BUILDING DROPS

YOU ENVISION IT – WE ENGINEER IT

398 E Dania Beach Blvd. #338
DANIA BEACH, FL 33004
TEL: 954.399-8478 | FAX: 954.744.4738
WEB: www.buildingdrops.com

Product Evaluation Report

of

Hardware and Glass Group LLC
BR80 Railing System with Monolithic/Laminated Glass

Report No. 8127

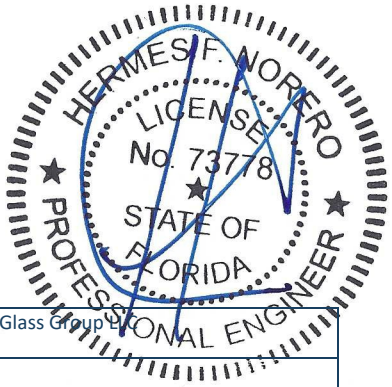
Current Florida Building Code

Category: Railings
Sub-Category Glass Railing

Product: BR80 Railing System with Monolithic/Laminated Glass
Materials: Aluminum 6063-T6

Prepared for:
Hardware and Glass Group LLC
8 The Green Suite #7407
Dover, DE 19901

Prepared by:
Hermes F. Norero, P.E.
Florida Professional Engineer # 73778
Date: 8/3/2022



Contents:

398 E Dania Beach Blvd. #338
DANIA BEACH, FL 33004
TEL: 954.399-8478 | FAX: 954.744.4738
WEB: www.buildingdrops.com

Manufacturer: **Hardware and Glass Group LLC**

Product Name: **BR80 Railing System with Monolithic/Laminated Glass**

Scope: This is a Product Evaluation Report issued by Hermes F. Norero, P.E. (FL # 73778) for **Hardware and Glass Group LLC**.

Hermes F. Norero, P.E. does not have nor will acquire financial interest in the company manufacturing or distributing the product or in any other entity involved in the approval process of the product named herein.

This product has been evaluated for use in locations adhering to the current Edition of the Florida Building Code.

See Installation Instructions **"BR80-T3680"**, signed and sealed by Hermes F. Norero, P.E. (FL # 73778) for specific use parameters.

Limits of Use:

1. This product has been evaluated and is in compliance with the current Edition of the Florida Building Code, excluding the "High Velocity Hurricane Zone" (HVHZ).
2. Product anchors shall be as listed and spaced as shown on details. Anchor embedment into concrete substrate (Min. F'c = Refer to Appendix).
3. When used in areas requiring wind borne debris protection this product complies with Chapter 16 of the current Edition of the Florida Building Code and does require an impact resistant covering in areas requiring Impact Resistance.
4. Site conditions that deviate from the details of drawing **"BR80-T3680"**, require further engineering analysis by a licensed engineer or registered architect.
5. See Installation Instructions **"BR80-T3680"**, for size and design pressure limitations.

398 E Dania Beach Blvd. #338
DANIA BEACH, FL 33004
TEL: 954.399-8478 | FAX: 954.744.4738
WEB: www.buildingdrops.com

Performance Standards: The product described herein has been tested per:

- TAS 202-94 (ASTM E330)
- Concentrated and Distributed Load per the current Florida Building Code, Section 1618.4.6
- ANSI Z97.1

Referenced Data:

1. Product Testing performed by **Blackwater Testing Inc.**
   (FBC Organization # TST10394)
   Report #: BT-HWG-19-001 Report Date: 12/06/2019
   Signed and sealed by Constantin Bortes, FL PE #77915

Installation:

Refer to Installation Instructions (**"BR80-T3680"**) for more details of the installation details.

Design Pressure:

Refer to Installation Instructions (**"BR80-T3680"**) for design pressures dependent on reinforcements, hardware type, configuration, and size of units.

398 E Dania Beach Blvd. #338
DANIA BEACH, FL 33004
TEL: 954.399-8478 | FAX: 954.744.4738
WEB: www.buildingdrops.com

APPENDIX

398 E Dania Beach Blvd. #338
DANIA BEACH, FL 33004
TEL: 954.399-8478 | FAX: 954.744.4738
WEB: www.buildingdrops.com

13/16” Laminated Glass (Tested)

Glass Calculations

Wind Load Tables

398 E Dania Beach Blvd. #338
DANIA BEACH, FL 33004
TEL: 954.399-8478 | FAX: 954.744.4738
WEB: www.buildingdrops.com

WIND LOAD ANALYSIS

To not exceed the maximum stress and deflection of the glass from the analysis, the glass has been analyzed under the following cases for sizes different than tested, but within the square footage of the testing.

- **Live Load:**
  - **50 lb/ft distributed load:** The distributed load has been considered for the stress and deflection limitations for the glass.
    - Stress: The allowable glass stress is 6000 psi (24000 psi with a safety factor of 4).

$$H_{D.L.O.} = \frac{12 * \theta * [1/6 * ta^2]}{50\ lb/ft}$$

    - Deflection: 1" max.

$$Deflection = \frac{50\ lb * {H_{D.L.O.}}^3}{3 * 10.4 * 10^6\ psi * b * ta^3}$$

$$H_{D.L.O.} = \sqrt[3]{\frac{3 * 10.4 * 10^6\ psi * b * ta^3 * Deflection}{50\ lb}}$$

$H_{D.L.O.}$= Unsupported glass height, in.
$b =$ Glass pane width, in.
$Deflection =$ 1 in.
$\boldsymbol{\theta} =$ Allowable Glass Stress, psi.
$ta =$ Effective Glass Thickness, in.

  - **Concentrated Load:** The concentrated load has been considered for the stress and deflection limitations using the following values:
    - Stress: The allowable glass stress is 6000 psi (24000 psi with a safety factor of 4).

$$H_{D.L.O.} = \frac{12 * \theta * \left[\frac{1}{6} * b * ta^2\right]}{200\ lb}$$

    - Deflection: 1" max.

$$Deflection = \frac{200\ lb * {H_{D.L.O.}}^3 * [1 + b/(H_{D.L.O.}/2)]^{1/2}}{3 * 10.4 * 10^6\ psi * b * ta^3}$$

$H_{D.L.O.}$= Unsupported glass height, in.
$b =$ Glass pane width, in.
$Deflection =$ 1 in.
$\boldsymbol{\theta} =$ Allowable Glass Stress, psi.
$ta =$ Effective Glass Thickness, in.
*The concentrated load maximum D.L.O. Height was obtained using iterations.

398 E Dania Beach Blvd. #338
DANIA BEACH, FL 33004
TEL: 954.399-8478 | FAX: 954.744.4738
WEB: www.buildingdrops.com

- **Wind Load:**
  - **Design Pressure:** The design pressure proposed for different glass dimensions is based on the equivalent pressure require to produce the same moment at the base of unsupported glass (top of base shoe). Deflection measurements were also simulated using Kuraray Co., Ltd.'s Glass Calculator and Window Glass Design 5 by Standards Design Group, Inc. Deflections were limited to H/24 + L/96 or H/12, whichever lower, according to ASTM E2358 requirements.

$$M_0 = M_x$$

$$M_0 = \frac{DP_x * {H_{D.L.O.}}^2}{2 * 144}$$

$$DP_x = \frac{2 * 144 * M_0}{{H_{D.L.O.}}^2}$$

$M_0 =$ Moment from testing, lb-in/in.
$H_{D.L.O.}=$ Unsupported glass height, in.
$DP_x =$ Design Pressure for a specific glass D.L.O. Height, psf.

Test Report Data

Glass:		
Glass pane width:	48.03	in
Unsupported Glass Pane Height	39.81	in
Design Pressure	50.00	psf
Single Lite Thickness	0.38	in
Interlayer Thickness	0.09	in
Glass Section Modulus	0.02	in^3/in
Area of Glass Tested:	13.28	ft²
Tested Moment at base of unsupported glass:	275.15	lb-in/in
Glass Stress	24000	psi
Safety Factor	4	
Allowable Glass Stress	6000	psi
Max. Deflection:		
ICC AC 439 (200 lbs Conc. Load & 50 plf Dist. Load)	1	in
ASTM E2358 (h/24 + l/96 or h/12, Wind Loads)	2.16	in

398 E Dania Beach Blvd. #338
DANIA BEACH, FL 33004
TEL: 954.399-8478 | FAX: 954.744.4738
WEB: www.buildingdrops.com

Deflection values were limited based on the required measurements below,

Max Deflection per H/24 + L/96 (in)							
		D.L.O Height					
		36	39.81	42	48	60	72
D.L.O Width	12	1.63	1.78	1.88	2.13	2.63	3.13
	24	1.75	1.91	2.00	2.25	2.75	3.25
	36	1.88	2.03	2.13	2.38	2.88	3.38
	48	2.00	2.16	2.25	2.50	3.00	3.50
	60	2.13	2.28	2.38	2.63	3.13	3.63
	72	2.25	2.41	2.50	2.75	3.25	3.75

Max Deflection per H/12 (in)							
		Railing Height					
		40	44	46	52	64	76
Railing Width	12	3.33	3.67	3.83	4.33	5.33	6.33
	24	3.33	3.67	3.83	4.33	5.33	6.33
	36	3.33	3.67	3.83	4.33	5.33	6.33
	48	3.33	3.67	3.83	4.33	5.33	6.33
	60	3.33	3.67	3.83	4.33	5.33	6.33
	72	3.33	3.67	3.83	4.33	5.33	6.33

398 E Dania Beach Blvd. #338
DANIA BEACH, FL 33004
TEL: 954.399-8478 | FAX: 954.744.4738
WEB: www.buildingdrops.com

Results

Concentrated Load Height Iterations (Fall Protection Requirements Only)

Glass Width		12
Height	Deflection	Target Deflection
50	0.91	1.00
52.29	1.03	
51.56	0.99	
51.79	1.00	
51.72	1.00	
51.74	1.00	
51.73	1.00	
51.74	1.00	
51.73	1.00	
51.74	1.00	
51.74	1.00	
51.74	1.00	
51.74	1.00	
51.74	1.00	
51.74	1.00	

Glass Width		24
Height	Deflection	Target Deflection
50.00	0.35	1.00
84.23	1.36	
72.17	0.91	
75.63	1.03	
74.58	0.99	
74.89	1.00	
74.80	1.00	
74.83	1.00	
74.82	1.00	
74.82	1.00	
74.82	1.00	
74.82	1.00	
74.82	1.00	
74.82	1.00	
74.82	1.00	

Glass Width		36
Height	Deflection	Target Deflection
50.00	0.21	1.00
109.33	1.57	
87.34	0.88	
93.34	1.04	
91.54	0.99	
92.07	1.00	
91.91	1.00	
91.96	1.00	
91.94	1.00	
91.95	1.00	
91.95	1.00	
91.95	1.00	
91.95	1.00	
91.95	1.00	
91.95	1.00	

Glass Width		48
Height	Deflection	Target Deflection
100	0.90	1.00
105.44	1.03	
103.85	0.99	
104.31	1.00	
104.17	1.00	
104.21	1.00	
104.20	1.00	
104.20	1.00	
104.20	1.00	
104.20	1.00	
104.20	1.00	
104.20	1.00	
104.20	1.00	
104.20	1.00	
104.20	1.00	

Glass Width		60
Height	Deflection	Target Deflection
100.00	0.73	1.00
117.38	1.09	
112.18	0.97	
113.64	1.01	
113.22	1.00	
113.34	1.00	
113.31	1.00	
113.32	1.00	
113.32	1.00	
113.32	1.00	
113.32	1.00	
113.32	1.00	
113.32	1.00	
113.32	1.00	
113.32	1.00	

Glass Width		72
Height	Deflection	Target Deflection
110.00	0.79	1.00
123.52	1.07	
119.58	0.98	
120.68	1.01	
120.37	1.00	
120.45	1.00	
120.43	1.00	
120.44	1.00	
120.43	1.00	
120.43	1.00	
120.43	1.00	
120.43	1.00	
120.43	1.00	
120.43	1.00	
120.43	1.00	

