

Prepared with Cooperation from:
Window Craftsmen Inc.
6031 Clark Center Avenue
Sarasota, FL 34238

September 29, 2023

3 and 4 track Engineering Analysis:
Aluminum Horizontal Sliding Glass Windows in Aluminum, Wood or Concrete and
Masonry Openings
Window Series:
40R and 45R 3 and 4 Track Horizontal Slider

Reference: Test reports CTLA-1245W, CTLA-1245W-1/W-1965

Testing Facility: Certified Testing Laboratories
7252 Narcoossee Rd.
Orlando, Florida 32822

Test Standards: AAMA/WDMA/CSA 101/I.S.2A440-11

Series 40R/45R Tested Specimen Information (Figure 1)

The extruded aluminum fin frame fit into buck opening that measured 72" wide x 72" high, utilizing coped and butted corner construction. Each end corner secured with two(2) #8 x .750" #1 square P.H. S.M.S. fasteners and two (2) #6 x .375" Phillips P.H. S.M.S. fasteners interior corner each jamb and sill connection. One (1) aluminum water adapter (sill riser) was secured to the interior face of the frame sill with seven (7) #6 x .375 Phillips P.H. S.M.S. fasteners and latex caulking.

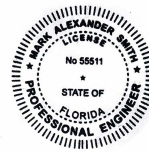
Configuration: X/X
Ventilator:

Unit tested with two (2) operable panels, each measuring 36.500" x 69.500" coped and butted corner construction. Each corner secured with two (2) #8 x 1.25" #2 square F.H. S.M.S. fasteners. The sash meeting stile had two (2) PVC extrusion caps on top and bottom of each end that nominally measured .76" wide x 1.5" high x .61" thick. Each operable panel had a daylight opening that measured 32.5" wide x 66.25" high.

Installation Anchors:

Based on report: Anchor Calculations: Installation of Horizontal Window In Aluminum, Wood or Concrete and Masonry Openings, Window Series: 40R and 45R series Horizontal Slider Window, Dated 9/29/23.

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Window Craftsmen, Inc.
40R and 45R Aluminum Horizontal Slider

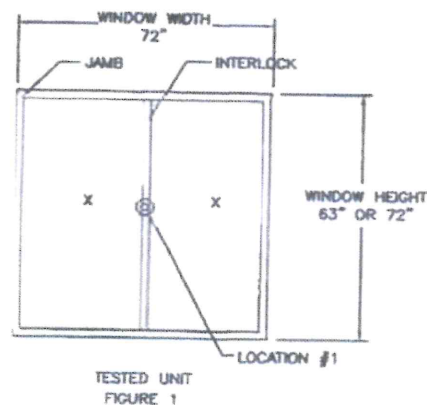
Hardware & Location:

Two (2) plastic cam locks located 24.5" C/L from top and bottom of sash meeting stile.
Two (2) Nylon Roller housing with (1) nylon roller each at each end of vent operable panel's bottom rail.

Glazing: ¼" thick annealed glass, marine (or channel) glazed with vinyl wrap around glazing gasket.

Installation:

Twenty (20) #8 x 1.50" Hex head S.M.S. fasteners were used to secure the specimen to the wooden test buck. Five (5) in each frame jamb located at 2.5", 19.5", 37.5", 53.5" and 72.5" measuring from frame sill to frame head. Five (5) in the frame sill located at 2", 18.5", 34.25", 54" and 72.5" measuring from right jamb to left jamb. Five (5) in the head located at 2", 19.5", 37.75", 55.5" and 72.5" measuring from right frame jamb to left frame jamb.



Structural Test Results:

Tested as per ASTM E330-02. Test pressure was +/-60 PSF. Measurements for permanent set were measured at Mid Span if interlock (Location #1). The maximum permanent set was .0147" in the positive direction and .205" in the negative direction which are less than the .288" allowed (0.4% of 72").

