"	51.50"
384110	5151	4' x 4'	51.50"	51.50"



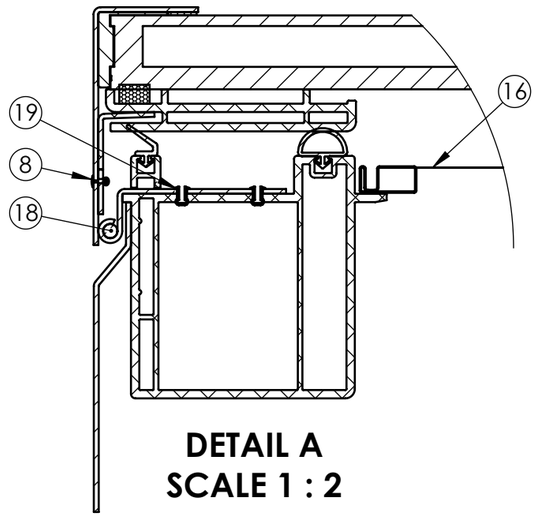
SECTION B-B



SECTION A-A



DETAIL B
SCALE 1 : 2



DETAIL A
SCALE 1 : 2

CURB MOUNT FIXED SKYLIGHT			
ITEM NO.	PART NO.	DESCRIPTION	MATERIAL
1	VARIES	INSULATED GLASS ASSEMBLY	4HT10– Tg14Ar – 33.2
2	VARIES	BASE FLANGE	PAINTED ALUMINUM ALLOY
3	381091	EXTRUSION SKYLIGHT BASE	RIGID PVC
4	700358	SEALANT	POLYURETHANE
5	620025	GLAZING TAPE	ACYLIC FOAM
6	381076	WEATHERSTRIP	EPDM FOAM
7	VARIES	CLEAT	PAINTED ALUMINUM ALLOY
8	700048	RIVET	ALUMINUM ALLOY
9	831162	JOINER PLATE	PAINTED ALUMINUM ALLOY

OPERABLE SKYLIGHT			
ITEM NO.	PART NO.	DESCRIPTION	MATERIAL
10	381083	EXTRUSION SKYLIGHT OPERABLE	RIGID PVC
11	VARIES	OPERABLE FLASH	PAINTED ALUMINUM ALLOY
12	381115	CORNER CONNECTOR	ASA
13	381121	CORNER BINDER (NOT SHOWN)	ASA
14	600235	SEAL FIN	TPE RUBBER
15	600304	SEAL HOLLOW 'D'	TPE RUBBER
16	VARIES	SCREEN	ALUMINUM / FIBERGLASS
17	720093	SCREW #8 X 1/2"	STAINLESS STEEL
18	381410	HINGE	STAINLESS STEEL
19	520050	RIVET	STEEL
20	382033	PV PANEL MOUNTING BRACKET (L)	STAINLESS STEEL
21	382028	PV PANEL MOUNTING BRACKET (R)	STAINLESS STEEL
22	381050	SKYLIGHT SOLAR PANEL ASSEMBLY	N/A
23	381208	MOTOR BRACKET	STAINLESS STEEL
24	700635	RIVET (FOR MOTOR BRACKET)	ALUMINUM
25	381130	MOTOR AND CHAIN ASSY.	N/A
26	382055	CHAIN CONNECTOR ASSY	STAINLESS STEEL
27	381320	RAIN SENSOR (NOT SHOWN)	N/A
28	381201	CLEVIS PIN	STEEL
29	381053	MOTOR COVER COATED	PAINTED STEEL

UNLESS OTHERWISE SPECIFIED:

TOLERANCES
ANGULAR: ±0.5°

INCH	MILLIMETER
.X ± .06	[.X] ± 1.5
.XX ± .01	[.XX] ± .25
.XXX ± .005	[.XXX] ± .125

MATERIAL
--
--

FINISH
--
--

DO NOT SCALE DRAWING

DRAWN BY	DATE
STEVENS	8 JUL 19
CHECKED BY	DATE
--	--

INTERPRET DRAWINGS IAW:
ASME Y14.5 - 1994

SOLATUBE®
2210 OAK RIDGE WAY
VISTA, CALIFORNIA 92081-8341
PH (760) 597-4400

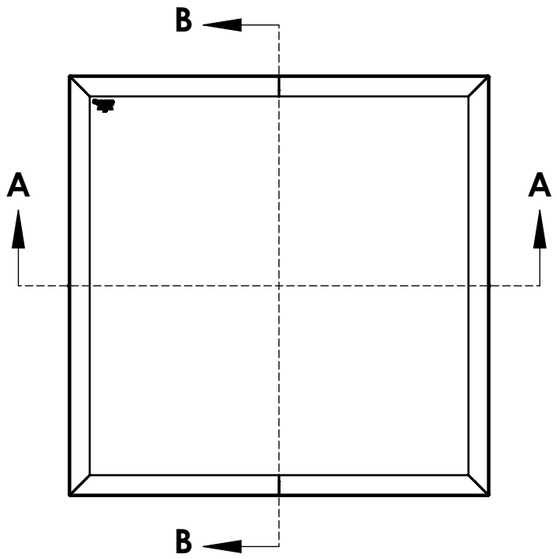
TITLE:
CURB MOUNT OPERABLE SKYLIGHT

SIZE	PROJECTION	DWG. NO.	REV
B	(3rd)	HSE-OS	1
	UNIT INCH [MM]	SCALE: 1:10	SHEET 1 OF 1

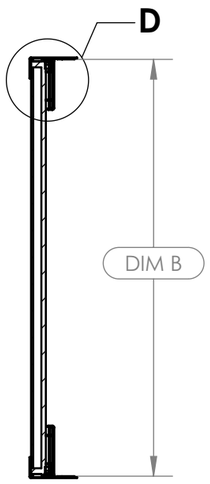
HSE FIXED SERIES

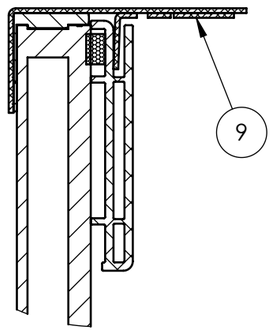
STANDARD SIZES (I.D.)				
PART NO.	MODEL	NOM.	DIM A	DIM B
380000	2020	1.5' x 1.5'	20.00"	20.00"
380120	2028	1.5' x 2'	20.00"	27.50"
380230	2052	1.5' x 4'	20.00"	51.50"
380370	2828	2' x 2'	27.50"	27.50"
380450	2836	2' X 3'	27.50"	36.00"
380510	2843	2' x 3.5'	27.50"	43.00"
380680	2852	2' x 4'	27.50"	51.50"
380740	3636	3' x 3'	36.00"	36.00"
380890	3652	3' x 4'	36.00"	51.50"
380960	4343	3.5' x 3.5'	43.00"	43.00"
381010	4352	3.5' x 4'	43.00"	51.50"
381120	5252	4' x 4'	51.50"	51.50"

CURB MOUNT FIXED SKYLIGHT			
ITEM NO.	PART NO.	DESCRIPTION	MATERIAL
1	VARIES	INSULATED GLASS ASSEMBLY	4HT10– Tg14Ar – 33.2
2	VARIES	BASE FLANGE	PAINTED ALUMINUM ALLOY
3	381091	BASE EXTRUSION PROFILE	RIGID PVC
4	700358	SEALANT	POLYURETHANE
5	620025	TAPE ACRYLIC FOAM	ACYLIC FOAM
6	381076	CLOSED CELL FOAM	EPDM FOAM
7	VARIES	CLEAT	PAINTED ALUMINUM ALLOY
8	700048	RIVET	ALUMINUM ALLOY
9	831162	JOINER PLATE	PAINTED ALUMINUM ALLOY

