Window Installation Analysis

QUAKER WINDOWS & DOORS
M700 Awning-Fixed-Awning
M700 Awn-Fix & Fix-Awn

Report Q3930.01-122-34 M700

Rendered to:

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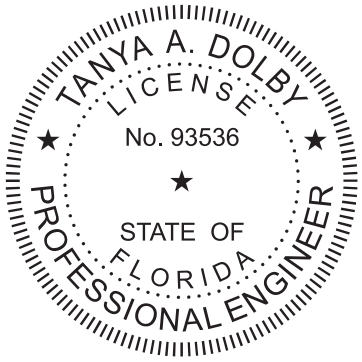

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Scope

Architectural Testing, Inc., an Intertek company, was contracted by Quaker Window & Doors to perform installation analysis for M700 Fixed/Awning/Fixed Windows on test report L5048.01-801-44-R5.

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

Florida Building Code, Building, 8th Edition (2023). International Code Council, 2023.

ANSI/AWC NDS-2018 *National Design Specification (NDS) for Wood Construction with 2015 Supplement*. American Wood Council, 2018.

ADM1-2020 *Aluminum Design Manual*. The Aluminum Association, Inc., 2020.

AISI S100-16(2020)w/S2-20 *North American Specification for the Design of Cold-Formed Steel Structural Members, 2016 Edition(Reaffirmed 2020)*. American Iron and Steel Institute, 2020.

ICC-ES Report ESR-1976 *ITW Buildex TEKS Self-Drilling Fasteners.* ICC Evaluation Service. 07/2023.

NOA 21-0628.20 *Hilti Kwik-Con+ Concrete and Masonry Screw Anchor.* Miami-Dade County Product Control Section. 08/19/2021.

AAMA TIR-A9-14 *Design Guide for Metal Cladding Fasteners, Includes 2020 Addendum*. American Architectural Manufacturers Association, 2014.

The calculations presented herein are for the integrity of the window 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.

Certification of Independence

In accordance with Rule 61G20-3 Florida Administrative Code, Architectural Testing, Inc. hereby certifies the following:

- Architectural Testing does not have, nor does it intend to acquire or will it acquire, a financial interest in any company manufacturing or distributing products tested or labeled by the agency.

- Architectural Testing is not owned, operated or controlled by any company manufacturing or distributing products it tests or labels.

- Tanya A. Dolby, P.E. and Adam R. Kunkel do not have nor will acquire, a financial interest in any company manufacturing or distributing products for which the reports are being issued.

- Tanya A. Dolby, P.E. and Adam R. Kunkel do not have, nor will acquire, a financial interest in any other entity involved in the approval process of the product.

Analyses

Summary of Test Results

The following table summarizes the M700 Fixed over Awning with Roto-Operator over Fixed Window products and their corresponding performance levels which have been established by testing or product certification.

Table 1 Summary of Test Results

Series/Model	Test Report Number	Product Certification	Size (W x H)	Performance
M700 Fixed over Awning with Roto-Operator over Fixed Window	L5048.01-801-44 (Revision 5, 12/01/22)	NI015457.03-R2	60" x 144"	+/- 70 psf

Testing documented in Table 1 was conducted by the Architectural Testing laboratory in Plano, Texas (Florida Department of Business & Professional Regulation Test Lab No. TST1910, IAS Accredited Laboratory TL-331).

As-Tested Installation Analysis

For Large Missile Impact and Cyclic testing, the test specimen was secured to a 2x Spruce-Pine-Fir wood buck with #12 x 2-1/2" wood screws located as shown in Table 2 for each anchor method. The as-tested installation methods are evaluated on pages 8 - 11 and the established design capacities are summarized in Table 2.