398 E Dania Beach Blvd. #338
DANIA BEACH, FL 33004
TEL: 954.399-8478 | FAX: 954.744.4738
WEB: www.buildingdrops.com

GLASS PANE WIDTH (IN)	EFFECTIVE GLASS THICKNESS		MOMENT AT TOP OF BASE SHOE (LB-IN/IN)	ALLOWABLE DESIGN PRESSURE (PSF)						200 LB LIVE LOAD		50 LB/FT LIVE LOAD	
	DEFLECTION (IN)	STRESS (IN)		UNSUPPORTED GLASS HEIGHT (IN)						MAX. UNSSUPORTED GLASS HEIGHT (IN)		MAX. UNSSUPORTED GLASS HEIGHT (IN)	
				36	39.81	42	48	60	72	STRESS	DEFLECTION	STRESS	DEFLECTION
12	0.5240	0.5907	275.1	61.1	50.0	44.9	34.4	22.0	15.3	20.9	51.7	83.7	44.8
24	0.6269	0.6880	275.1	61.1	50.0	44.9	34.4	22.0	15.3	56.8	74.8	113.6	53.6
36	0.6913	0.7365	275.1	61.1	50.0	44.9	34.4	22.0	15.3	97.6	91.9	130.2	59.1
48	0.7281	0.7603	275.1	61.1	50.0	44.9	34.4	22.0	15.3	138.7	104.2	138.7	62.2
60	0.7498	0.7731	275.1	61.1	50.0	44.9	34.4	22.0	15.3	179.3	113.3	143.4	64.1
72	0.7633	0.7806	275.1	61.1	50.0	44.9	34.4	22.0	15.3	219.4	120.4	146.3	65.2

398 E Dania Beach Blvd. #338
DANIA BEACH, FL 33004
TEL: 954.399-8478 | FAX: 954.744.4738
WEB: www.buildingdrops.com

1/2” Monolithic Glass

Glass Calculations

Wind Load Tables

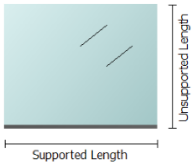
398 E Dania Beach Blvd. #338
DANIA BEACH, FL 33004
TEL: 954.399-8478 | FAX: 954.744.4738
WEB: www.buildingdrops.com

Input

July 21, 2022

Glazing Information

Supported Edges:	One side Supported
Shape:	Rectangular
Unsupported Length:	39.0 in.
Supported Length:	48.0 in.
Glazing Angle:	90.0 °



Glazing Construction (Single Glazed Lite)

Single Lite Properties (Monolithic)

Thickness:	1/2 in.
Heat Treatment:	Fully Tempered

Applied Loads

Description	Load	Duration
Short Duration	50.0 psf	3.00 sec

Project Description: Hardware And Glass Shoe and Anchor Options	Date: August 3, 2022	Customer: Hardware and Glass Group LLC	
		Project #: EEV-22-0712	
	Engineer: LL	PER: 8127	Page #: Page 12 of 60

398 E Dania Beach Blvd. #338
DANIA BEACH, FL 33004
TEL: 954.399-8478 | FAX: 954.744.4738
WEB: www.buildingdrops.com

ASTM E1300 Ext. Basic (8/1000)

Load Resistance Report

July 21, 2022

Glazing Construction (Single Glazed Lite)

Single Lite Properties (Monolithic)

Thickness:	1/2 in.
Heat Treatment:	Fully Tempered

Load Resistance

Short Duration (3 Sec)

Description	NFL	GTF	LR
Single Lite	16.7 psf	4.00	66.6 psf

Comparisons

Scenario - Short Duration

50.0 psf 3.00 sec <= 66.6 psf — OK

Approximate edge of glass deflection

Single Lite — 1.21 in.

Notes

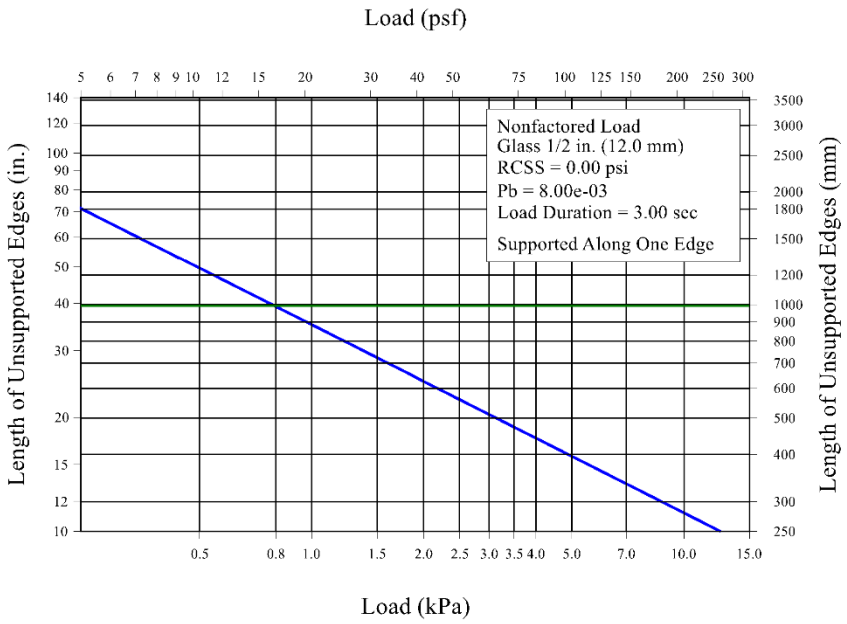
Load resistance values are computed in accordance with ASTM E1300-16 Section 6.2 and are based on non-factored load values calculated in a manner consistent with those presented in ASTM E1300-16.

398 E Dania Beach Blvd. #338
DANIA BEACH, FL 33004
TEL: 954.399-8478 | FAX: 954.744.4738
WEB: www.buildingdrops.com

ASTM E1300 Ext. Basic (8/1000)

Load Resistance Details

July 21, 2022



Project Description: Hardware And Glass Shoe and Anchor Options	Date: August 3, 2022	Customer: Hardware and Glass Group LLC	
		Project #: EEV-22-0712	
	Engineer: LL	PER: 8127	Page #: Page 14 of 60

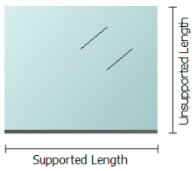
398 E Dania Beach Blvd. #338
DANIA BEACH, FL 33004
TEL: 954.399-8478 | FAX: 954.744.4738
WEB: www.buildingdrops.com

Input

July 29, 2022

Glazing Information

Supported Edges:	One side Supported
Shape:	Rectangular
Unsupported Length:	60.0 in.
Supported Length:	72.0 in.
Glazing Angle:	90.0 °



Glazing Construction (Single Glazed Lite)

Single Lite Properties (Monolithic)

Thickness:	1/2 in.
Heat Treatment:	Fully Tempered

Applied Loads

Description	Load	Duration
Short Duration	19.4 psf	3.00 sec

Project Description: Hardware And Glass Shoe and Anchor Options	Date: August 3, 2022	Customer: Hardware and Glass Group LLC	
		Project #: EEV-22-0712	
	Engineer: LL	PER: 8127	Page #: Page 15 of 60

398 E Dania Beach Blvd. #338
DANIA BEACH, FL 33004
TEL: 954.399-8478 | FAX: 954.744.4738
WEB: www.buildingdrops.com

ASTM E1300 Ext. Basic (8/1000)

Load Resistance Report

July 29, 2022

Glazing Construction (Single Glazed Lite)

Single Lite Properties (Monolithic)

Thickness:	1/2 in.
Heat Treatment:	Fully Tempered

Load Resistance

Short Duration (3 Sec)

Description	NFL	GTF	LR
Single Lite	7.0 psf	4.00	28.2 psf

Comparisons

Scenario - Short Duration

19.4 psf 3.00 sec <= 28.2 psf OK

Approximate edge of glass deflection

Single Lite 2.62 in.

Notes

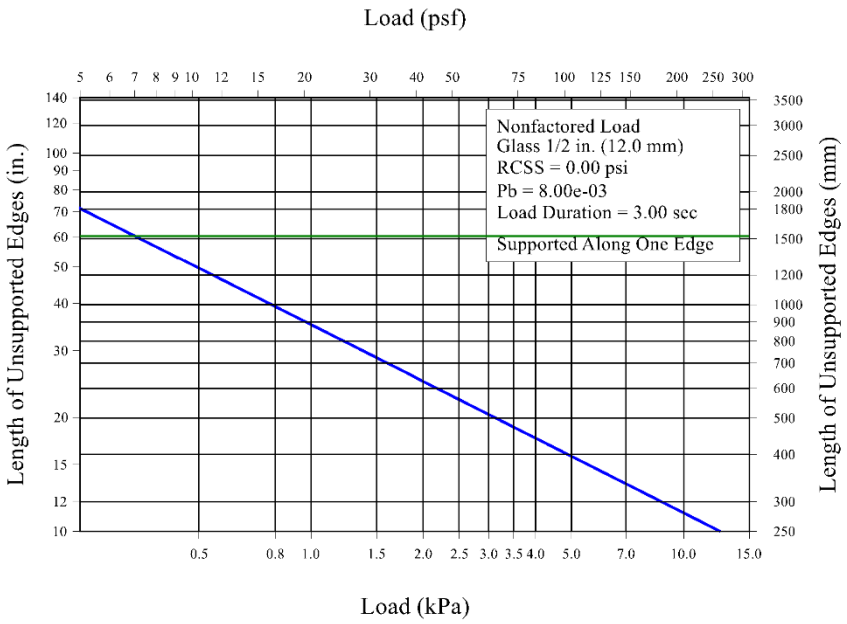
Load resistance values are computed in accordance with ASTM E1300-16 Section 6.2 and are based on non-factored load values calculated in a manner consistent with those presented in ASTM E1300-16.

398 E Dania Beach Blvd. #338
DANIA BEACH, FL 33004
TEL: 954.399-8478 | FAX: 954.744.4738
WEB: www.buildingdrops.com

ASTM E1300 Ext. Basic (8/1000)

Load Resistance Details

July 29, 2022



Project Description: Hardware And Glass Shoe and Anchor Options	Date: August 3, 2022	Customer: Hardware and Glass Group LLC	
		Project #: EEV-22-0712	
	Engineer: LL	PER: 8127	Page #: Page 17 of 60

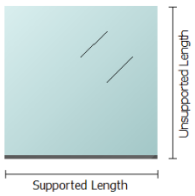
398 E Dania Beach Blvd. #338
DANIA BEACH, FL 33004
TEL: 954.399-8478 | FAX: 954.744.4738
WEB: www.buildingdrops.com

Input

July 29, 2022

Glazing Information

Supported Edges:	One side Supported
Shape:	Rectangular
Unsupported Length:	72.0 in.
Supported Length:	72.0 in.
Glazing Angle:	90.0 °



Glazing Construction (Single Glazed Lite)

Single Lite Properties (Monolithic)

Thickness:	1/2 in.
Heat Treatment:	Fully Tempered

Applied Loads

Description	Load	Duration
Short Duration	11.1 psf	3.00 sec

Project Description: Hardware And Glass Shoe and Anchor Options	Date: August 3, 2022	Customer: Hardware and Glass Group LLC	
		Project #: EEV-22-0712	
	Engineer: LL	PER: 8127	Page #: Page 18 of 60

398 E Dania Beach Blvd. #338
DANIA BEACH, FL 33004
TEL: 954.399-8478 | FAX: 954.744.4738
WEB: www.buildingdrops.com

ASTM E1300 Ext. Basic (8/1000)

Load Resistance Report

July 29, 2022

Glazing Construction (Single Glazed Lite)

Single Lite Properties (Monolithic)

Thickness:	1/2 in.
Heat Treatment:	Fully Tempered

Load Resistance

Short Duration (3 Sec)

Description	NFL	GTF	LR
Single Lite	4.9 psf	4.00	19.6 psf

Comparisons

Scenario - Short Duration

11.1 psf 3.00 sec <= 19.6 psf — OK

Approximate edge of glass deflection

Single Lite — 3.11 in.

Notes

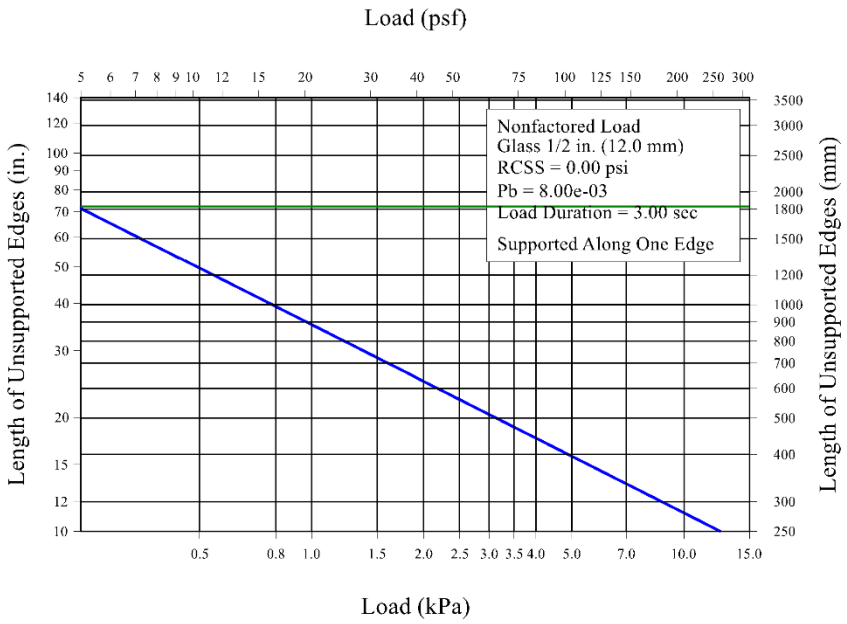
Load resistance values are computed in accordance with ASTM E1300-16 Section 6.2 and are based on non-factored load values calculated in a manner consistent with those presented in ASTM E1300-16.