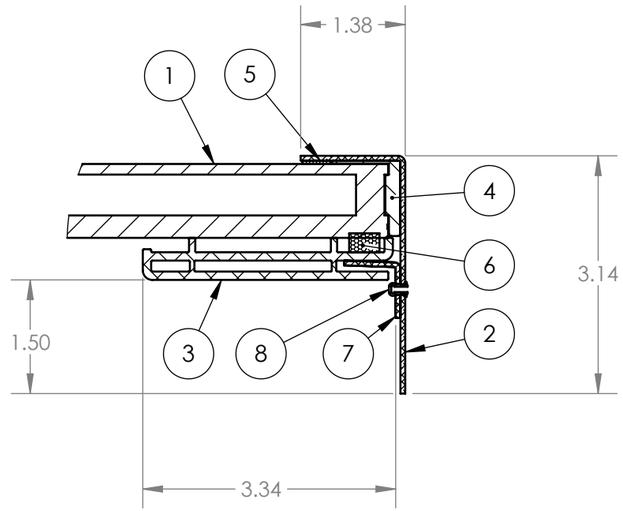


SECTION B-B

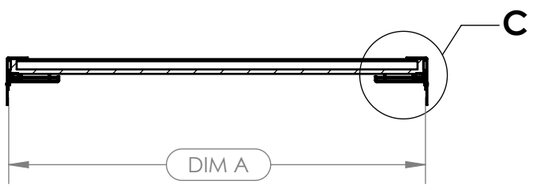




DETAIL D



DETAIL C



SECTION A-A

UNLESS OTHERWISE SPECIFIED:	PROPRIETARY AND CONFIDENTIAL	SOLATUBE® 2210 OAK RIDGE WAY VISTA, CALIFORNIA 92081-8341 PH (760) 597-4400	
TOLERANCES ANGULAR: ±0.5° INCH .X ± .06 .XX ± .01 .XXX ± .005 MILLIMETER [.X] ± 1.5 [.XX] ± .25 [.XXX] ± .125	THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF SOLATUBE. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF SOLATUBE IS PROHIBITED.	TITLE: CURB MOUNT FIXED SKYLIGHT	
MATERIAL -- --	DRAWN BY STEVENS / DATE 8 JUL 19	SIZE B	DWG. NO. HSE-FS / REV 1
FINISH -- --	CHECKED BY -- / DATE --	PROJECTION (3rd)	UNIT INCH [MM] / SCALE: 1:10 / SHEET 1 OF 1
DO NOT SCALE DRAWING	INTERPRET DRAWINGS IAW: ASME Y14.5 - 1994		

REVISIONS					
REV.	ECO	DATE	REVISED	CHECKED	APPROVED
A	3129-1	5/29/2019	CS		
B	3154-1	1/8/2020	CS		

NOTES: UNLESS OTHERWISE SPECIFIED.

1 FINISH:

1.1 ~~POWDER COAT SPEC ACCORDING TO SPEC~~

1.2 BREAK ALL CORNERS AND SHARP EDGES

2. QUALITY ASSURANCE REQUIREMENTS:

2.1 THE SUPPLIER MUST MAINTAIN STATISTICAL PROCESS CONTROL (SPC) OR 100% INSPECTION ON CRITICAL PARAMETERS DURING PRODUCTION.