Table 2 As-Tested Anchorage Design Capacities

Test	Connection	Capacity
Unit 1, 2, 3 Nailing Fin	Nailing Fin with #12 x 2-1/2” Wood Screws Placed 3" from each corner and 14" on center at head and sill, 3” from each corner and 12” on center at jambs.	128 lb
Unit 4 Receptor	Screws attached through receptor spaced 3" from each end and 15" on center at head and sill. Receptor jambs are attached with screws 3" from each end and 13" on center.	193 lb
Unit 5 Trim Clip	Screws attached through 1-1/4" x 1-1/2" aluminum (Part #M15267) at interior of frame into buck, 2" from each end and 15" O.C. at frame head and sill, 13" O.C. at frame jambs.	114 lb

The capacities presented in Table 2 will be used to prove acceptable alternate anchors and substrates for the windows.

Alternate Anchorages

Calculations on pages 12 through 17 determine the design capacity of alternate anchorages for the windows. The alternate anchorage capacities are summarized in Table 3.

Table 3 Alternate Anchorage Capacities

Installation	Connection	Capacity	Comments
Nailing Fin to Steel	#12-14 TEKS Screw connecting Receptor to Light Gauge Steel Framing	131 lb	1. Limited by pull-out 2. Full penetration +3 threads 3. Min 18 gauge 33 KSI steel
Receptor to Steel	#12-14 TEKS Screw connecting Receptor to Light Gauge Steel Framing	209 lb	1. Limited by bending 2. Full penetration +3 threads 3. 1/4" max shim space Min 18 gauge 33 KSI steel
Receptor to Concrete	1/4" Hilti Kwik-Con+ Anchor connecting Receptor to Concrete	183 lb	1. Limited by bending 2. 1" min embedment 3. 2-1/2" min edge distance 4. 2" min spacing 5. 1/4" max shim space 6. Min f'_c = 3,000 psi concrete
Receptor to CMU	1/4" Hilti Kwik-Con+ Anchor connecting Receptor to CMU	183 lb	1. Limited by bending 2. 1" min embedment 3. 2-1/2" min edge distance 4. 3" min spacing 5. 1/4" max shim space 6. Min ASTM C90 masonry

Table 3 Alternate Anchorage Capacities (Cont.)

Installation	Connection	Capacity	Comments
Trim Clip to Steel	#12-14 TEKS Screw connecting Trim Clip to Light Gauge Steel Framing, #12 TEK Screw connecting Trim Clip to Window	114 lb	1. Limited by connection to window frame 2. Full penetration +3 threads 3. Min 18 gauge 33 KSI steel
Trim Clip to Concrete	1/4" Hilti Kwik-Con+ Anchor connecting Trim Clip to Concrete, #12 TEK Screw connecting Trim Clip to Window	114 lb	1. Limited by connection to window frame 2. 1" min embedment 3. 2-1/2" min edge distance 4. 2" min spacing 5. Min f'_c = 3,000 psi concrete
Trim Clip to CMU	1/4" Hilti Kwik-Con+ Anchor connecting Trim Clip to CMU, #12 TEK Screw connecting Trim Clip to Window	114 lb	1. Limited by connection to window frame 2. 1" min embedment 3. 2-1/2" min edge distance 4. 3" min spacing 5. Min ASTM C90 masonry

Anchorage Requirements

Calculated capacities of Receptor to Concrete/CMU installation are within 5% of tested capacity. Other alternate anchorage conditions have anchorage capacities which are comparable to or exceed the as-tested anchorage capacities. The as tested spacings for each anchoring system will apply to alternate substrates.

Unit 5 with Trim and Clip was tested with anchors located 2" from the corners. Locating anchors at 3" from the corners in lieu of 2" is accepted. All anchorage may be installed 3" from corners and per the spacing indicated on the Installation Instructions. Maximum shim space between the window frame and surrounding substrate is 1/4" for all conditions. Anchors must be fully shimmed and supported.