398 E Dania Beach Blvd. #338
DANIA BEACH, FL 33004
TEL: 954.399-8478 | FAX: 954.744.4738
WEB: www.buildingdrops.com

ASTM E1300 Ext. Basic (8/1000)

Load Resistance Details

July 29, 2022



Project Description: Hardware And Glass Shoe and Anchor Options	Date: August 3, 2022	Customer: Hardware and Glass Group LLC	
		Project #: EEV-22-0712	
	Engineer: LL	PER: 8127	Page #: Page 20 of 60

398 E Dania Beach Blvd. #338
DANIA BEACH, FL 33004
TEL: 954.399-8478 | FAX: 954.744.4738
WEB: www.buildingdrops.com

Glass Composition

Glass:		
Glass pane width:	48.03	in
Unsupported Glass Pane Height	39.81	in
Design Pressure	50.00	psf
Single Lite Thickness	0.50	in
Interlayer Thickness	N/A	in
Glass Section Modulus	0.04	in^3/in
Area of Glass Tested:	13.28	ft²
Tested Moment at base of unsupported glass:	275.15	lb-in/in
Glass Stress	24000	psi
Safety Factor	4	
Allowable Glass Stress	6000	psi
Max. Deflection:		
ICC AC 439 (200 lbs Conc. Load & 50 plf Dist. Load)	1	in
ASTM E2358 (h/24 + l/96 or h/12, Wind Loads)	2.16	in

Results

Concentrated Load Height Iterations (Fall Protection Requirements Only)

Glass Width		12
Height	Deflection	Target Deflection
50	1.27	1.00
44.42	0.93	
46.09	1.02	
45.57	0.99	
45.73	1.00	
45.68	1.00	
45.69	1.00	
45.69	1.00	
45.69	1.00	
45.69	1.00	
45.69	1.00	
45.69	1.00	
45.69	1.00	
45.69	1.00	
45.69	1.00	
45.69	1.00	

Glass Width		24
Height	Deflection	Target Deflection
50.00	0.84	1.00
54.68	1.05	
53.29	0.99	
53.69	1.00	
53.57	1.00	
53.61	1.00	
53.60	1.00	
53.60	1.00	
53.60	1.00	
53.60	1.00	
53.60	1.00	
53.60	1.00	
53.60	1.00	
53.60	1.00	
53.60	1.00	
53.60	1.00	

Glass Width		36
Height	Deflection	Target Deflection
50.00	0.67	1.00
61.29	1.12	
57.91	0.97	
58.84	1.01	
58.58	1.00	
58.65	1.00	
58.63	1.00	
58.63	1.00	
58.63	1.00	
58.63	1.00	
58.63	1.00	
58.63	1.00	
58.63	1.00	
58.63	1.00	
58.63	1.00	
58.63	1.00	

398 E Dania Beach Blvd. #338
DANIA BEACH, FL 33004
TEL: 954.399-8478 | FAX: 954.744.4738
WEB: www.buildingdrops.com

Glass Width		48
Height	Deflection	Target Deflection
100	3.34	1.00
54.68	0.71	
64.70	1.10	
61.79	0.98	
62.58	1.01	
62.36	1.00	
62.42	1.00	
62.41	1.00	
62.41	1.00	
62.41	1.00	
62.41	1.00	
62.41	1.00	
62.41	1.00	
62.41	1.00	
62.41	1.00	
62.41	1.00	

Glass Width		60
Height	Deflection	Target Deflection
100.00	2.95	1.00
58.25	0.74	
67.56	1.08	
64.91	0.98	
65.62	1.01	
65.42	1.00	
65.48	1.00	
65.46	1.00	
65.46	1.00	
65.46	1.00	
65.46	1.00	
65.46	1.00	
65.46	1.00	
65.46	1.00	
65.46	1.00	
65.46	1.00	

Glass Width		72
Height	Deflection	Target Deflection
110.00	3.40	1.00
59.69	0.72	
70.47	1.09	
67.41	0.98	
68.22	1.01	
68.00	1.00	
68.06	1.00	
68.04	1.00	
68.05	1.00	
68.05	1.00	
68.05	1.00	
68.05	1.00	
68.05	1.00	
68.05	1.00	
68.05	1.00	
68.05	1.00	

- Using methods previously described,

GLASS PANE WIDTH (IN)	EFFECTIVE GLASS THICKNESS (IN)	MOMENT AT TOP OF BASE SHOE (LB-IN/IN)	ALLOWABLE DESIGN PRESSURE (PSF)						200 LB LIVE LOAD		50 LB/FT LIVE LOAD	
			UNSUPPORTED GLASS HEIGHT (IN)						MAX. UNSSUPORTED GLASS HEIGHT (IN)		MAX. UNSSUPORTED GLASS HEIGHT (IN)	
			36	39.81	42	48	60	72	STRESS	DEFLECTION	STRESS	DEFLECTION
12	0.47	275.1	61.1	50.0	44.9	34.4	19.4	11.1	13.3	45.7	53.0	40.2
24	0.47	275.1	61.1	50.0	44.9	34.4	19.4	11.1	26.5	53.6	53.0	40.2
36	0.47	275.1	61.1	50.0	44.9	34.4	22.0	11.1	39.8	58.6	53.0	40.2
48	0.47	275.1	61.1	50.0	44.9	34.4	22.0	11.1	53.0	62.4	53.0	40.2
60	0.47	275.1	61.1	50.0	44.9	34.4	22.0	11.1	66.3	65.5	53.0	40.2
72	0.47	275.1	61.1	50.0	44.9	34.4	22.0	11.1	79.5	68.0	53.0	40.2

398 E Dania Beach Blvd. #338
DANIA BEACH, FL 33004
TEL: 954.399-8478 | FAX: 954.744.4738
WEB: www.buildingdrops.com

9/16” Laminated Glass

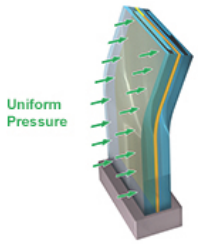
Glass Calculations

Wind Load Tables

398 E Dania Beach Blvd. #338
DANIA BEACH, FL 33004
TEL: 954.399-8478 | FAX: 954.744.4738
WEB: www.buildingdrops.com

Your calculated results

SIDE SUPPORTED BEAM **PROJECT TITLE:** **FIRM NAME: Hardware and Glass**



Calculation according to ASTM E1300
Results do not include gravity

*= Field requires no data input by user

Case 3: Uniform Pressure (psi)

Glass Span:	39	(in)
Uniform Load:	.347	(psi)

GLASS PROPERTIES:

Type of Glass:	Tempered Glass	
Nominal Single Glass Thickness:	1/4	
Minimum Single Glass Thickness*:	0.219	(in)
Allowable Stress*:	10616.76242	(psi)

INTERLAYER:

Thickness:	0.060	(in)

INTERLAYER PROPERTIES:

Load Duration:	3 s
Temperature:	75° F

Material	Shear Modulus	Youngs Modulus
SentryGlas®	27985 psi	81345 psi
Standard PVB	140.8 psi	422.3 psi
Trosifol® EXTRA STIFF	8412.19 psi	24511.4 psi

Your calculated results:

398 E Dania Beach Blvd. #338
DANIA BEACH, FL 33004
TEL: 954.399-8478 | FAX: 954.744.4738
WEB: www.buildingdrops.com

Effective Thickness for Glass Stress	SentryGlas®:	0.497 in
	Trosifol® EXTRA STIFF	0.494 in
	Standard PVB:	0.401 in
Effective Thickness for Laminate Deflection	SentryGlas®:	0.496 in
	Trosifol® EXTRA STIFF	0.491 in
	Standard PVB:	0.359 in
Glass Stress ✔ Meets ASTM E1300 ✖ Fails ASTM E1300	SentryGlas®:	✔ 6423.052 psi
	Trosifol® EXTRA STIFF	✔ 6482.977 psi
	Standard PVB:	✔ 9861.461 psi
Laminate Deflection	SentryGlas®:	0.951 in
	Trosifol® EXTRA STIFF	0.979 in
	Standard PVB:	2.507 in

Calculation according to ASTM E1300

PRINT RESULTS DOWNLOAD RESULTS NEW CALCULATON

Disclaimer

The information provided is offered for assistance in application of Kuraray Glass Laminating Solutions laminating interlayer products, but IT DOES NOT CONSTITUTE A WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE. Actual performance may vary in particular applications.

Kuraray Glass Laminating Solutions laminate analysis procedures are believed to give adequate estimates of deformation of laminated glass based upon best engineering judgment and practices but no claims are made as to the accuracy of the results obtained. Users will need to satisfy themselves that the results are reasonable for their purposes. The performance of the final construction should be measured before adoption to meet a specification. Any use of the information provided is the sole responsibility of the user. Furthermore, conclusions drawn from the information provided should be checked against building code requirements in the jurisdiction of the construction.

Because Kuraray Glass Laminating Solutions cannot anticipate or control the many different conditions under which this information and or product may be used, it does not guarantee the applicability or the accuracy of this information or the suitability of its products in any given situation. Users of Kuraray Glass Laminating Solutions products should make their own tests to determine the suitability of each such product for their particular purposes.

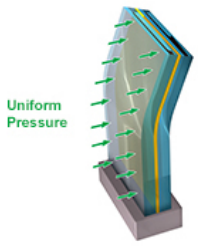
NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, OR MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR ANY OTHER NATURE ARE MADE HEREUNDER WITH RESPECT TO INFORMATION OR THE PRODUCT TO WHICH THE INFORMATION REFERS.

SentryGlas® is a registered trademark of E. I. du Pont de Nemours and Company or its affiliates for its brand of interlayers. It is used under license by Kuraray.

398 E Dania Beach Blvd. #338
DANIA BEACH, FL 33004
TEL: 954.399-8478 | FAX: 954.744.4738
WEB: www.buildingdrops.com

Your calculated results

SIDE SUPPORTED BEAM **PROJECT TITLE:** **FIRM NAME: Hardware and Glass**



Calculation according to ASTM E1300
Results do not include gravity

*= Field requires no data input by user

Case 3: Uniform Pressure (psi)

Glass Span:	72	(in)
Uniform Load:	0.099	(psi)

GLASS PROPERTIES:

Type of Glass:	Tempered Glass	
Nominal Single Glass Thickness:	1/4	
Minimum Single Glass Thickness*:	0.219	(in)
Allowable Stress*:	10616.76242	(psi)

INTERLAYER:

Thickness:	0.060	(in)

INTERLAYER PROPERTIES:

Load Duration:	3 s	
Temperature:	75° F	

Material	Shear Modulus	Youngs Modulus
SentryGlas®	27985 psi	81345 psi
Standard PVB	140.8 psi	422.3 psi
Trosifol® EXTRA STIFF	8412.19 psi	24511.4 psi

Your calculated results:

398 E Dania Beach Blvd. #338
DANIA BEACH, FL 33004
TEL: 954.399-8478 | FAX: 954.744.4738
WEB: www.buildingdrops.com

Effective Thickness for Glass Stress	SentryGlas®:	0.497 in
	Trosifol® EXTRA STIFF	0.497 in
	Standard PVB:	0.452 in
Effective Thickness for Laminate Deflection	SentryGlas®:	0.497 in
	Trosifol® EXTRA STIFF	0.496 in
	Standard PVB:	0.422 in
Glass Stress Meets ASTM E1300 Fails ASTM E1300	SentryGlas®:	6225.647 psi
	Trosifol® EXTRA STIFF	6243.211 psi
	Standard PVB:	7522.743 psi
Laminate Deflection	SentryGlas®:	3.124 in
	Trosifol® EXTRA STIFF	3.151 in
	Standard PVB:	5.125 in

Calculation according to ASTM E1300

PRINT RESULTS DOWNLOAD RESULTS NEW CALCULATON

Disclaimer

The information provided is offered for assistance in application of Kuraray Glass Laminating Solutions laminating interlayer products, but IT DOES NOT CONSTITUTE A WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE. Actual performance may vary in particular applications.