2.2 FIRST ARTICLE: FIRST ARTICLE VERIFICATION IS REQUIRED PRIOR TO INITIAL TOOL APPROVAL OR APPROVAL OF A TOOL CHANGE.

3. MARKING:

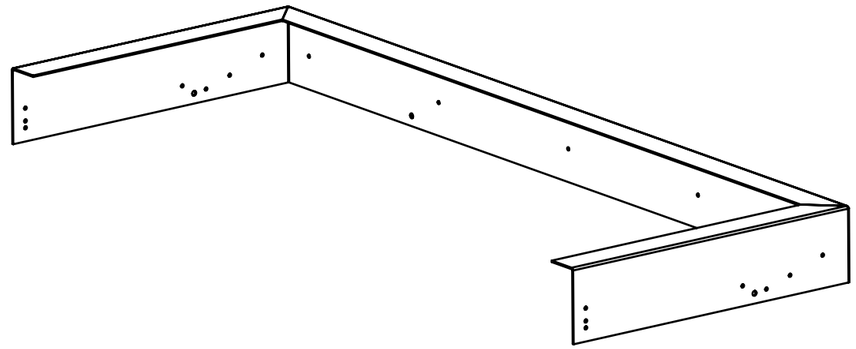
3.1 PART NUMBER AND CURRENT REVISION LEVEL SHALL BE STAMPED IN CONTRASTING INDELIBLE INK AT LOCATION SHOWN.

3.2 IDENTIFY PARTS THAT CANNOT BE STAMPED WITH PART NUMBER AND REVISION LEVEL BY BAG AND/OR TAG METHOD.

4. GENERAL REQUIREMENTS:

4.1 CRITICAL DIMENSIONS ARE DENOTED BY ~~X.XXX~~.

4.2 PART DIMENSIONED PER ANSI Y14.100-2000 STANDARDS



BENT PART NO.	DESCRIPTION	MATERIAL
381251	BASE FLANGE 1.5' X 1.5' BENT	381134
381262	BASE FLANGE 1.5' X 2' BENT	381148
381273	BASE FLANGE 1.5' X 4' BENT	381152
381284	BASE FLANGE 2' X 2' BENT	381166
381295	BASE FLANGE 2' X 3' BENT	381177
381306	BASE FLANGE 2' X 3.5' BENT	381189
381317	BASE FLANGE 2' X 4' BENT	381191
381328	BASE FLANGE 3' X 3' BENT	381205
381339	BASE FLANGE 3' X 4' BENT	381218
381346	BASE FLANGE 3.5' X 3.5' BENT	381222
381353	BASE FLANGE 3.5' X 4' BENT	381237
381362	BASE FLANGE 4' X 4' BENT	381246

UNLESS OTHERWISE SPECIFIED:

TOLERANCES
ANGULAR: ±0.5°

INCH	MILLIMETER
.X ± .03	[.X] ± .75
.XX ± .01	[.XX] ± .25
.XXX ± .005	[.XXX] ± .125

MATERIAL: SEE TABLE

FINISH: --

DO NOT SCALE DRAWING

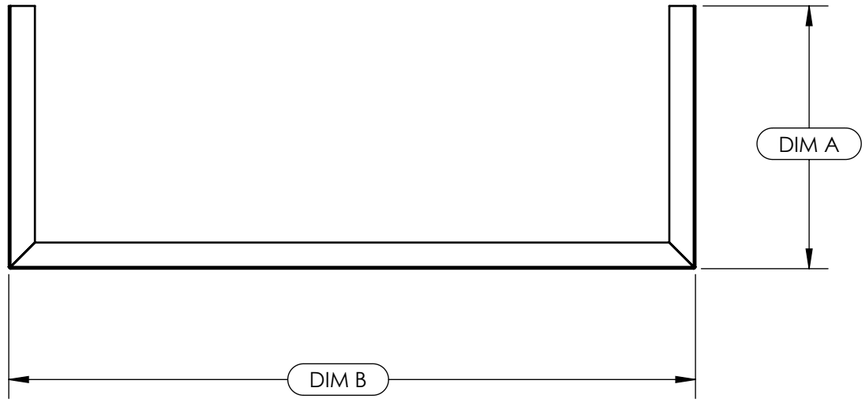
DRAWN BY	STEVENS	DATE 9/24/19
CHECKED BY	--	DATE --
APPROVED BY	--	DATE --

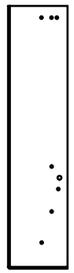
SOLATUBE®
2210 OAK RIDGE WAY
VISTA, CALIFORNIA 92081-8341
PH (760) 597-4400