Reference Drawings

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

- *M700 Impact Awn-Fix & Fix-Awning Installation Instructions.* Quaker Windows and Doors. 10/05/23. (8 pages)
- *M700 Fixed-Awning-Fixed Installation Instructions.* Quaker Windows and Doors. 10/05/23. (8 pages)

As-Tested Installation – Nailing Fin to Wood Blocking

#12 x 2-1/2" Wood Screw (Non-Countersunk)

1-1/2" Minimum Penetration

1/16" thick 6063-T6 Aluminum Nailing Fin

G = 0.42 Minimum Spruce-Pine-Fir 2x Wood Blocking

Withdrawal of #12 Wood Screw

$W' = 2{,}850(G^2)(D)(C_d)(C_m^2)(C_t)(C_{eg})(C_{tn})(L)$

$W' = 2{,}850(0.42)^2(0.216")(1.6)(1.0)^2(1.0)(1.0)(1.0)(1.5")$

$W' = 128$ lb

Pull-Over of #12 Wood Screw

$P_{nov} = C_{pov}t_1F_{tu1}(D_{ws}-D_h)/3.0$

$P_{nov} = 1.0(0.0625")(30{,}000 \text{ psi})(0.438" - 0.228")/3.0$

$P_{nov} = 131$ lb

Capacity of Connection is 128 lb

As-Tested Installation – Receptor to Wood Blocking

#12 x 2-1/2" Wood Screw (Non-Countersunk)

1-1/2" Minimum Penetration

1/16" thick 6063-T6 Aluminum Nailing Fin

G = 0.42 Minimum Spruce-Pine-Fir 2x Wood Blocking

1/4" Maximum Shim Space

Z' = 193 lb

Bending of #12 Wood Screw

$S = \pi d^3/32 = \pi(0.216")^3/32 = 0.001 \text{ in}^3$

$F_b = (1.3)(0.6F_y) = (1.3)(0.6)(80{,}000 \text{ psi}) = 62{,}400$ psi (1.3 factor for weak axis bending)

$F_b = M/S = (VL/2)/S$ (L/2 for guided bending)

$V = 2SF_b/L = (2)(0.001 \text{ in}^3)(62{,}400 \text{ psi})/0.375" = 329$ lb

Capacity of Connection is 193 lb

Lateral Design Strength of Wood Connections

ANSI / AF&PA NDS-2018

Data

Fastener

Fastener	=	#12 Wood Screw
Shank Dia	=	0.216 in.
Root Dia.	=	0.171 in.
F_{yb}	=	80,000 psi
Fastener length	=	2.000 in.

Main Member

Material	=	SPF	
G	=	0.42	
θ	=	90	<= (Angle of load to grain)
F_e	=	3,350 psi	(Table 12.3.2)
Thickness	=	1.500 in.	

Side Member

Material	=	6063 T6 Aluminum	
G	=	N/A	
θ	=	0	<= (Angle of load to grain)
F_{es}	=	37,500 psi	
Thickness	=	0.063 in.	

Calculations

Lateral Bearing Factors

D	=	0.171 in.	
ℓ_m	=	1.500 in.	
K_θ	=	1.25	(Table 12.3.1B)
K_D	=	2.21	(Table 12.3.1B)
R_e	=	0.089	(Table 12.3.1A)
R_t	=	24.00	(Table 12.3.1A)
k_1	=	0.8662	(Table 12.3.1A)
k_2	=	0.5564	(Table 12.3.1A)
k_3	=	15.53	(Table 12.3.1A)

Yield Mode	R_d	
I_m, I_s	2.21	(Table 12.3.1B)
II	2.21	(Table 12.3.1B)
III_m, III_s, IV	2.21	(Table 12.3.1B)

Lateral Design Values, Z

Mode I_m	=	389 lbf		(Eq 12.3-1)
Mode I_s	=	181 lbf		(Eq 12.3-2)
Mode II	=	157 lbf		(Eq 12.3-3)
Mode III_m	=	184 lbf		(Eq 12.3-4)
Mode III_s	=	120 lbf	<==== Min Value	(Eq 12.3-5)
Mode IV	=	169 lbf		(Eq 12.3-6)
C_D	=	1.6		(B.2)
Wet Service Factor				
Fabrication/In-Service		Dry/Dry		
C_M	=	1.0		(Table 11.3.3)
In service temperature		T≤100˚F		
C_t	=	1.0		(Table 11.3.4)
C_g	=	1.0		(11.3.6)
C_Δ	=	1.0		(12.5.1)
Installed in end grain?		No		
C_{eg}	=	1.00		(12.5.2)
Part of a diaphragm?		No		
C_{di}	=	1.0		(12.5.3)
Toe-nailed?		No		
C_{tn}	=	1.00		(12.5.4)
Z'	=	**193 lbf**		(Table 11.3.1)