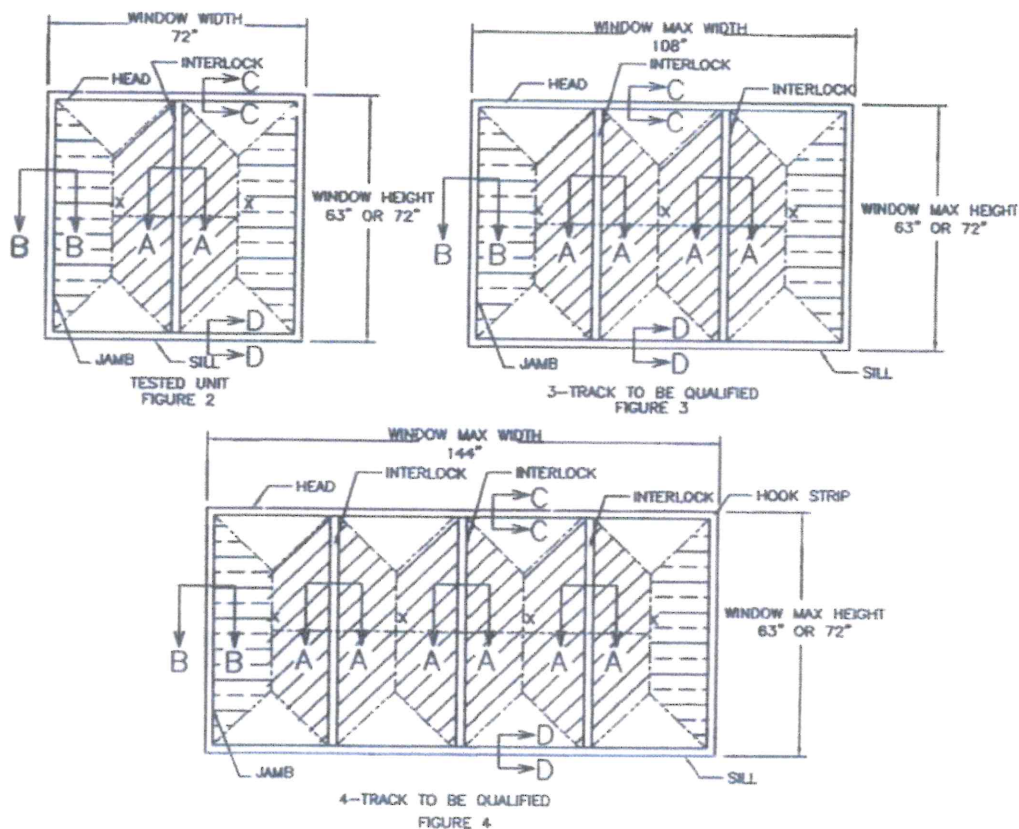
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40R and 45R Aluminum Horizontal Slider

Series 40 Window Configurations to be qualified:

3 track slider 108" wide x 72" tall and 4 track slider 144" wide x 72" tall.

1. Test data and analysis provide enough information to prove that additional window vents greater than the number tested can be qualified. The tested specimen included all combinations of structure and interlocks that will be used to add additional window vents. (figures 2, 3 & 4)
2. The size of the vents shall not exceed the size tested.
3. The window size tested shall qualify windows that are smaller.



The above figures show that although there are more window panels in the configurations to be qualified the interlocks are affected by the same tributary load areas.

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40R and 45R Aluminum Horizontal Slider

Series 45R Tested Specimen Information (Figure 1)

The extruded aluminum fin frame fit into buck opening that measured 72" wide x 63" high, utilizing coped and butted corner construction. Each end corner secured with two (2) #8 x .750" #1 square P.H. S.M.S. fasteners and two (2) #6 x .375" Phillips P.H. S.M.S. fasteners interior corner each jamb and sill connection. One (1) aluminum water adapter (sill riser) was secured to the interior face of the frame sill with seven (7) #6 x .375 Phillips P.H. S.M.S. fasteners and latex caulking.