Kuraray Glass Laminating Solutions laminate analysis procedures are believed to give adequate estimates of deformation of laminated glass based upon best engineering judgment and practices but no claims are made as to the accuracy of the results obtained. Users will need to satisfy themselves that the results are reasonable for their purposes. The performance of the final construction should be measured before adoption to meet a specification. Any use of the information provided is the sole responsibility of the user. Furthermore, conclusions drawn from the information provided should be checked against building code requirements in the jurisdiction of the construction.

Because Kuraray Glass Laminating Solutions cannot anticipate or control the many different conditions under which this information and or product may be used, it does not guarantee the applicability or the accuracy of this information or the suitability of its products in any given situation. Users of Kuraray Glass Laminating Solutions products should make their own tests to determine the suitability of each such product for their particular purposes.

NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, OR MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR ANY OTHER NATURE ARE MADE HEREUNDER WITH RESPECT TO INFORMATION OR THE PRODUCT TO WHICH THE INFORMATION REFERS.

SentryGlas® is a registered trademark of E. I. du Pont de Nemours and Company or its affiliates for its brand of interlayers. It is used under license by Kuraray.

398 E Dania Beach Blvd. #338
DANIA BEACH, FL 33004
TEL: 954.399-8478 | FAX: 954.744.4738
WEB: www.buildingdrops.com

Glass Composition

Glass:		
Glass pane width:	48.03	in
Unsupported Glass Pane Height	39.81	in
Design Pressure	50.00	psf
Single Lite Thickness	0.25	in
Interlayer Thickness	0.06	in
Glass Section Modulus	0.01	in^3/in
Area of Glass Tested:	13.28	ft²
Tested Moment at base of unsupported glass:	275.15	lb-in/in
Glass Stress	24000	psi
Safety Factor	4	
Allowable Glass Stress	6000	psi
Max. Deflection		
ICC AC 439 (200 lbs Conc. Load & 50 plf Dist. Load)	1	in
ASTM E2358 (h/24 + l/96 or h/12, Wind Loads)	2.16	in

Results

Concentrated Load Height Iterations (Fall Protection Requirements Only)

Glass Width		12
Height	Deflection	Target Deflection
50	2.74	1.00
30.23	0.74	
35.22	1.09	
33.66	0.97	
34.12	1.01	
33.98	1.00	
34.02	1.00	
34.01	1.00	
34.01	1.00	
34.01	1.00	
34.01	1.00	
34.01	1.00	
34.01	1.00	
34.01	1.00	
34.01	1.00	
34.01	1.00	

Glass Width		24
Height	Deflection	Target Deflection
50.00	1.07	1.00
48.41	0.98	
48.86	1.01	
48.73	1.00	
48.77	1.00	
48.76	1.00	
48.76	1.00	
48.76	1.00	
48.76	1.00	
48.76	1.00	
48.76	1.00	
48.76	1.00	
48.76	1.00	
48.76	1.00	
48.76	1.00	
48.76	1.00	

Glass Width		36
Height	Deflection	Target Deflection
50.00	0.70	1
59.90	1.11	
56.96	0.97	
57.77	1.01	
57.54	1.00	
57.61	1.00	
57.59	1.00	
57.59	1.00	
57.59	1.00	
57.59	1.00	
57.59	1.00	
57.59	1.00	
57.59	1.00	
57.59	1.00	
57.59	1.00	
57.59	1.00	

398 E Dania Beach Blvd. #338
DANIA BEACH, FL 33004
TEL: 954.399-8478 | FAX: 954.744.4738
WEB: www.buildingdrops.com

Glass Width		48
Height	Deflection	Target Deflection
100	3.21	1.00
55.82	0.72	
65.68	1.09	
62.82	0.98	
63.59	1.01	
63.38	1.00	
63.44	1.00	
63.42	1.00	
63.42	1.00	
63.42	1.00	
63.42	1.00	
63.42	1.00	
63.42	1.00	
63.42	1.00	
63.42	1.00	
63.42	1.00	

Glass Width		60
Height	Deflection	Target Deflection
100.00	2.71	1.00
60.80	0.76	
69.70	1.08	
67.17	0.98	
67.85	1.01	
67.66	1.00	
67.71	1.00	
67.70	1.00	
67.70	1.00	
67.70	1.00	
67.70	1.00	
67.70	1.00	
67.70	1.00	
67.70	1.00	
67.70	1.00	
67.70	1.00	

Glass Width		72
Height	Deflection	Target Deflection
110.00	3.04	1.00
63.09	0.74	
73.39	1.08	
70.47	0.98	
71.25	1.01	
71.04	1.00	
71.10	1.00	
71.08	1.00	
71.09	1.00	
71.08	1.00	
71.08	1.00	
71.08	1.00	
71.08	1.00	
71.08	1.00	
71.08	1.00	
71.08	1.00	

- Using methods previously described,

GLASS PANE WIDTH (IN)	EFFECTIVE GLASS THICKNESS		MOMENT AT TOP OF BASE SHOE (LB-IN/IN)	ALLOWABLE DESIGN PRESSURE (PSF)						200 LB LIVE LOAD		50 LB/FT LIVE LOAD	
	DEFLECTION (IN)	STRESS (IN)		UNSUPPORTED GLASS HEIGHT (IN)						MAX. UNSSUPORTED GLASS HEIGHT (IN)		MAX. UNSSUPORTED GLASS HEIGHT (IN)	
				36	39.81	42	48	60	72	STRESS	DEFLECTION	STRESS	DEFLECTION
12	0.3636	0.4052	275.1	61.1	50.0	44.9	34.4	22.0	14.3	9.9	34.0	39.4	31.1
24	0.4333	0.4606	275.1	61.1	50.0	44.9	34.4	22.0	15.3	25.5	48.8	50.9	37.0
36	0.4629	0.4791	275.1	61.1	50.0	44.9	34.4	22.0	15.3	41.3	57.6	55.1	39.6
48	0.4765	0.4867	275.1	61.1	50.0	44.9	34.4	22.0	15.3	56.8	63.4	56.8	40.7
60	0.4836	0.4905	275.1	61.1	50.0	44.9	34.4	22.0	15.3	72.2	67.7	57.7	41.3
72	0.4877	0.4926	275.1	61.1	50.0	44.9	34.4	22.0	15.3	87.4	71.1	58.2	41.7

398 E Dania Beach Blvd. #338
DANIA BEACH, FL 33004
TEL: 954.399-8478 | FAX: 954.744.4738
WEB: www.buildingdrops.com

11/16” Laminated Glass

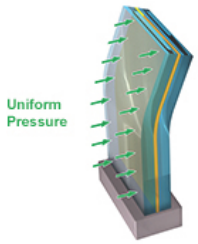
Glass Calculations

Wind Load Tables

398 E Dania Beach Blvd. #338
DANIA BEACH, FL 33004
TEL: 954.399-8478 | FAX: 954.744.4738
WEB: www.buildingdrops.com

Your calculated results

SIDE SUPPORTED BEAM **PROJECT TITLE:** **FIRM NAME: Hardware and Glass**



Calculation according to ASTM E1300
Results do not include gravity

*= Field requires no data input by user

Case 3: Uniform Pressure (psi)

Glass Span:	39	(in)
Uniform Load:	.347	(psi)

GLASS PROPERTIES:

Type of Glass:	Tempered Glass	
Nominal Single Glass Thickness:	5/16	
Minimum Single Glass Thickness*:	0.292	(in)
Allowable Stress*:	10616.76242	(psi)

INTERLAYER:

Thickness:	0.060	(in)

INTERLAYER PROPERTIES:

Load Duration:	3 s
Temperature:	75° F

Material	Shear Modulus	Youngs Modulus
SentryGlas®	27985 psi	81345 psi
Standard PVB	140.8 psi	422.3 psi
Trosifol® EXTRA STIFF	8412.19 psi	24511.4 psi

Your calculated results:

398 E Dania Beach Blvd. #338
DANIA BEACH, FL 33004
TEL: 954.399-8478 | FAX: 954.744.4738
WEB: www.buildingdrops.com

Effective Thickness for Glass Stress	SentryGlas®:	0.642 in
	Trosifol® EXTRA STIFF	0.638 in
	Standard PVB:	0.506 in
Effective Thickness for Laminate Deflection	SentryGlas®:	0.64 in
	Trosifol® EXTRA STIFF	0.632 in
	Standard PVB:	0.452 in
Glass Stress ✔ Meets ASTM E1300 ✖ Fails ASTM E1300	SentryGlas®:	✔ 3841.58 psi
	Trosifol® EXTRA STIFF	✔ 3889.901 psi
	Standard PVB:	✔ 6186.579 psi
Laminate Deflection	SentryGlas®:	0.441 in
	Trosifol® EXTRA STIFF	0.458 in
	Standard PVB:	1.252 in

Calculation according to ASTM E1300

PRINT RESULTS DOWNLOAD RESULTS NEW CALCULATON

Disclaimer

The information provided is offered for assistance in application of Kuraray Glass Laminating Solutions laminating interlayer products, but IT DOES NOT CONSTITUTE A WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE. Actual performance may vary in particular applications.

Kuraray Glass Laminating Solutions laminate analysis procedures are believed to give adequate estimates of deformation of laminated glass based upon best engineering judgment and practices but no claims are made as to the accuracy of the results obtained. Users will need to satisfy themselves that the results are reasonable for their purposes. The performance of the final construction should be measured before adoption to meet a specification. Any use of the information provided is the sole responsibility of the user. Furthermore, conclusions drawn from the information provided should be checked against building code requirements in the jurisdiction of the construction.

Because Kuraray Glass Laminating Solutions cannot anticipate or control the many different conditions under which this information and or product may be used, it does not guarantee the applicability or the accuracy of this information or the suitability of its products in any given situation. Users of Kuraray Glass Laminating Solutions products should make their own tests to determine the suitability of each such product for their particular purposes.

NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, OR MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR ANY OTHER NATURE ARE MADE HEREUNDER WITH RESPECT TO INFORMATION OR THE PRODUCT TO WHICH THE INFORMATION REFERS.

SentryGlas® is a registered trademark of E. I. du Pont de Nemours and Company or its affiliates for its brand of interlayers. It is used under license by Kuraray.

398 E Dania Beach Blvd. #338
DANIA BEACH, FL 33004
TEL: 954.399-8478 | FAX: 954.744.4738
WEB: www.buildingdrops.com

Glass Composition

Glass:		
Glass pane width:	48.03	in
Unsupported Glass Pane Height	39.81	in
Design Pressure	50.00	psf
Single Lite Thickness	0.31	in
Interlayer Thickness	0.06	in
Glass Section Modulus	0.02	in^3/in
Area of Glass Tested:	13.28	ft²
Tested Moment at base of unsupported glass:	275.15	lb-in/in
Glass Stress	24000	psi
Safety Factor	4	
Allowable Glass Stress	6000	psi
Max. Deflection		
ICC AC 439 (200 lbs Conc. Load & 50 plf Dist. Load)	1	in
ASTM E2358 (h/24 + l/96 or h/12, Wind Loads)	2.16	in

Results

Concentrated Load Height Iterations (Fall Protection Requirements Only)

Glass Width		12
Height	Deflection	Target Deflection
50	1.37	1.00
42.71	0.91	
44.85	1.03	
44.18	0.99	
44.38	1.00	
44.32	1.00	
44.34	1.00	
44.33	1.00	
44.34	1.00	
44.34	1.00	
44.34	1.00	
44.34	1.00	
44.34	1.00	
44.34	1.00	
44.34	1.00	
44.34	1.00	

Glass Width		24
Height	Deflection	Target Deflection
50.00	0.53	1.00
68.41	1.20	
62.42	0.95	
64.14	1.02	
63.63	1.00	
63.78	1.00	
63.73	1.00	
63.75	1.00	
63.74	1.00	
63.74	1.00	
63.74	1.00	
63.74	1.00	
63.74	1.00	
63.74	1.00	
63.74	1.00	
63.74	1.00	

Glass Width		36
Height	Deflection	Target Deflection
50.00	0.34	1
85.82	1.36	
73.65	0.92	
76.97	1.03	
76.00	0.99	
76.28	1.00	
76.20	1.00	
76.22	1.00	
76.22	1.00	
76.22	1.00	
76.22	1.00	
76.22	1.00	
76.22	1.00	
76.22	1.00	
76.22	1.00	
76.22	1.00	