Capacity of Connection is 193 lb

As-Tested Installation – Trim and Clip to Wood Blocking

#12 Wood Screw (Non-Countersunk)

1-1/2" Minimum Penetration

1/16" thick 6063-T6 Aluminum Trim Clip

G = 0.42 Minimum Spruce-Pine-Fir 2x Wood Blocking (Qualifies Southern Yellow Pine)

1/4" Maximum Shim Space allowed

Allowable Shear of #12 Wood Screw

$Z' = 193$ lb

Bearing of #12 Screw

$V_a = 2DtF_u/n_u$

$V_a = 2(0.216")(0.0625")(30{,}000 \text{ psi})/3.0$

$V_a = 270$ lb

Bending of #12 Wood Screw

$S = \pi d^3/32 = \pi(0.216")^3/32 = 0.001 \text{ in}^3$

$F_b = (1.3)(0.6F_y) = (1.3)(0.6)(80{,}000 \text{ psi}) = 62{,}400$ psi (1.3 factor for weak axis bending)

$F_b = M/S = (VL/2)/S$ (L/2 for guided bending)

$V = 2SF_b/L = (2)(0.001 \text{ in}^3)(62{,}400 \text{ psi})/0.25" = 316$ lb

Capacity of Connection is 193 lb

As-Tested Installation – Trim Clip to Window Frame

#12-14 TEKS Screw

Full Penetration +3 Threads

1/16" thick 6063-T6 Aluminum Trim Clip

1/16" thick 6063-T6 Aluminum Window Frame

Allowable Tension of #12-14 TEKS Screw

V_a = 1184 lb (ESR-1976)

Pull-Over of #12-14 TEKS Screw in Trim Clip

$P_{nov} = C_{pov}t_1F_{tu1}(D_{ws}-D_h)/3.0$

$P_{nov} = 1.0(0.0625")(30{,}000\ psi)(0.438" – 0.228")/3.0$

P_{nov} = 131 lb

Pull-Out of #12-14 TEKS Screw in Window Frame

$P_{not} = K_sDL_eF_{ty2}/3.0$

$P_{not} = 1.01(0.216")(0.0625")(25{,}000\ psi)/3.0$

P_{not} = 114 lb

Capacity of Connection is 114 lb

Tested capacity of M2078 Interior Snap Trim (1/16” thick) determined as shown below on Q3412.01-550-44-R0. Qualified for use at the design capacity of 114 lb.

Trim&Clip	70.0 psf					
Anchor Spacing	8.0 inch					
Window Mark	**Width, w (inch)**	**Height, h (inch)**	**w/h**	**gamma**	**R (lb/inch)**	**Anchor Capacity for Specified Spacing (lb)**
Q3412.01-550-44-R0	60.00	99.00	1.65	0.494	14.40	115

Alternate Installation – Nailing Fin to Steel Stud

#12-14 TEKS Screw

Full Penetration +3 Threads

1/16" thick 6063-T6 Aluminum Nailing Fin

Minimum 18 Gauge 33 KSI Steel Stud (Qualifies thicker and stronger steel)

Allowable Tension of #12-14 TEKS Screw

V_a = 1184 lb (ESR-1976)

Pull-Over of #12-14 TEKS Screw in Trim Clip

$P_{nov} = C_{pov}t_1F_{tu1}(D_{ws}-D_h)/3.0$

$P_{nov} = 1.0(0.0625")(30{,}000\ psi)(0.438" - 0.228")/3.0$

P_{nov} = 131 lb

Pull-Out of #12-14 TEKS Screw in Steel Stud

$P_{not} = 0.85t_cdF_{u2}/3.0$

$P_{not} = 0.85(0.0478")(0.216")(45{,}000\ psi)/3.0$

P_{not} = 132 lb

Capacity of Connection is 131 lb

Alternate Installation – Receptor to Steel Stud

#12-14 TEKS Screw

Full Penetration +3 Threads

1/16" thick 6063-T6 Aluminum Receptor

Minimum 18 Gauge 33 KSI Steel Stud (Qualifies thicker and stronger steel)