Configuration: X/X
Ventilator:

Unit tested with two (2) operable panels, each measuring 36.500" x 61.250" coped and butted corner construction. Each corner secured with two (2) #8 x 1.25" #2 square F.H. S.M.S. fasteners. The sash meeting stile had two (2) PVC extrusion caps on top and bottom of each end that nominally measured .76" wide x 1.5" high x .61" thick. Each operable panel had a day light opening that measured 32.5" wide x 57.50" high. **Figures 2, 3 and 4**

Hardware & Location:

Two (2) plastic cam locks located 24.5" C/L from top and bottom of sash meeting stile. Two (2) Nylon Roller housing with (1) nylon roller each at each end of vent operable panel's bottom rail.

Glazing: 1/4" thick annealed glass, marine (or channel) glazed with vinyl wrap around glazing gasket.

Installation:

Eighteen (18) #8 x 1.50" Hex head S.M.S. fasteners were used to secure the specimen to the wooden test buck. Four (4) in each frame jamb located at 2.5", 16.5", 32.5" and 48.5" measuring from frame sill to frame head. Five (5) in the frame sill located at 2", 18.5", 34.25" 54" and 72.5" measuring from right jamb to left jamb. Five (5) in the head located at 2" 19.5", 37.75", 55.5" and 72.5" measuring from right frame jamb to left frame jamb.

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Structural Test Results:

Tested as per ASTM E330-02. Test pressure was +/-67.5 PSF. Measurements for permanent set were measured at Mid Span if interlock (Location 1). The maximum permanent set was .0.123" in the positive direction and .128" in the negative direction which are less than the .252" allowed (0.4% of 63").

Series 45 Window Configurations to be qualified:

3 track slider 108" wide x 63" tall and 4 track slider 144" wide x 63" tall.

1. Test data and analysis provide enough information to prove that additional window vents greater than the number tested can be qualified. The tested specimen included all combinations of structure and interlocks that will be used to add additional window vents. (figure 2, 3 & 4)
2. The size of the vents shall not exceed the size tested.
3. The window size tested shall qualify windows that are smaller.

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40R and 45R Aluminum Horizontal Slider

Analysis 40R (72" X 72" tested)

Interlock (Section A-A Figure 5)

Load:

2, 3 and 4-track: Tributary area: 13.5 square feet. Load per sq. ft.=40 lbs. Total Load = 540 lbs.

Assembly and installation:

Assembly of the interlock and affected window vents are the same no matter where the location is.

Installation of the frame and the frame itself is consistent no matter how many window vents are used.

Jamb (Section B-B Figure 6)

Load:

2, 3 and 4 track: Tributary area: 6.75 square feet. Load per sq. ft.=40 lbs. Total Load = 270 lbs.

Assembly and installation:

Installation of the frame and the frame itself is consistent no matter how many window vents are used.

Head (Section C-C Figure 7) and Sill (Section D-D Figure 8)

Load:

2-track tested: Tributary area: 11.25 square feet. Load per sq. ft.=40 lbs. Total Load = 450 lbs. 6 foot window width= 75 lbs/ft.

3-track: 18 square feet. Load per sq. ft.=40 lbs. Total Load = 720 lbs. 9 foot window width= 80 lbs/ft.

4-track: 24.75 square feet. Load per sq. ft.=40 lbs. Total Load = 990 lbs. 12 foot window width= 82.5 lbs/ft.

Assembly and installation:

Installation of the frame and the frame itself is consistent no matter how many window vents are used.

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Analysis 45R (63" x 72" tested)

Interlock (Section A-A Figure 5)

Load:

2, 3 and 4-track: Tributary area: 12.38 square feet. Load per sq. ft.=45 lbs. Total Load = 557 lbs.

Assembly and installation:

Assembly of the interlock and affected window vents are the same no matter where the location is.

Installation of the frame and the frame itself is consistent no matter how many window vents are used.

Jamb (Section B-B Figure 6)

Load:

2, 3 and 4 track: Tributary area: 6.19 square feet. Load per sq. ft.=45 lbs. Total Load = 279 lbs.

Assembly and installation:

Installation of the frame and the frame itself is consistent no matter how many window vents are used.

Head (Section C-C Figure 7) and Sill (Section D-D Figure 8)

Load:

2-track tested: Tributary area: 10.69 square feet. Load per sq. ft.=45 lbs. Total Load = 481 lbs. 6 foot window width= 80.17 lbs/ft.