398 E Dania Beach Blvd. #338
DANIA BEACH, FL 33004
TEL: 954.399-8478 | FAX: 954.744.4738
WEB: www.buildingdrops.com

Glass Width		48
Height	Deflection	Target Deflection
100	1.54	1.00
80.69	0.89	
85.76	1.03	
84.30	0.99	
84.71	1.00	
84.59	1.00	
84.63	1.00	
84.62	1.00	
84.62	1.00	
84.62	1.00	
84.62	1.00	
84.62	1.00	
84.62	1.00	
84.62	1.00	
84.62	1.00	
84.62	1.00	

Glass Width		60
Height	Deflection	Target Deflection
100.00	1.28	1.00
88.36	0.93	
91.47	1.02	
90.59	0.99	
90.84	1.00	
90.77	1.00	
90.79	1.00	
90.78	1.00	
90.78	1.00	
90.78	1.00	
90.78	1.00	
90.78	1.00	
90.78	1.00	
90.78	1.00	
90.78	1.00	
90.78	1.00	

Glass Width		72
Height	Deflection	Target Deflection
110.00	1.43	1.00
92.00	0.91	
96.65	1.03	
95.35	0.99	
95.71	1.00	
95.61	1.00	
95.64	1.00	
95.63	1.00	
95.63	1.00	
95.63	1.00	
95.63	1.00	
95.63	1.00	
95.63	1.00	
95.63	1.00	
95.63	1.00	
95.63	1.00	

- Using same method described previously,

GLASS PANE WIDTH (IN)	EFFECTIVE GLASS THICKNESS		MOMENT AT TOP OF BASE SHOE (LB-IN/IN)	ALLOWABLE DESIGN PRESSURE (PSF)						200 LB LIVE LOAD		50 LB/FT LIVE LOAD	
	DEFLECTION (IN)	STRESS (IN)		UNSUPPORTED GLASS HEIGHT (IN)						MAX. UNSSUPORTED GLASS HEIGHT (IN)		MAX. UNSSUPORTED GLASS HEIGHT (IN)	
				36	39.81	42	48	60	72	STRESS	DEFLECTION	STRESS	DEFLECTION
12	0.4578	0.5115	275.1	61.1	50.0	44.9	34.4	22.0	15.3	15.7	44.3	62.8	39.1
24	0.5457	0.5851	275.1	61.1	50.0	44.9	34.4	22.0	15.3	41.1	63.7	82.2	46.6
36	0.5883	0.6133	275.1	61.1	50.0	44.9	34.4	22.0	15.3	67.7	76.2	90.3	50.3
48	0.6092	0.6255	275.1	61.1	50.0	44.9	34.4	22.0	15.3	93.9	84.6	93.9	52.1
60	0.6205	0.6317	275.1	61.1	50.0	44.9	34.4	22.0	15.3	119.7	90.8	95.8	53.0
72	0.6271	0.6353	275.1	61.1	50.0	44.9	34.4	22.0	15.3	145.3	95.6	96.9	53.6

398 E Dania Beach Blvd. #338
DANIA BEACH, FL 33004
TEL: 954.399-8478 | FAX: 954.744.4738
WEB: www.buildingdrops.com

3/4” Monolithic Glass

Glass Calculations

Wind Load Tables

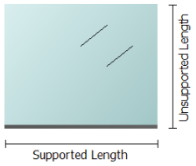
398 E Dania Beach Blvd. #338
DANIA BEACH, FL 33004
TEL: 954.399-8478 | FAX: 954.744.4738
WEB: www.buildingdrops.com

Input

July 21, 2022

Glazing Information

Supported Edges:	One side Supported
Shape:	Rectangular
Unsupported Length:	39.0 in.
Supported Length:	48.0 in.
Glazing Angle:	90.0 °



Glazing Construction (Single Glazed Lite)

Single Lite Properties (Monolithic)

Thickness:	3/4 in.
Heat Treatment:	Fully Tempered

Applied Loads

Description	Load	Duration
Short Duration	50.0 psf	3.00 sec

Project Description: Hardware And Glass Shoe and Anchor Options	Date: August 3, 2022	Customer: Hardware and Glass Group LLC	
		Project #: EEV-22-0712	
	Engineer: LL	PER: 8127	Page #: Page 36 of 60

398 E Dania Beach Blvd. #338
DANIA BEACH, FL 33004
TEL: 954.399-8478 | FAX: 954.744.4738
WEB: www.buildingdrops.com

ASTM E1300 Ext. Basic (8/1000)

Load Resistance Report

July 21, 2022

Glazing Construction (Single Glazed Lite)

Single Lite Properties (Monolithic)

Thickness:	3/4 in.
Heat Treatment:	Fully Tempered

Load Resistance

Short Duration (3 Sec)

Description	NFL	GTF	LR
Single Lite	39.1 psf	4.00	157 psf

Comparisons

Scenario - Short Duration

50.0 psf 3.00 sec <= 157 psf — OK

Approximate edge of glass deflection

Single Lite — 0.33 in.

Notes

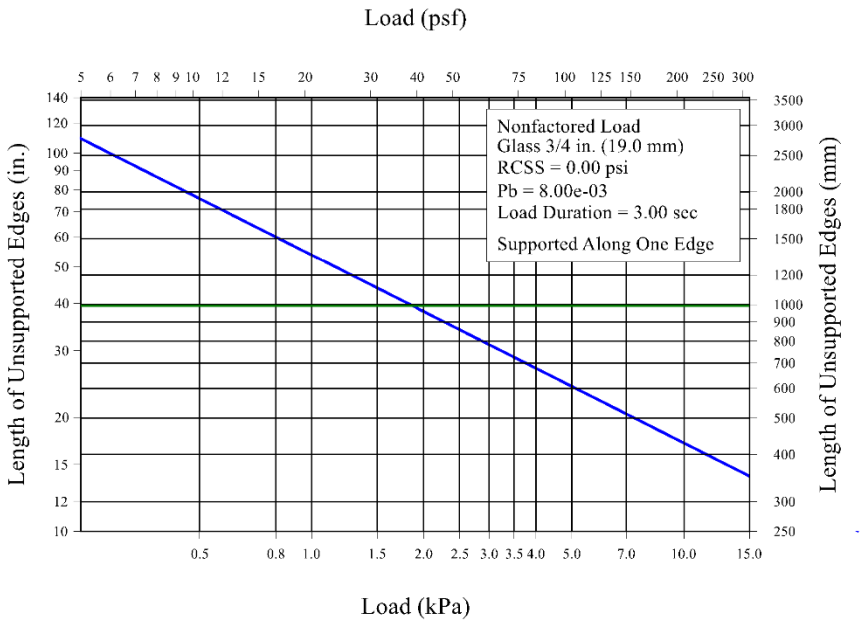
Load resistance values are computed in accordance with ASTM E1300-16 Section 6.2 and are based on non-factored load values calculated in a manner consistent with those presented in ASTM E1300-16.

398 E Dania Beach Blvd. #338
DANIA BEACH, FL 33004
TEL: 954.399-8478 | FAX: 954.744.4738
WEB: www.buildingdrops.com

ASTM E1300 Ext. Basic (8/1000)

Load Resistance Details

July 21, 2022



Project Description: Hardware And Glass Shoe and Anchor Options	Date: August 3, 2022	Customer: Hardware and Glass Group LLC	
		Project #: EEV-22-0712	
	Engineer: LL	PER: 8127	Page #: Page 38 of 60

398 E Dania Beach Blvd. #338
DANIA BEACH, FL 33004
TEL: 954.399-8478 | FAX: 954.744.4738
WEB: www.buildingdrops.com

Glass Composition

Glass:		
Glass pane width:	48.03	in
Unsupported Glass Pane Height	39.81	in
Design Pressure	50.00	psf
Single Lite Thickness	0.75	in
Interlayer Thickness	N/A	
Glass Section Modulus	0.09	in^3/in
Area of Glass Tested:	13.28	ft²
Tested Moment at base of unsupported glass:	275.15	lb-in/in
Glass Stress	24000	psi
Safety Factor	4	
Allowable Glass Stress	6000	psi
Max. Deflection		
ICC AC 439 (200 lbs Conc. Load & 50 plf Dist. Load)	1	in
ASTM E2358 (h/24 + l/96 or h/12, Wind Loads)	2.16	in

Results

Concentrated Load Height Iterations (Fall Protection Requirements Only)

Glass Width		12
Height	Deflection	Target Deflection
50	0.35	1.00
84.05	1.41	
70.89	0.89	
75.08	1.04	
73.66	0.99	
74.13	1.00	
73.97	1.00	
74.03	1.00	
74.01	1.00	
74.01	1.00	
74.01	1.00	
74.01	1.00	
74.01	1.00	
74.01	1.00	
74.01	1.00	
74.01	1.00	

Glass Width		24
Height	Deflection	Target Deflection
50.00	0.23	1.00
103.46	1.55	
83.16	0.87	
89.00	1.04	
87.16	0.99	
87.73	1.00	
87.55	1.00	
87.60	1.00	
87.59	1.00	
87.59	1.00	
87.59	1.00	
87.59	1.00	
87.59	1.00	
87.59	1.00	
87.59	1.00	
87.59	1.00	

Glass Width		36
Height	Deflection	Target Deflection
50.00	0.19	1.00
115.96	1.62	
91.00	0.87	
97.82	1.04	
95.76	0.99	
96.36	1.00	
96.18	1.00	
96.24	1.00	
96.22	1.00	
96.22	1.00	
96.22	1.00	
96.22	1.00	
96.22	1.00	
96.22	1.00	
96.22	1.00	
96.22	1.00	

398 E Dania Beach Blvd. #338
DANIA BEACH, FL 33004
TEL: 954.399-8478 | FAX: 954.744.4738
WEB: www.buildingdrops.com

Glass Width		48
Height	Deflection	Target Deflection
100	0.93	1.00
103.46	1.02	
102.46	0.99	
102.75	1.00	
102.66	1.00	
102.69	1.00	
102.68	1.00	
102.68	1.00	
102.68	1.00	
102.68	1.00	
102.68	1.00	
102.68	1.00	
102.68	1.00	
102.68	1.00	
102.68	1.00	
102.68	1.00	
102.68	1.00	

Glass Width		60
Height	Deflection	Target Deflection
100.00	0.82	1.00
110.22	1.06	
107.24	0.98	
108.08	1.00	
107.84	1.00	
107.91	1.00	
107.89	1.00	
107.89	1.00	
107.89	1.00	
107.89	1.00	
107.89	1.00	
107.89	1.00	
107.89	1.00	
107.89	1.00	
107.89	1.00	
107.89	1.00	
107.89	1.00	

Glass Width		72
Height	Deflection	Target Deflection
110.00	0.95	1.00
112.94	1.01	
112.11	1.00	
112.34	1.00	
112.28	1.00	
112.29	1.00	
112.29	1.00	
112.29	1.00	
112.29	1.00	
112.29	1.00	
112.29	1.00	
112.29	1.00	
112.29	1.00	
112.29	1.00	
112.29	1.00	
112.29	1.00	
112.29	1.00	

- Using same method described previously,

GLASS PANE WIDTH (IN)	EFFECTIVE GLASS THICKNESS (IN)	MOMENT AT TOP OF BASE SHOE (LB-IN/IN)	ALLOWABLE DESIGN PRESSURE (PSF)						200 LB LIVE LOAD		50 LB/FT LIVE LOAD	
			UNSUPPORTED GLASS HEIGHT (IN)						MAX. UNSSUPORTED GLASS HEIGHT (IN)		MAX. UNSSUPORTED GLASS HEIGHT (IN)	
			36	39.81	42	48	60	72	STRESS	DEFLECTION	STRESS	DEFLECTION
12	0.72	275.1	61.1	50.0	44.9	34.4	22.0	15.3	31.0	74.0	124.1	61.4
24	0.72	275.1	61.1	50.0	44.9	34.4	22.0	15.3	62.0	87.6	124.1	61.4
36	0.72	275.1	61.1	50.0	44.9	34.4	22.0	15.3	93.1	96.2	124.1	61.4
48	0.72	275.1	61.1	50.0	44.9	34.4	22.0	15.3	124.1	102.7	124.1	61.4
60	0.72	275.1	61.1	50.0	44.9	34.4	22.0	15.3	155.1	107.9	124.1	61.4
72	0.72	275.1	61.1	50.0	44.9	34.4	22.0	15.3	186.1	112.3	124.1	61.4