1/4" Maximum Shim Space

0.6875" Maximum Bending Space

Allowable Shear of #12-14 TEKS Screw

V_a = 724 lb (ESR-1976)

Bearing of #12-14 TEKS Screw on Receptor

$V_a = 2DtF_u/n_u$

$V_a = 2(0.216")(0.0625")(30{,}000\ psi)/3.0$

V_a = 270 lb

Bearing of #12-14 TEKS Screw on Steel Stud

$V_a = 2.7DtF_u/n_u$

$V_a = 2.7(0.216")(0.0478")(45{,}000\ psi)/3.0$

V_a = 418 lb

Tilting of #12-14 TEKS Screw in Steel

$V_a = 4.2(t_2^3D)^{1/2}F_{tu}/n_s$

$V_a = 4.2(0.0478^3 \times 0.216)^{1/2}(45{,}000\ psi)/3.0$

V_a = 306 lb

Bending of #12-14 TEKS Screw

$S = \pi d^3/32 = \pi(0.216")^3/32 = 0.001\ in^3$

$F_b = (1.3)(0.6F_y) = (1.3)(0.6)(92{,}000\ psi) = 71{,}760\ psi$ (1.3 factor for weak axis bending)

$F_b = M/S = (VL/2)/S$ (L/2 for guided bending)

$V = 2SF_b/L = (2)(0.001\ in^3)(71{,}760\ psi)/0.6875" = 209$ lb

Capacity of Connection is 209 lb

Alternate Installation – Receptor to Concrete

1/4" Hilti Kwik-Con+ Anchor

1" Minimum Embedment

2-1/2" Minimum Edge Distance

2" Minimum Spacing

1/16" thick 6063-T6 Aluminum Receptor

Minimum f'_c = 3,000 psi Concrete

1/4" Maximum Shim Space

11/16" Maximum Bending Space

Allowable Shear of 1/4" Hilti Kwik-Con+ Anchor

P_{ss}/Ω = 379 lb (NOA-No. 21-0628.20)

Bearing of 1/4" Hilti Kwik-Con+ in Receptor

$V_a = 2DtF_u/n_u$

$V_a = 2(0.25")(0.0625")(30{,}000 \text{ psi})/3.0$

V_a = 313 lb

Bending of 1/4" Hilti Kwik-Con+

$S = \pi d^3/32 = \pi(0.190")^3/32 = 0.0007 \text{ in}^3$

F_y = 120,000 psi per Miami Dade NOA 20-0427.13

$F_b = (1.3)(0.6F_y) = (1.3)(0.6)(120{,}000 \text{ psi}) = 93{,}600$ psi (1.3 factor for rod bending)

$F_b = M/S = (VL/2)/S$ (L/2 for guided bending)

$V = 2SF_b/L = (2)(0.0007 \text{ in}^3)(93{,}600 \text{ psi})/0.6875" = 183$ lb

Capacity of Connection is 183 lb,
Within 5% of tested capacity of 193 lb

Alternate Installation – Receptor to CMU

1/4" Hilti Kwik-Con+ Anchor

1" Minimum Embedment

2-1/2" Minimum Edge Distance

3" Minimum Spacing

1/16" thick 6063-T6 Aluminum Receptor

Minimum f'm = 1,500 psi ASTM C90 Concrete Masonry

1/4" Maximum Shim Space

11/16" Maximum Bending Space

Allowable Shear of 1/4" Hilti Kwik-Con+ Anchor

P_{ss}/Ω = 251 lb (NOA-No. 21-0628.20)

