

Prepared with Cooperation from:

November 17, 2020

Window Craftsmen Inc.
6031 Clark Center Avenue
Sarasota, FL 34238

Anchor Calculations:
Installation of Impact IG Double Impact Slider Window
In Aluminum, Wood or Concrete and Masonry Openings

Window Series: DS-300
Impact IG Glass Double Slider Window

Reference: Test report NCTL-110-14895-1 Report Date: 10/6/10

Testing Facility: NCTL
5 Leigh Drive
York, PA, 17406

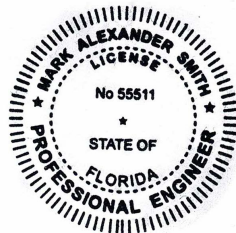
Test Standards: TAS-201/202/203-94,
AAMA/WDMA/CSA 101/I.S.2/A440-05,
AAMA/WDMA/CSA 101/I.S.2/A440-08,
ASTM E-1886-02/05/13a
ASTM E 1996-02/05/14a

Specimen: 74" x 63" Vinyl Single Hung,

Glazing: 7/8" overall thickness, 1 lite of 1/8" annealed glass, 7/16" spacer,
2 lites of 1/8" double strength annealed glass with a .090" PVB
interlayer.

Design Pressure: +50PSF/-50PSF

Mark A. Smith, P.E.
Florida No. 55511
3738 Kingswood Drive
Sarasota, FL 34232



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Mark Smith
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Window Craftsmen, Inc.
DS-300 Impact IG Glass Vinyl Double Slider

Notes:

Anchor calculations are based on approved installation instructions and:

- 1) Concrete or masonry substrate where one by, non-structural, wood bucking is employed, use 3/16" ITW Tapcon anchors of sufficient length to achieve a minimum embedment of 1-1/4" into concrete or masonry.
- 2) Concrete substrate where wood bucking is not employed, use 3/16" ITW Tapcon anchors of sufficient length to achieve a minimum embedment of 1-1/4" into concrete or masonry.
- 3) Wood Frame substrate, use #10 wood screws of sufficient embedment of 1-1/2" into wood framing.
- 4) Aluminum Frame substrate, #12 Tek screw of sufficient length to allow full thread engagement through aluminum. Reference Aluminum Design Manual, Allowable stress design, 5.4.
- 5) Maximum allowable shim thickness shall be 1/4". A load bearing shim shall be located at each anchor.
- 6) Anchor calculations and analysis comply with the current Florida Building Code.

Tested Installation Anchor Information

Six (6) #8 x 2" Phillips flat head counter-sunk sheet metal screws were used to fasten the head and sill into a wooden test buck. The screws were located 6" from the corners and 12" on center. The Jambs each had four (4) #8 x 2" Phillips flat head counter-sunk sheet metal screws located 6" from the corners and 12" on center.

Anchors to be qualified:

1. #10 wood screws for installation in wood substrates.
2. 3/16" ITW Tapcons for installation in concrete and masonry substrates.
3. #12 Tek screws for installation into aluminum substrates.

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Anchor Calculations:

#10 wood screw
1-1/2" embedment

Head & Sill

Shear:

Proof load 80 ksi
Root diameter = .150 in.
Allowable Shear=353 pounds
NDS min lateral load in wood with metal for #10 wood screw is 121 pounds

Bending:

Allowable bending stress=64 ksi
Cantilever=.234" , Moment arm=.165
Allowable bending load=128 pounds

Jamb

Shear:

Proof load 80 ksi
Root diameter = .150 in.
Shear=353 pounds
NDS min lateral load in wood with metal for #10 wood screw is 121 pounds

Bending:

Allowable bending stress=64 ksi
Cantilever=.234" , Moment arm=.165
Allowable bending load=128 pounds

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3/16" Tapcon

1-1/4" embedment
2000psi concrete

Head & Sill

Shear:

Yield Strength = 92 ksi
Allowable shear stress 23 ksi
Allowable shear load = 406 pounds
Allowable lateral load = 170 pounds

Bending:

Root dia=.150
Allowable bending stress=73.6 ksi
Cantilever=.234" , Moment arm=.165
Allowable bending load=184 pounds

Jambs

Shear:

Yield Strength = 92 ksi
Allowable shear stress 23 ksi
Allowable shear load = 406 pounds
Allowable shear= 170 pounds

Bending:

Root dia=.150
Allowable bending stress=73.6 ksi
Cantilever=.234" , Moment arm=.165
Allowable bending load=184 pounds

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#12 TEK Screw

Min .045" thick aluminum

Head & Sill

Shear:

Proof load 80 ksi

Root diameter = .171 in.