398 E Dania Beach Blvd. #338
DANIA BEACH, FL 33004
TEL: 954.399-8478 | FAX: 954.744.4738
WEB: www.buildingdrops.com

27/32” Laminated Glass

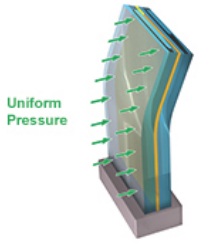
Glass Calculations

Wind Load Tables

398 E Dania Beach Blvd. #338
DANIA BEACH, FL 33004
TEL: 954.399-8478 | FAX: 954.744.4738
WEB: www.buildingdrops.com

Your calculated results

SIDE SUPPORTED BEAM **PROJECT TITLE:** **FIRM NAME: Hardware and Glass**



Calculation according to ASTM E1300
Results do not include gravity

*= Field requires no data input by user

Case 3: Uniform Pressure (psi)

Glass Span:	39	(in)
Uniform Load:	.347	(psi)

GLASS PROPERTIES:

Type of Glass:	Tempered Glass	
Nominal Single Glass Thickness:	3/8	
Minimum Single Glass Thickness*:	0.355	(in)
Allowable Stress*:	10616.76242	(psi)

INTERLAYER:

Thickness:	0.060	(in)

INTERLAYER PROPERTIES:

Load Duration:	3 s
Temperature:	75° F

Material	Shear Modulus	Youngs Modulus
SentryGlas®	27985 psi	81345 psi
Standard PVB	140.8 psi	422.3 psi
Trosifol® EXTRA STIFF	8412.19 psi	24511.4 psi

Your calculated results:

398 E Dania Beach Blvd. #338
DANIA BEACH, FL 33004
TEL: 954.399-8478 | FAX: 954.744.4738
WEB: www.buildingdrops.com

Effective Thickness for Glass Stress	SentryGlas®:	0.767 in
	Trosifol® EXTRA STIFF	0.762 in
	Standard PVB:	0.596 in
Effective Thickness for Laminate Deflection	SentryGlas®:	0.765 in
	Trosifol® EXTRA STIFF	0.754 in
	Standard PVB:	0.533 in
Glass Stress Meets ASTM E1300 Fails ASTM E1300	SentryGlas®:	2689.364 psi
	Trosifol® EXTRA STIFF	2729.77 psi
	Standard PVB:	4452.976 psi
Laminate Deflection	SentryGlas®:	0.259 in
	Trosifol® EXTRA STIFF	0.27 in
	Standard PVB:	0.767 in

Calculation according to ASTM E1300

PRINT RESULTS DOWNLOAD RESULTS NEW CALCULATON

Disclaimer

The information provided is offered for assistance in application of Kuraray Glass Laminating Solutions laminating interlayer products, but IT DOES NOT CONSTITUTE A WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE. Actual performance may vary in particular applications.

Kuraray Glass Laminating Solutions laminate analysis procedures are believed to give adequate estimates of deformation of laminated glass based upon best engineering judgment and practices but no claims are made as to the accuracy of the results obtained. Users will need to satisfy themselves that the results are reasonable for their purposes. The performance of the final construction should be measured before adoption to meet a specification. Any use of the information provided is the sole responsibility of the user. Furthermore, conclusions drawn from the information provided should be checked against building code requirements in the jurisdiction of the construction.

Because Kuraray Glass Laminating Solutions cannot anticipate or control the many different conditions under which this information and or product may be used, it does not guarantee the applicability or the accuracy of this information or the suitability of its products in any given situation. Users of Kuraray Glass Laminating Solutions products should make their own tests to determine the suitability of each such product for their particular purposes.

NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, OR MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR ANY OTHER NATURE ARE MADE HEREUNDER WITH RESPECT TO INFORMATION OR THE PRODUCT TO WHICH THE INFORMATION REFERS.

SentryGlas® is a registered trademark of E. I. du Pont de Nemours and Company or its affiliates for its brand of interlayers. It is used under license by Kuraray.

398 E Dania Beach Blvd. #338
DANIA BEACH, FL 33004
TEL: 954.399-8478 | FAX: 954.744.4738
WEB: www.buildingdrops.com

Glass Composition

Glass:		
Glass pane width:	48.03	in
Unsupported Glass Pane Height	39.81	in
Design Pressure	50.00	psf
Single Lite Thickness	0.38	in
Interlayer Thickness	0.06	in
Glass Section Modulus	0.02	in^3/in
Area of Glass Tested:	13.28	ft²
Tested Moment at base of unsupported glass:	275.15	lb-in/in
Glass Stress	24000	psi
Safety Factor	4	
Allowable Glass Stress	6000	psi
Max. Deflection		
ICC AC 439 (200 lbs Conc. Load & 50 plf Dist. Load)	1	in
ASTM E2358 (h/24 + l/96 or h/12, Wind Loads)	2.16	in

Results

Concentrated Load Height Iterations (Fall Protection Requirements Only)

Glass Width		12
Height	Deflection	Target Deflection
50	0.84	1.00
54.48	1.06	
53.02	0.98	
53.48	1.01	
53.33	1.00	
53.38	1.00	
53.36	1.00	
53.37	1.00	
53.37	1.00	
53.37	1.00	
53.37	1.00	
53.37	1.00	
53.37	1.00	
53.37	1.00	
53.37	1.00	
53.37	1.00	

Glass Width		24
Height	Deflection	Target Deflection
50.00	0.33	1.00
86.87	1.39	
73.73	0.90	
77.51	1.03	
76.35	0.99	
76.70	1.00	
76.59	1.00	
76.62	1.00	
76.61	1.00	
76.62	1.00	
76.62	1.00	
76.62	1.00	
76.62	1.00	
76.62	1.00	
76.62	1.00	
76.62	1.00	

Glass Width		36
Height	Deflection	Target Deflection
50.00	0.21	1.00
109.92	1.57	
87.66	0.87	
93.74	1.04	
91.92	0.99	
92.45	1.00	
92.29	1.00	
92.34	1.00	
92.33	1.00	
92.33	1.00	
92.33	1.00	
92.33	1.00	
92.33	1.00	
92.33	1.00	
92.33	1.00	
92.33	1.00	

398 E Dania Beach Blvd. #338
DANIA BEACH, FL 33004
TEL: 954.399-8478 | FAX: 954.744.4738
WEB: www.buildingdrops.com

Glass Width		48
Height	Deflection	Target Deflection
100	0.92	1.00
104.03	1.02	
102.85	0.99	
103.19	1.00	
103.09	1.00	
103.12	1.00	
103.11	1.00	
103.12	1.00	
103.11	1.00	
103.11	1.00	
103.11	1.00	
103.11	1.00	
103.11	1.00	
103.11	1.00	
103.11	1.00	
103.11	1.00	

Glass Width		60
Height	Deflection	Target Deflection
100.00	0.76	1.00
114.39	1.08	
110.13	0.98	
111.32	1.01	
110.98	1.00	
111.08	1.00	
111.05	1.00	
111.06	1.00	
111.06	1.00	
111.06	1.00	
111.06	1.00	
111.06	1.00	
111.06	1.00	
111.06	1.00	
111.06	1.00	
111.06	1.00	

Glass Width		72
Height	Deflection	Target Deflection
110.00	0.85	1.00
119.41	1.05	
116.71	0.99	
117.46	1.00	
117.25	1.00	
117.31	1.00	
117.29	1.00	
117.29	1.00	
117.29	1.00	
117.29	1.00	
117.29	1.00	
117.29	1.00	
117.29	1.00	
117.29	1.00	
117.29	1.00	
117.29	1.00	

- Using same method described previously,

GLASS PANE WIDTH (IN)	EFFECTIVE GLASS THICKNESS		MOMENT AT TOP OF BASE SHOE (LB-IN/IN)	ALLOWABLE DESIGN PRESSURE (PSF)						200 LB LIVE LOAD		50 LB/FT LIVE LOAD	
	DEFLECTION (IN)	STRESS (IN)		UNSUPPORTED GLASS HEIGHT (IN)						MAX. UNSSUPORTED GLASS HEIGHT (IN)		MAX. UNSSUPORTED GLASS HEIGHT (IN)	
				36	39.81	42	48	60	72	STRESS	DEFLECTION	STRESS	DEFLECTION
12	0.5385	0.6023	275.1	61.1	50.0	44.9	34.4	22.0	15.3	21.8	53.4	87.1	46.0
24	0.6399	0.6901	275.1	61.1	50.0	44.9	34.4	22.0	15.3	57.2	76.6	114.3	54.7
36	0.6938	0.7272	275.1	61.1	50.0	44.9	34.4	22.0	15.3	95.2	92.3	126.9	59.3
48	0.7216	0.7440	275.1	61.1	50.0	44.9	34.4	22.0	15.3	132.9	103.1	132.9	61.7
60	0.7370	0.7527	275.1	61.1	50.0	44.9	34.4	22.0	15.3	170.0	111.1	136.0	63.0
72	0.7462	0.7577	275.1	61.1	50.0	44.9	34.4	22.0	15.3	206.7	117.3	137.8	63.8

398 E Dania Beach Blvd. #338
DANIA BEACH, FL 33004
TEL: 954.399-8478 | FAX: 954.744.4738
WEB: www.buildingdrops.com

1-1/8” Laminated Glass

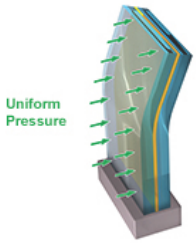
Glass Calculations

Wind Load Tables

398 E Dania Beach Blvd. #338
DANIA BEACH, FL 33004
TEL: 954.399-8478 | FAX: 954.744.4738
WEB: www.buildingdrops.com

Your calculated results

SIDE SUPPORTED BEAM **PROJECT TITLE:** **FIRM NAME: Hardware and Glass**



Calculation according to ASTM E1300
Results do not include gravity

*= Field requires no data input by user

Case 3: Uniform Pressure (psi)

Glass Span:	39	(in)
Uniform Load:	.347	(psi)

GLASS PROPERTIES:

Type of Glass:	Tempered Glass	
Nominal Single Glass Thickness:	1/2	
Minimum Single Glass Thickness*:	0.469	(in)
Allowable Stress*:	10616.76242	(psi)

INTERLAYER:

Thickness:	0.060	(in)

INTERLAYER PROPERTIES:

Load Duration:	3 s
Temperature:	75° F

Material	Shear Modulus	Youngs Modulus
SentryGlas®	27985 psi	81345 psi
Standard PVB	140.8 psi	422.3 psi
Trosifol® EXTRA STIFF	8412.19 psi	24511.4 psi

Your calculated results:

398 E Dania Beach Blvd. #338
DANIA BEACH, FL 33004
TEL: 954.399-8478 | FAX: 954.744.4738
WEB: www.buildingdrops.com

Effective Thickness for Glass Stress	SentryGlas®:	0.994 in
	Trosifol® EXTRA STIFF	0.984 in
	Standard PVB:	0.759 in
Effective Thickness for Laminate Deflection	SentryGlas®:	0.989 in
	Trosifol® EXTRA STIFF	0.971 in
	Standard PVB:	0.677 in
Glass Stress ✔ Meets ASTM E1300 ✖ Fails ASTM E1300	SentryGlas®:	✔ 1603.824 psi
	Trosifol® EXTRA STIFF	✔ 1634.939 psi
	Standard PVB:	✔ 2747.78 psi
Laminate Deflection	SentryGlas®:	0.12 in
	Trosifol® EXTRA STIFF	0.126 in
	Standard PVB:	0.373 in

Calculation according to ASTM E1300

PRINT RESULTS DOWNLOAD RESULTS NEW CALCULATON

Disclaimer

The information provided is offered for assistance in application of Kuraray Glass Laminating Solutions laminating interlayer products, but IT DOES NOT CONSTITUTE A WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE. Actual performance may vary in particular applications.

Kuraray Glass Laminating Solutions laminate analysis procedures are believed to give adequate estimates of deformation of laminated glass based upon best engineering judgment and practices but no claims are made as to the accuracy of the results obtained. Users will need to satisfy themselves that the results are reasonable for their purposes. The performance of the final construction should be measured before adoption to meet a specification. Any use of the information provided is the sole responsibility of the user. Furthermore, conclusions drawn from the information provided should be checked against building code requirements in the jurisdiction of the construction.

Because Kuraray Glass Laminating Solutions cannot anticipate or control the many different conditions under which this information and or product may be used, it does not guarantee the applicability or the accuracy of this information or the suitability of its products in any given situation. Users of Kuraray Glass Laminating Solutions products should make their own tests to determine the suitability of each such product for their particular purposes.

NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, OR MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR ANY OTHER NATURE ARE MADE HEREUNDER WITH RESPECT TO INFORMATION OR THE PRODUCT TO WHICH THE INFORMATION REFERS.

SentryGlas® is a registered trademark of E. I. du Pont de Nemours and Company or its affiliates for its brand of interlayers. It is used under license by Kuraray.