Bearing of 1/4" Hilti Kwik-Con+ in Receptor

$V_a = 2DtF_u/n_u$

$V_a = 2(0.25")(0.0625")(30{,}000\ psi)/3.0$

V_a = 313 lb

Bending of 1/4" Hilti Kwik-Con+

$S = \pi d^3/32 = \pi(0.190")^3/32 = 0.0007\ in^3$

F_y = 120,000 psi per Miami Dade NOA 20-0427.13

$F_b = (1.3)(0.6F_y) = (1.3)(0.6)(120{,}000\ psi) = 93{,}600$ psi (1.3 factor for rod bending)

$F_b = M/S = (VL/2)/S$ (L/2 for guided bending)

$V = 2SF_b/L = (2)(0.0007\ in^3)(93{,}600\ psi)/0.6875" = 183$ lb

Capacity of Connection is 183 lb
Within 5% of tested capacity of 193 lb

Alternate Installation – Trim Clip to Steel Stud

#12-14 TEKS Screw

Full Penetration +3 Threads

1/16" thick 6063-T6 Aluminum Trim Clip

Minimum 18 Gauge 33 KSI Steel Stud (Qualifies thicker and stronger steel)

1/4" Maximum Shim Space

No Bending

Allowable Shear of #12-14 TEKS Screw

V_a = 724 lb (ESR-1976)

Bearing of #12-14 TEKS Screw on Trim Clip

$V_a = 2DtF_u/n_u$

$V_a = 2(0.216")(0.0625")(30{,}000\ psi)/3.0$

V_a = 270 lb

Bearing of #12-14 TEKS Screw on Steel Stud

$V_a = 2.7DtF_u/n_u$

$V_a = 2.7(0.216")(0.0478")(45{,}000\ psi)/3.0$

V_a = 418 lb

Tilting of #12-14 TEKS Screw in Steel

$V_a = 4.2(t_2^3D)^{1/2}F_{tu}/n_s$

$V_a = 4.2(0.0478^3 \times 0.216)^{1/2}(45{,}000\ psi)/3.0$

V_a = 306 lb

Capacity of Connection is 270 lb

Alternate Installation – Trim Clip to Concrete

1/4" Hilti Kwik-Con+ Anchor

1" Minimum Embedment

2-1/2" Minimum Edge Distance

2" Minimum Spacing

1/16" thick 6063-T6 Aluminum Trim Clip

Minimum f'_c = 3,000 psi Concrete

1/4" Maximum Shim Space

No Bending

Allowable Shear of 1/4" Hilti Kwik-Con+ Anchor

P_{ss}/Ω = 379 lb (NOA-No. 21-0628.20)

Bearing of 1/4" Hilti Kwik-Con+ in Trim Clip

$V_a = 2DtF_u/n_u$

$V_a = 2(0.25")(0.0625")(30{,}000 \text{ psi})/3.0$

V_a = 313 lb

Capacity of Connection is 313 lb

Alternate Installation – Trim Clip to CMU

1/4" Hilti Kwik-Con+ Anchor

1" Minimum Embedment

2-1/2" Minimum Edge Distance

3" Minimum Spacing

1/16" thick 6063-T6 Aluminum Trim Clip

Minimum f'm = 1,500 psi ASTM C90 Concrete Masonry

1/4" Maximum Shim Space

No Bending

Allowable Shear of 1/4" Hilti Kwik-Con+ Anchor

P_{ss}/Ω = 251 lb (NOA-No. 21-0628.20)

Bearing of 1/4" Hilti Kwik-Con+ in Receptor

$V_a = 2DtF_u/n_u$

$V_a = 2(0.25")(0.0625")(30{,}000\ psi)/3.0$

V_a = 313 lb

Capacity of Connection is 251 lb

Note: A #12-14 TEKS screw is used to connect the trim clip to window frame. The capacity of this connection is 114 lb as shown on page 11. This connection governs the capacity of all trim clip installation methods.