3-track: 16.88 square feet. Load per sq. ft.=45 lbs. Total Load = 760 lbs. 9 foot window width= 84 lbs/ft.

4-track: 23.07 square feet. Load per sq. ft.=45 lbs. Total Load = 1038 lbs. 12 foot window width= 86.5 lbs/ft.

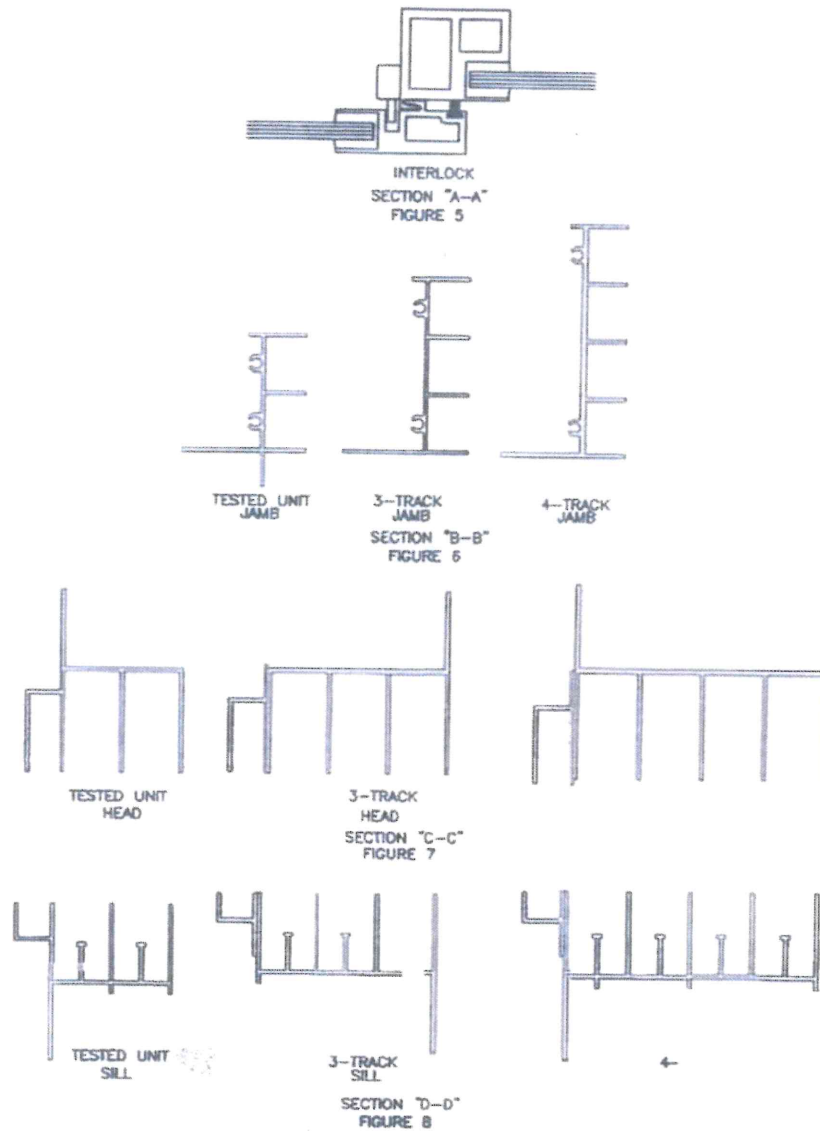
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Conclusion:

Tests show that each individual meeting of panels at the interlock meets the permanent deformation criteria set forth by TAS 202-94. The tributary loads carried by these meeting areas do not increase even if the numbers of window panels involved are increased. The manufacture and the installation do not change even though the number of window panels is greater than the number tested. The jamb, head and sill aluminum extrusions for the 3 and 4-track are stronger than the 2-track aluminum extrusion tested (see figures 6, 7 & 8) due to greater resistance to bending in the positive and negative directions with only a minimal increase in load. Therefore three 3-track and four 4-track and window vent assemblies shall be qualified.

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