398 E Dania Beach Blvd. #338
DANIA BEACH, FL 33004
TEL: 954.399-8478 | FAX: 954.744.4738
WEB: www.buildingdrops.com

Glass Composition

Glass:		
Glass pane width:	48.03	in
Unsupported Glass Pane Height	39.81	in
Design Pressure	50.00	psf
Single Lite Thickness	0.50	in
Interlayer Thickness	0.06	in
Glass Section Modulus	0.04	in^3/in
Area of Glass Tested:	13.28	ft²
Tested Moment at base of unsupported glass:	275.15	lb-in/in
Glass Stress	24000	psi
Safety Factor	4	
Allowable Glass Stress	6000	psi
Max. Deflection		
ICC AC 439 (200 lbs Conc. Load & 50 plf Dist. Load)	1	in
ASTM E2358 (h/24 + l/96 or h/12, Wind Loads)	2.16	in

Results

Concentrated Load Height Iterations (Fall Protection Requirements Only)

Glass Width		12
Height	Deflection	Target Deflection
50	0.41	1.00
77.95	1.34	
67.45	0.91	
70.78	1.03	
69.66	0.99	
70.03	1.00	
69.91	1.00	
69.95	1.00	
69.94	1.00	
69.94	1.00	
69.94	1.00	
69.94	1.00	
69.94	1.00	
69.94	1.00	
69.94	1.00	

Glass Width		24
Height	Deflection	Target Deflection
50.00	0.17	1.00
122.71	1.73	
93.38	0.84	
101.85	1.06	
99.12	0.98	
99.97	1.01	
99.70	1.00	
99.79	1.00	
99.76	1.00	
99.77	1.00	
99.76	1.00	
99.77	1.00	
99.77	1.00	
99.77	1.00	
99.77	1.00	

Glass Width		36
Height	Deflection	Target Deflection
50.00	0.10	1.00
156.88	1.96	
112.12	0.81	
124.38	1.07	
120.52	0.98	
121.68	1.01	
121.33	1.00	
121.44	1.00	
121.40	1.00	
121.41	1.00	
121.41	1.00	
121.41	1.00	
121.41	1.00	
121.41	1.00	
121.41	1.00	

398 E Dania Beach Blvd. #338
DANIA BEACH, FL 33004
TEL: 954.399-8478 | FAX: 954.744.4738
WEB: www.buildingdrops.com

Glass Width		48
Height	Deflection	Target Deflection
100	0.44	1.00
149.91	1.27	
133.09	0.93	
137.91	1.02	
136.46	0.99	
136.89	1.00	
136.76	1.00	
136.80	1.00	
136.79	1.00	
136.79	1.00	
136.79	1.00	
136.79	1.00	
136.79	1.00	
136.79	1.00	
136.79	1.00	

Glass Width		60
Height	Deflection	Target Deflection
100.00	0.36	1.00
165.94	1.34	
143.40	0.92	
149.69	1.03	
147.83	0.99	
148.37	1.00	
148.21	1.00	
148.26	1.00	
148.24	1.00	
148.25	1.00	
148.25	1.00	
148.25	1.00	
148.25	1.00	
148.25	1.00	
148.25	1.00	

Glass Width		72
Height	Deflection	Target Deflection
110.00	0.40	1.00
173.98	1.30	
152.69	0.93	
158.57	1.02	
156.86	0.99	
157.35	1.00	
157.21	1.00	
157.25	1.00	
157.24	1.00	
157.24	1.00	
157.24	1.00	
157.24	1.00	
157.24	1.00	
157.24	1.00	
157.24	1.00	

- Using same method described previously,

GLASS PANE WIDTH (IN)	EFFECTIVE GLASS THICKNESS		MOMENT AT TOP OF BASE SHOE (LB-IN/IN)	ALLOWABLE DESIGN PRESSURE (PSF)						200 LB LIVE LOAD		50 LB/FT LIVE LOAD	
	DEFLECTION (IN)	STRESS (IN)		UNSUPPORTED GLASS HEIGHT (IN)						MAX. UNSSUPORTED GLASS HEIGHT (IN)		MAX. UNSSUPORTED GLASS HEIGHT (IN)	
				36	39.81	42	48	60	72	STRESS	DEFLECTION	STRESS	DEFLECTION
12	0.68	0.7658	275.1	61.1	50.0	44.9	34.4	22.0	15.3	35.2	69.9	140.7	58.4
24	0.81	0.8758	275.1	61.1	50.0	44.9	34.4	22.0	15.3	92.1	99.8	184.1	68.8
36	0.88	0.9295	275.1	61.1	50.0	44.9	34.4	22.0	15.3	155.5	121.4	207.4	75.2
48	0.92	0.9556	275.1	61.1	50.0	44.9	34.4	22.0	15.3	219.1	136.8	219.1	78.7
60	0.94	0.9695	275.1	61.1	50.0	44.9	34.4	22.0	15.3	282.0	148.2	225.6	80.7
72	0.96	0.9776	275.1	61.1	50.0	44.9	34.4	22.0	15.3	344.1	157.2	229.4	82.0

398 E Dania Beach Blvd. #338
DANIA BEACH, FL 33004
TEL: 954.399-8478 | FAX: 954.744.4738
WEB: www.buildingdrops.com

Anchor Layout Calculations

SIMPSON Strong-Tie® Anchor Designer™ Software
Version 3.0.7947.8

Company:		Date:	6/8/2022
Engineer:		Page:	1/6
Project:			
Address:			
Phone:			
E-mail:			

1.Project information

Customer company:
Customer contact name:
Customer e-mail:
Comment:

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

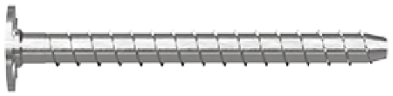
General
Design method:ACI 318-14
Units: Imperial units

Anchor Information:
Anchor type: Concrete screw
Material: Carbon Steel
Diameter (inch): 0.500
Nominal Embedment depth (inch): 4.000
Effective Embedment depth, h_{ef} (inch): 2.990
Code report: ICC-ES ESR-2713
Anchor category: 1
Anchor ductility: No
h_{min} (inch): 6.25
c_{ac} (inch): 4.50
C_{min} (inch): 1.75
S_{min} (inch): 3.00

Base Material
Concrete: Normal-weight
Concrete thickness, h (inch): 6.25
State: Uncracked
Compressive strength, f'_c (psi): 2500
$\Psi_{c,V}$: 1.4
Reinforcement condition: B tension, B shear
Supplemental reinforcement: No
Reinforcement provided at corners: No
Ignore concrete breakout in tension: No
Ignore concrete breakout in shear: No
Ignore 6do requirement: Not applicable
Build-up grout pad: No

Base Plate
Length x Width x Thickness (inch): 3.15 x 50.00 x 0.25

Recommended Anchor
Anchor Name: Titen HD® Flat Washer Head - 1/2"Ø Titen HD Flat Washer, hnom:4" (102mm)
Code Report: ICC-ES ESR-2713



SIMPSON Strong-Tie® Anchor Designer™ Software Version 3.0.7947.8

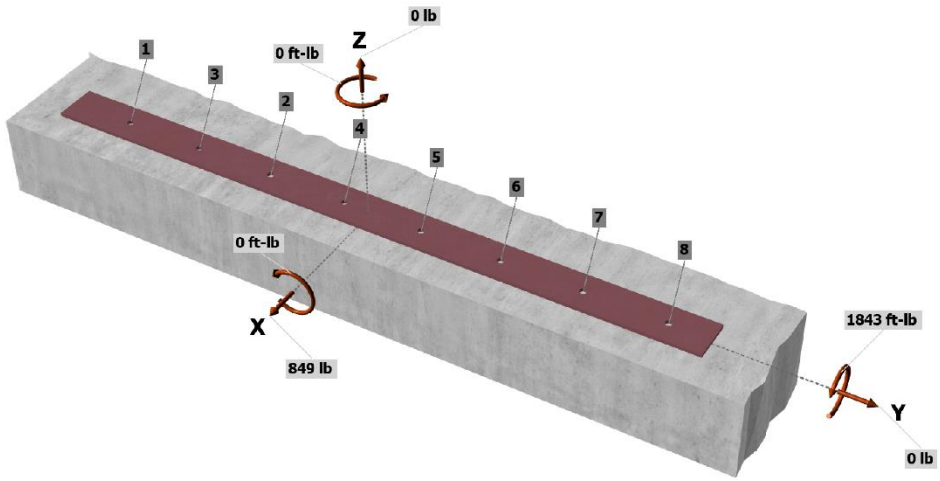
Company:		Date:	6/8/2022
Engineer:		Page:	2/6
Project:			
Address:			
Phone:			
E-mail:			

Load and Geometry
Load factor source: ACI 318 Section 5.3
Load combination: U = 1.2D + 1.0W + 1.0L + 0.5(Lr or S or R)
Seismic design: No
Anchors subjected to sustained tension: Not applicable
Apply entire shear load at front row: No
Anchors only resisting wind and/or seismic loads: No

Service level loads:

	D	W	L	Lr/S/R	*Strength level loads*
N_a [lb]:	0	0	0	0	*0*
V_{ax} [lb]:	0	649	200	0	*849*
V_{ay} [lb]:	0	0	0	0	*0*
M_x [ft-lb]:	0	0	0	0	*0*
M_y [ft-lb]:	0	1193	650	0	*1843*
M_z [ft-lb]:	0	0	0	0	*0*

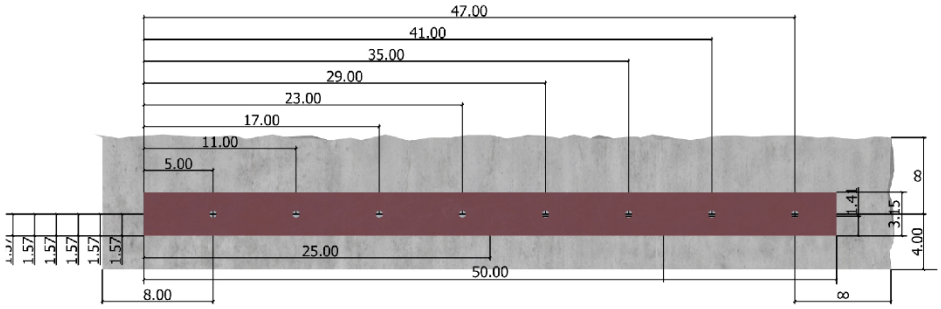
<Figure 1>



SIMPSON Strong-Tie Anchor Designer™ Software Version 3.0.7947.8

Company:		Date:	6/8/2022
Engineer:		Page:	3/6
Project:			
Address:			
Phone:			
E-mail:			

<Figure 2>



SIMPSON Strong-Tie Anchor Designer™ Software Version 3.0.7947.8

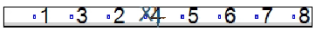
Company:		Date:	6/8/2022
Engineer:		Page:	4/6
Project:			
Address:			
Phone:			
E-mail:			

3. Resulting Anchor Forces

Anchor	Tension load, N_{ua} (lb)	Shear load x, V_{uax} (lb)	Shear load y, V_{uay} (lb)	Shear load combined, $\sqrt{(V_{uax})^2+(V_{uay})^2}$ (lb)
1	2143.5	117.9	0.0	117.9
2	2100.7	111.2	0.0	111.2
3	2118.6	114.5	0.0	114.5
4	2082.7	107.8	0.0	107.8
5	2064.8	104.4	0.0	104.4
6	2046.9	101.1	0.0	101.1
7	2028.9	97.7	0.0	97.7
8	2011.0	94.3	0.0	94.3
Sum	16597.1	849.0	0.0	849.0

Maximum concrete compression strain (‰): 0.22
Maximum concrete compression stress (psi): 970
Resultant tension force (lb): 16597
Resultant compression force (lb): 16597
Eccentricity of resultant tension forces in x-axis, e'_{Nx} (inch): 0.28
Eccentricity of resultant tension forces in y-axis, e'_{Ny} (inch): 0.00
Eccentricity of resultant shear forces in x-axis, e'_{Vx} (inch): 0.00
Eccentricity of resultant shear forces in y-axis, e'_{Vy} (inch): 0.00

<Figure 3>



4. Steel Strength of Anchor in Tension (Sec. 17.4.1)

N_{sa} (lb)	ϕ	ϕN_{sa} (lb)
20130	0.65	13085

5. Concrete Breakout Strength of Anchor in Tension (Sec. 17.4.2)

$N_b = k_c \lambda_a \sqrt{f'_c} h_{ef}^{1.5}$ (Eq. 17.4.2.2a)

k_c	λ_a	f'_c (psi)	h_{ef} (in)	N_b (lb)
24.0	1.00	2500	2.990	6204

$\phi N_{cbg} = \phi \left(A_{Nc} / A_{Nco}\right) \Psi_{ec,N} \Psi_{ed,N} \Psi_{c,N} \Psi_{cp,N} N_b$ (Sec. 17.3.1 & Eq. 17.4.2.1b)