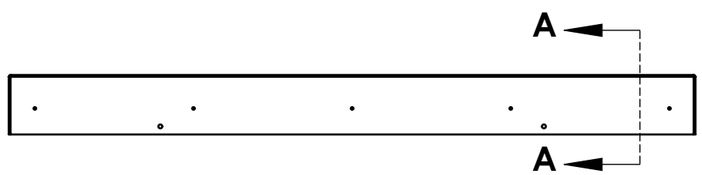
TITLE:

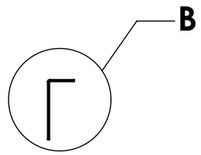
BASE FLANGE BENT

SIZE	PROJECTION	DWG. NO.	REV
B	(3rd)	VARIES	B
	UNIT MM[INCH]	SCALE: 1:6	SHEET 1 OF 2

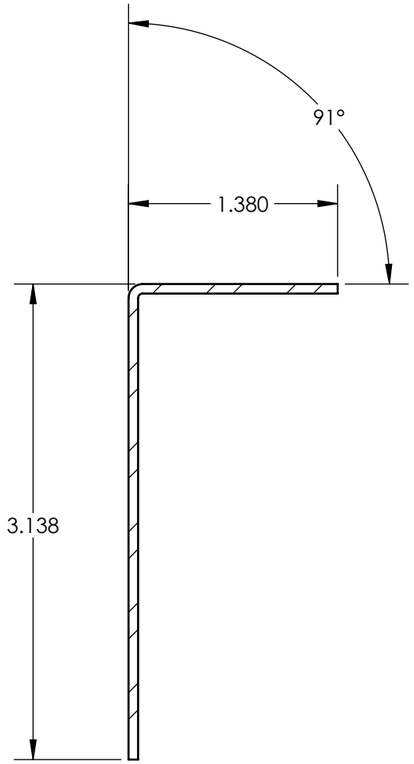








SECTION A-A
SCALE 1 : 8



DETAIL B
SCALE 1 : 1

NOM. SIZE	BENT PART NO.	DESCRIPTION	DIM A	DIM B
1.5 X 1.5	381251	BASE FLANGE 1.5' X 1.5' BENT	10.120	20.254
1.5 X 2	381262	BASE FLANGE 1.5' X 2' BENT	10.120	27.754
1.5 X 4	381273	BASE FLANGE 1.5' X 4' BENT	10.120	51.754
2 X 2	381284	BASE FLANGE 2' X 2' BENT	13.870	27.754
2 X 3	381295	BASE FLANGE 2' X 3' BENT	13.870	36.254
2 X 3.5	381306	BASE FLANGE 2' X 3.5' BENT	13.870	43.254
2 X 4	381317	BASE FLANGE 2' X 4' BENT	13.870	51.754
3 X 3	381328	BASE FLANGE 3' X 3' BENT	18.120	36.254
3 X 4	381339	BASE FLANGE 3' X 4' BENT	18.120	51.754
3.5 X 3.5	381346	BASE FLANGE 3.5' X 3.5' BENT	21.620	43.254
3.5 X 4	381353	BASE FLANGE 3.5' X 4' BENT	21.620	51.754
4 X 4	381362	BASE FLANGE 4' X 4' BENT	25.870	51.754

TITLE:
BASE FLANGE BENT

SIZE	DWG. NO.	REV
B	VARIES	B
	SCALE: 1:12	SHEET 2 OF 2

Solatube International
2210 Oak Ridge Way
Vista, CA 92081

SPECIFICATION / SOURCE CONTROL DRAWING (SCD)

REV	ECO	DESCRIPTION	REV BY	CHECK'D	DATE
A	3094-1	INITIAL RELEASE	CS		
B	3107-1	ADD TOLERANCE	CS		

REGULATORY CONTROLLED: ☐

MATERIAL: ALUMINUM ALLOY 3105

TEMPER: H24

THICKNESS: 14 GAUGE (~.063 INCH)

FINISH: MILLED FINISH

PAINT: NONE

TOLERANCE: LENGTH AND WIDTH: -0/+.0625"; FLATNESS: 6.7 i-UNITS (1/16" per 12")