Allowable shear stress 20 ksi

Shear=459 pounds

Shear shall not exceed the least of:

$$2 \times F_{tu1} / x D \times t_1 / \nu = (2)(22000)(.206)(.045/1.95) = 209 \text{ lbs}$$

$$2 \times F_{tu2} \times D \times t_2 / \nu = (2)(22000)(.206)(.045/1.95) = 209 \text{ lbs}$$

$$4.2 \times ((t_2)^3 \times D)^{1/2} \times F_{tu2} / \nu \text{ for } t_2 \leq t_1. 4.2(((.045^3)(.206))^{1/2})(22000/3) = 127 \text{ lbs}$$

$$P_{ns} / 1.25 \nu = 459 / (1.25 \times 3) = 122.4$$

Bending:

Allowable bending stress=64 ksi

Cantilever=.234", Moment arm=.165

Allowable bending load=190 pounds

Jamb

Shear:

Proof load 80 ksi

Root diameter = .171 in.

Allowable shear stress 20 ksi

Shear=459 pounds

Shear shall not exceed the least of:

$$2 \times F_{tu1} / x D \times t_1 / \nu = (2)(22000)(.206)(.045/1.95) = 209 \text{ lbs}$$

$$2 \times F_{tu2} \times D \times t_2 / \nu = (2)(22000)(.206)(.045/1.95) = 209 \text{ lbs}$$

$$4.2 \times ((t_2)^3 \times D)^{1/2} \times F_{tu2} / \nu \text{ for } t_2 \leq t_1. 4.2(((.045^3)(.206))^{1/2})(22000/3) = 127 \text{ lbs}$$

$$P_{ns} / 1.25 \nu = 459 / (1.25 \times 3) = 122.4$$

Bending:

Allowable bending stress=64 ksi

Cantilever=.234", Moment arm=.165

Allowable bending load=190 pounds

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DS-300 Impact IG Glass Vinyl Double Slider

50R Series Vinyl Double Slider

Load on 74" header or sill:
Area=1339 square in=9.3 square feet
Design pressure= 50 psf
Total load = 465 pounds

Load on 63" Jambs:
Area=992 square in=6.9 square feet
Design Pressure= 50 psf
Total load= 345 pounds

Minimum Anchors required, #10 wood screw:

Spacing, Locations End Distance & # of Anchors/Location:

Head or Sill: 12.4"	6 Locations	6" End Distance	1 Anchor/Loc
Frame Jambs: 12.75"	5 Locations	6" End Distance	1 Anchors/Loc

Verify Anchor Locations Required exceeds # of Anchor Locations during Testing:

Head or Sill:	6 Locations Required =>	6 Locations Tested
Frame Jambs:	5 Locations Required =>	5 Locations Tested

#10 Wood Anchor:

Head or Sill Capacity:	726 lbs.	>	465 lbs.	OK
Jamb Capacity:	605 lbs.	>	345 lbs.	OK

#12 Tek Screw:

Head or Sill:	732 lbs.	>	465 lbs.	OK
Jamb Capacity:	610lbs .	<	345 lbs.	OK

Dade Shear and Bending Load on lesser screw

$$(fb/Fb)+(fv/Fv)^2 \leq 1.0$$

$$\text{Head or Sill: } (0.605)+(0.048)=(0.653) < 1.0$$

$$\text{Jambs: } (0.539)+(0.038)=(0.577) < 1.0$$

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DS-300 Impact IG Glass Vinyl Double Slider

Minimum Anchors required, 3/16 Tapcon:

Spacing, Locations End Distance & # of Anchors/Location:

Head or Sill:	12.4"	6 Locations	6" End Distance	1 Anchors/Loc
Frame Jambs:	12.75"	5 Locations	6" End Distance	1 Anchors/Loc

Verify Anchor Locations Required exceeds # of Anchor Locations during Testing:

Head or Sill:	6 Locations Required =>	6 Locations Tested
Frame Jambs:	5 Locations Required =>	5 Locations Tested

3/16" Tapcon:

Head or Sill Capacity:	1020 lbs.	>	465 lbs	OK
Jamb Capacity:	850 lbs.	>	345 lbs.	OK

Dade Shear and Bending Load on screw

$$(fb/Fb)+(fv/Fv)^2 \leq 1.0$$

$$\text{Head or Sill: } (0.421)+(0.036)=(0.457) < 1.0$$

$$\text{Jambs: } (0.375)+(0.029)=(0.404) < 1.0$$

Anchor Locations Required (63" X 43") # 10 wood screw, 3/16" Tapcon and #12 Tek Screw:

Spacing, Locations End Distance & # of Anchors/Location:

Head or Sill:	12-3/8"	6 Locations	6" End Distance	1 Anchors/Loc
Frame Jamb:	12-3/4"	5 Locations	6" End Distance	1 Anchors/Loc

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