A_{Nc} (in²)	A_{Nco} (in²)	$c_{a,min}$ (in)	$\Psi_{ec,N}$	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	ϕ	ϕN_{cbg} (lb)
432.51	80.46	4.00	0.941	0.968	1.00	0.997	6204	0.65	19671

8. Steel Strength of Anchor in Shear (Sec. 17.5.1)

V_{sa} (lb)	ϕ_{grout}	ϕ	$\phi_{grout}\phi V_{sa}$ (lb)
7455	1.0	0.60	4473

9. Concrete Breakout Strength of Anchor in Shear (Sec. 17.5.2)

Shear perpendicular to edge in x-direction:

$V_{bx} = \min\left|7\left(l_e / d_a\right)^{0.2} \sqrt{d_a} \lambda_a \sqrt{f'_c} c_{a1}^{1.5};\ 9 \lambda_a \sqrt{f'_c} c_{a1}^{1.5}\right|$ (Eq. 17.5.2.2a & Eq. 17.5.2.2b)

l_e (in)	d_a (in)	λ_a	f'_c (psi)	c_{a1} (in)	V_{bx} (lb)
2.99	0.500	1.00	2500	4.00	2834

$\phi V_{cbx} = \phi \left(A_{Vc} / A_{Vco}\right) \Psi_{ed,V} \Psi_{c,V} \Psi_{h,V} V_{bx}$ (Sec. 17.3.1 & Eq. 17.5.2.1a)

A_{Vc} (in²)	A_{Vco} (in²)	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{bx} (lb)	ϕ	ϕV_{cbx} (lb)

Input data and results must be checked for agreement with the existing circumstances, the standards and guidelines must be checked for plausibility.
Simpson Strong-Tie Company Inc. 5956 W. Las Positas Boulevard Pleasanton, CA 94588 Phone: 925.560.9000 Fax: 925.847.3871 www.strongtie.com

SIMPSON Strong-Tie® Anchor Designer™ Software Version 3.0.7947.8

Company:		Date:	6/8/2022
Engineer:		Page:	5/6
Project:			
Address:			
Phone:			
E-mail:			

72.10	72.10	1.000	1.400	1.000	2834	0.70	2778

Shear perpendicular to edge in y-direction:

$V_{by} = \min\left|7(l_e/d_a)^{0.2}\sqrt{d_a}\lambda_a\sqrt{f'_c}c_{a1}^{1.5};\ 9\lambda_a\sqrt{f'_c}c_{a1}^{1.5}\right|$ (Eq. 17.5.2.2a & Eq. 17.5.2.2b)

l_e (in)	d_a (in)	λ_a	f'_c (psi)	c_{a1} (in)	V_{by} (lb)
2.99	0.500	1.00	2500	8.00	8008

$\phi V_{cby} = \phi\,(A_{Vc}/A_{Vco})\,\Psi_{ed,V}\Psi_{c,V}\Psi_{h,V}V_{by}$ (Sec. 17.3.1 & Eq. 17.5.2.1a)

A_{Vc} (in²)	A_{Vco} (in²)	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{by} (lb)	ϕ	ϕV_{cby} (lb)
100.02	288.00	0.800	1.400	1.386	8008	0.70	3021

Shear parallel to edge in x-direction:

$V_{by} = \min\left|7(l_e/d_a)^{0.2}\sqrt{d_a}\lambda_a\sqrt{f'_c}c_{a1}^{1.5};\ 9\lambda_a\sqrt{f'_c}c_{a1}^{1.5}\right|$ (Eq. 17.5.2.2a & Eq. 17.5.2.2b)

l_e (in)	d_a (in)	λ_a	f'_c (psi)	c_{a1} (in)	V_{by} (lb)
2.99	0.500	1.00	2500	4.00	2834

$\phi V_{cbgx} = \phi\,(2)(A_{Vc}/A_{Vco})\,\Psi_{ec,V}\Psi_{ed,V}\Psi_{c,V}\Psi_{h,V}V_{by}$ (Sec. 17.3.1, 17.5.2.1(c) & Eq. 17.5.2.1b)

A_{Vc} (in²)	A_{Vco} (in²)	$\Psi_{ec,V}$	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{by} (lb)	ϕ	ϕV_{cbgx} (lb)
72.10	72.10	1.000	1.000	1.400	1.000	2834	0.70	5555

Shear parallel to edge in y-direction:

$V_{bx} = \min\left|7(l_e/d_a)^{0.2}\sqrt{d_a}\lambda_a\sqrt{f'_c}c_{a1}^{1.5};\ 9\lambda_a\sqrt{f'_c}c_{a1}^{1.5}\right|$ (Eq. 17.5.2.2a & Eq. 17.5.2.2b)

l_e (in)	d_a (in)	λ_a	f'_c (psi)	c_{a1} (in)	V_{bx} (lb)
2.99	0.500	1.00	2500	44.00	103293

$\phi V_{cby} = \phi\,(2)(A_{Vc}/A_{Vco})\,\Psi_{ed,V}\Psi_{c,V}\Psi_{h,V}V_{bx}$ (Sec. 17.3.1, 17.5.2.1(c) & Eq. 17.5.2.1a)

A_{Vc} (in²)	A_{Vco} (in²)	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{bx} (lb)	ϕ	ϕV_{cby} (lb)
437.50	8712.00	1.000	1.400	3.250	103293	0.70	33039

10. Concrete Pryout Strength of Anchor in Shear (Sec. 17.5.3)

$\phi V_{cp} = \phi k_{cp} N_{cb} = \phi k_{cp}(A_{Nc}/A_{Nco})\,\Psi_{ed,N}\Psi_{c,N}\Psi_{cp,N}N_b$ (Sec. 17.3.1 & Eq. 17.5.3.1a)

k_{cp}	A_{Nc} (in²)	A_{Nco} (in²)	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	ϕ	ϕV_{cp} (lb)
2.0	50.91	80.46	0.968	1.000	0.997	6204	0.70	5300

11. Results

Interaction of Tensile and Shear Forces (Sec. R17.6)

Tension	Factored Load, N_{ua} (lb)	Design Strength, ϕN_n (lb)	Ratio	Status
Steel	2143	13085	0.16	Pass
Concrete breakout	**16597**	**19671**	**0.84**	**Pass (Governs)**

Shear	Factored Load, V_{ua} (lb)	Design Strength, ϕV_n (lb)	Ratio	Status
Steel	118	4473	0.03	Pass
T Concrete breakout x+	849	2778	0.31	Pass
T Concrete breakout y-	0	3021	0.00	Pass
|| Concrete breakout x+	0	5555	0.00	Pass
|| Concrete breakout y-	755	33039	0.02	Pass
Concrete breakout, combined	-	-	**0.31**	**Pass (Governs)**
Pryout	115	5300	0.02	Pass

Interaction check	$(N_{ua}/\phi N_{ua})^{5/3}$	$(V_{ua}/\phi V_{ua})^{5/3}$	Combined Ratio	Permissible	Status

Input data and results must be checked for agreement with the existing circumstances, the standards and guidelines must be checked for plausibility.

SIMPSON Strong-Tie Anchor Designer™ Software
Version 3.0.7947.8

Company:		Date:	6/8/2022
Engineer:		Page:	6/6
Project:			
Address:			
Phone:			
E-mail:			

Sec. R17.6	0.75	0.14	89.2%	1.0	Pass

1/2"Ø Titen HD Flat Washer, hnom:4" (102mm) meets the selected design criteria.

12. Warnings

- For irregular anchor patterns, the designer must consider sizing of base plate holes to ensure shear loads are distributed to anchors as designed.

- Designer must exercise own judgement to determine if this design is suitable.

- Refer to manufacturer's product literature for hole cleaning and installation instructions.

398 E Dania Beach Blvd. #338
DANIA BEACH, FL 33004
TEL: 954.399-8478 | FAX: 954.744.4738
WEB: www.buildingdrops.com

BR80 Supplemental Anchor Calculation

Jul 21 2022

1.Project Information

Company:	
Project Engineer:	- -
Address:	- - - Florida 33004
Phone:	M: - P: -
Email:	llopes@buildingdrops.com
Project Name:	Untitled
Project Address:	Untitled
Notes:	

2.Selected Anchor Information

Selected Anchor :	Screw-Bolt+ (Flat Head)
Brand:	DEWALT
Material:	1/2" Ø Low Carbon Steel
Embedment,hnom:	h_{ef} 1.75 in h_{nom} 2.5 in
Approval:	ICC-ES ESR-3889
Issued/Revision:	Nov,2021 -
Drill method:	Hammer Drilled

3.Design Principles

Design Method:	ACI 318-14	
Load Combinations:	Section 5.3	U = 1.2 (D) + (W) + (L) + 0.5 (Lr)

4.Base Material Information

Concrete:								
Type:	Uncracked Normal Weight Concrete							
Strength	3625	psi						
Reinforcement:								
Supplemental Reinforcement	False							
Spacing	Tension	No (Condition B)		Shear	No (Condition B)			
Controls Breakout	Tension	False		Shear	False			
Base Plate:								
Sizing	Thickness	0.25	in	Length	3.15	in	Width 50	in
Standoff	None			Height	0	in		
Strength	36000	psi						
Profile:	None							

DEWALT

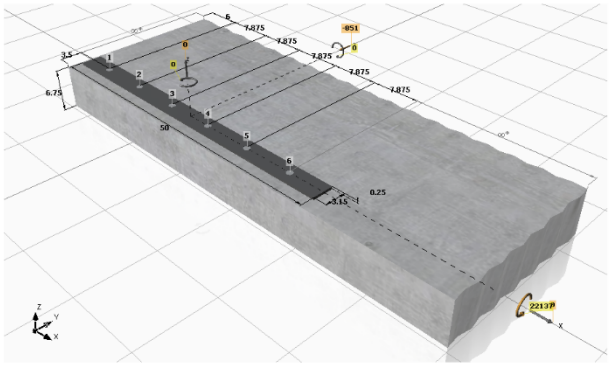
DEWALT DESIGN ASSIST 1.6.3.0

Page 2

BR80 Supplemental Anchor Calculation

Jul 21 2022

5.Geometric Conditions



h_{slab}	6.75	in	h_{min}	4.000	in
Edge Cx-	6	in	c_{min}	1.750	in
Edge Cx+	∞	in	c_{ac}	3.300	in
Edge Cy-	3.5	in	s_{min}	2.750	in
Edge Cy+	∞	in			

6.Summary Results

Tension Loading

Design Proof	Demand(lb)	Capacity(lb)	Utilization	Status	Critical
Steel Strength:	2661.00	13309.00	0.200	OK	
Concrete Breakout Strength:	15868.00	15957.00	0.994	OK	Controls

Shear Loading

Design Proof	Demand(lb)	Capacity(lb)	Utilization	Status	Critical
Steel Strength	147.00	5316.00	0.028	OK	
Concrete Breakout Strength:	851.00	11014.00	0.077	OK	Controls
Pryout Strength	851.00	17562.00	0.048	OK	

Input data and results must be checked for agreement with the existing conditions, the standards and guidelines and must be checked for plausibility

398 E Dania Beach Blvd. #338
DANIA BEACH, FL 33004
TEL: 954.399-8478 | FAX: 954.744.4738
WEB: www.buildingdrops.com

7.Warnings and Remarks

ANCHOR DESIGN CRITERIA IS SATISFIED

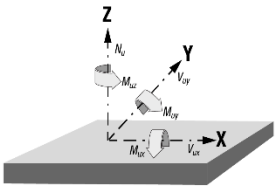
- The results of the calculations carried out by means of the DDA Software are based essentially on the data you put in. Therefore, you bear the sole responsibility for the absence of errors, the completeness and the relevance of the data to be put in by you. Moreover, you bear sole responsibility for having the results of the calculation checked and cleared by an design professional/engineer, particularly with regard to compliance with applicable standards, norms and permits, prior to using them for your specific project. The DDA Software serves only as an aid to interpret standards, norms and permits without any guarantee as to the absence of errors, the correctness and the relevance of the results or suitability for a specific application.

8.Load Condition

Design Loads / Actions

Nu	0	lb	Vux	0	lb	Vuy	-851	lb
Muz	0	in-lb	Mux	22137	in-lb	Muy	0	in-lb

Consider Load Reversal X Direction 0% Y Direction 0%



Input data and results must be checked for agreement with the existing conditions, the standards and guidelines and must be checked for plausibility