MANUFACTURER:	MANUFACTURER PART NO.:
SUPPLIER:	SUPPLIER PART NO.:

PART NO.:	DESCRIPTION (30 CHARACTERS PER LINE):	REV:
201895	Line 1: **SHEET ALUM 48 X 56.6 3105 H24** Line 2: **14 GAUGE**	**B**

Attachments:
☐ CATALOG PAGE ☒ VENDOR SPECIFICATION ☐ DRAWING ☐ OTHER
☐ QUOTE ☐ MATERIAL CERTIFICATION ☐ FIRST ARTICLE

ORIGINATOR DATE:	APPROVED BY/ DATE:	SHEET 1 OF **1**
CSTEVENS 10 JUL 19		

Solatube International
2210 Oak Ridge Way
Vista, CA 92081

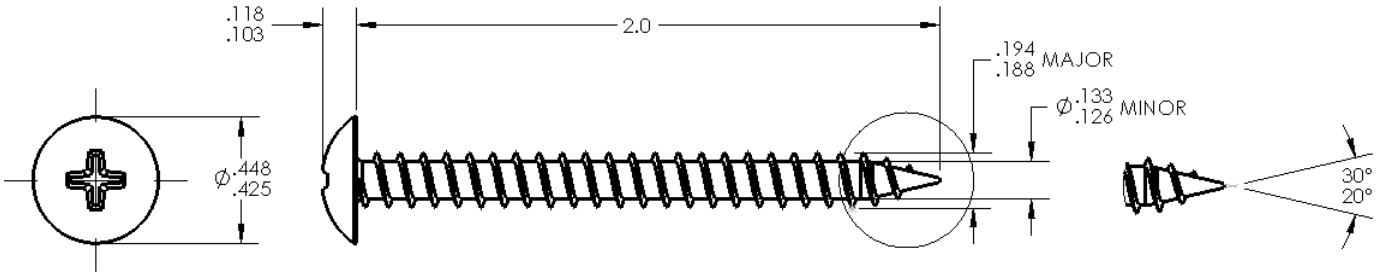
SPECIFICATION / SOURCE CONTROL DRAWING (SCD)

REV	ECO	DESCRIPTION	REV BY	CHECK'D	DATE
F	2248-1	ADD COATING SPEC. REF.	MM	CS	8/27/13
G	2356-1	UPDATE SPEC.	JT	CS	4/14/14
H	2442-1	INCLUDE COATING SPEC IN BOM			

REGULATORY CONTROLLED: ☐ NO / ☒ YES – **CERTIFICATE OF CONFORMANCE REQUIRED**

SCREW

- **TYPE: #10 X 2" SELF PIERCING, PHILLIPS, TRUSS HEAD**
- **THREAD / POINT: TYPE A; 12 THREAD PER INCH; SELF PIERCING TIP (25° ±5°)**
- **MATERIAL: CARBON STEEL AISI 1018-1022 OR EQUAL**
- **FINISH / COATING: REFERNCE STI SPECIFICATION NO. 990005**
- **HARDNESS: SURFACE ROCKWELL C45 MIN. ; CORE ROCKWELL C28-38**



APPROVED MANUFACTURERS:	MANUFACTURER PART NO.:
1. 2. 3.	1. 2. 3.
SUPPLIER:	SUPPLIER PART NO.:

PART NO.:	DESCRIPTION (30 CHARACTERS PER LINE):	REV:
700480	Line 1: **SCREW #10 X 2"SELF PIERCE, PHILLIPS** Line 2: **TRUSS HEAD**	**H**

ATTACHMENTS:
☐ CATALOG PAGE ☐ VENDOR SPECIFICATION ☐ DRAWING ☐ OTHER
☐ QUOTE ☐ MATERIAL CERTIFICATION ☐ FIRST ARTICLE

ORIGINATOR DATE:	APPROVED BY/ DATE:	SHEET 1 OF **1**
CSTEVENS 8/27/13		