Actual Tested Anchorage Capacity

Nailfin

Design Pressure	70.0	psf	
Anchor Spacing	14.0	inch	Head/Sill
Anchor Spacing	12.0	inch	Jambs

Window Mark	Width, w (inch)	Height, h (inch)	w/h	gamma	R (lb/inch)	Anchor Capacity for Specified Spacing (lb)
L5048.01-801-44-R5	60.00	144.00	2.40	0.505	14.74	177
L5048.01-801-44-R5	60.00	60.00	1.00	0.420	12.25	171

Receptor

Design Pressure	70.0	psf	
Anchor Spacing	15.0	inch	Head/Sill
Anchor Spacing	13.0	inch	Jambs

Window Mark	Width, w (inch)	Height, h (inch)	w/h	gamma	R (lb/inch)	Anchor Capacity for Specified Spacing (lb)
L5048.01-801-44-R5	60.00	144.00	2.40	0.505	14.74	192
L5048.01-801-44-R5	60.00	60.00	1.00	0.420	12.25	184

Trim&Clip

Design Pressure	70.0	psf	
Anchor Spacing	15.0	inch	Head/Sill
Anchor Spacing	13.0	inch	Jambs

Window Mark	Width, w (inch)	Height, h (inch)	w/h	gamma	R (lb/inch)	Anchor Capacity for Specified Spacing (lb)
L5048.01-801-44-R5	60.00	144.00	2.40	0.505	14.74	192
L5048.01-801-44-R5	60.00	60.00	1.00	0.420	12.25	184

GLASS ANALYSIS

Glazing Information

Supported Edges:	Four sides simply supported
Shape:	Rectangular
Lite Width:	57.1 in.
Lite Height:	47.7 in.
Glazing Angle:	90.0 °

Glazing Construction (Double Glazed Insulating Unit)

Exterior Lite Properties (Monolithic 1/4 in.)

Single Glass Ply Properties

RCSS (Heat Treatment):	0.00 psi (Annealed)
Min Thickness:	0.219 in.
Surface Treatment:	None
Surface Parameters:	7.00 [1.36e-29 in^12/lbf^7] (ASTM)

Airspace Properties

Thickness:	0.480 in.
Sealant Width:	0.236 in.
Elevation:	0.00 ft
Initial Pressure:	14.70 psi
Initial Temperature:	70.0 °F

Interior Lite Properties (Laminated 1/4 in.)

Exterior Glass Ply Properties

RCSS (Heat Treatment):	0.00 psi (Annealed)
Min Thickness:	0.115 in.
Surface Treatment:	None
Surface Parameters:	7.00 [1.36e-29 in^12/lbf^7] (ASTM)

Interlayer Properties

Interlayer Type:	PVB
Thickness:	0.090 in.

Interior Glass Ply Properties

RCSS (Heat Treatment):	0.00 psi (Annealed)
Min Thickness:	0.115 in.
Surface Treatment:	None
Surface Parameters:	7.00 [1.36e-29 in^12/lbf^7] (ASTM)

Load Combinations

Load Combination 1 - 70.0 psf (3.00 sec)

Description	Load	Duration	Factor	Total
Short Duration	70.0 psf	3.00 sec	1.00	70.0 psf

Details

Selected standard: ASTM E1300 Extended Basic

Glazing Construction (Double Glazed Insulating Unit)

Exterior Lite Properties (1/4 in. Monolithic)

Construction: 1/4 in. (AN)

Airspace Properties

Thickness: 0.480 in.

Interior Lite Properties (1/4 in. Laminated)

Construction: 1/8 in. (AN) | 0.090 in. (PVB) | 1/8 in. (AN)

Load Resistance

Short Duration (3 Sec)

Description	NFL	GTF	LSF	LR
Exterior Lite	54.0 psf	0.900	1/0.500	97.3 psf
Interior Lite	47.4 psf	0.900	1/0.500	85.4 psf

Comparisons

Scenario 1

70.0 psf 3.00 sec <= 85.4 psf	OK
Approximate center of glass deflection	
Exterior Lite	0.44 in.
Interior Lite	0.57 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.

Revision Log

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0	09/29/23	N/A	Original report issue