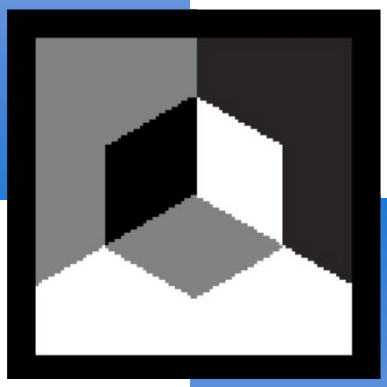
AMERICAN ARCHITECTURAL

AAMA 910-16

Voluntary “Life Cycle” Specifications and Test Methods for AW Class Architectural Windows and Doors



MANUFACTURERS ASSOCIATION

TABLE OF CONTENTS

AAMA. The Source of Performance Standards, Products Certification and Educational Programs for the Fenestration Industry.

All AAMA documents may be ordered at our web site in the “Publications Store”.

©2016 American Architectural Manufacturers Association – These printed or electronic pages may NOT be reproduced, republished or distributed in any format without the express written consent of the American Architectural Manufacturers Association.

This document was developed and maintained by representative members of AAMA as advisory information. AAMA DISCLAIMS ALL WARRANTIES WITH REGARD TO THIS INFORMATION, INCLUDING ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS. IN NO EVENT SHALL AAMA BE LIABLE FOR ANY DAMAGES WHATSOEVER FROM THE USE, APPLICATION OR ADAPTATION OF MATERIALS PUBLISHED HEREIN. It is the sole responsibility of the user/purchaser to evaluate the accuracy, completeness or usefulness of any information, opinion, advice or other content published herein.

AAMA 910-16
ORIGINALLY PUBLISHED: 1993
PRECEDING DOCUMENT: 910-10
PUBLISHED: 3/16

American Architectural Manufacturers Association
1827 Walden Office Square, Suite 550, Schaumburg, IL 60173
PHONE (847) 303-5664 FAX (847) 303-5774
EMAIL webmaster@aamanet.org WEBSITE www.aamanet.org

0.0 INTRODUCTION

Since its introduction more than 20 years ago, the AAMA 910 “Life Cycle” testing specification for Architectural Class windows and doors (AW) has been widely accepted by industry consultants and the specifying community. With the advance of technology, along with two decades of experience and test data from a variety of materials, this specification and test method has now been updated to reflect the changing needs of the marketplace, such as longer warranty periods, sustainable design, more durable finishes and increasingly more stringent code requirements. Enhancement of performance requirements, to include thermal cycling and increase the number of operating cycles, as well as increased misuse loads, helps to more clearly differentiate AW products from other Performance Classes. In addition, descriptive language has been clarified for ease of use.

1.0 SCOPE

1.1 This specification and test method is intended to model, through accelerated testing, the normal wear that can be expected during the life of a typical Architectural Class window or door (hereafter known as "AW product"). Life cycle modeling is accomplished by performing a representative number of basic vent operating cycles and locking hardware opening/closing cycles to simulate actual use. Vent or door cycling shall be permitted to be performed separate of hardware cycling to make standardized mechanical testing more feasible. Tests shall also be performed to simulate the loading conditions expected during washing, maintenance and predictable misuse situations. Thermal cycling is also an important durability attribute and is included in this specification.

Misuse is defined as the forces and impacts, outside of normal operation, expected to occasionally occur during the life of an AW product installation. These include:

1. Carelessness by occupants or building maintenance personnel;
2. Ignorance of proper operating or maintenance procedures;
3. Application of excessive operating force to the limits of normal physical ability; and
4. Attempted operation without proper keys or devices.

Specifically excluded are:

1. Vandalism;
2. Improper installation/handling practices;
3. Intentional abuse;
4. Detention or psychiatric applications;
5. Leaving windows open in a wind event; and
6. Child fall protection.

Screens and installation accessories are not subjected to cycling or misuse testing.

Environmental conditioning such as U.V. exposure, humidity, atmospheric pollutants, harsh cleaning agents, salt spray, etc., have not been included as part of this specification; these factors are recognized in AAMA’s finishing specifications. Air leakage and water resistance tests shall be conducted both before and after life cycle, structural design loads, misuse testing and thermal cycling to evaluate performance changes. All testing shall be performed on the same unaltered product test sample except for the preventive maintenance adjustments as outlined in Section 4.5.

If the manufacturer offers both thermal and non-thermal construction using the same extrusions, testing of the thermal construction shall qualify the non-thermal construction, but not vice versa.

2.0 REFERENCED DOCUMENTS

2.1 References to the standards listed below shall be to the edition indicated. Any undated reference to a code or standard appearing in the requirements of this specification shall be interpreted as referring to the latest edition of that code or standard.

2.2 American Architectural Manufacturers Association (AAMA)

AAMA 103-15, Procedural Guide for Certification of Window, Door and Skylight Assemblies

AAMA 501.1-05, Standard Test Method for Water Penetration of Windows, Curtain Walls, and Doors Using Dynamic Pressure

AAMA 501.5-07, Test Method for Thermal Cycling of Exterior Walls

AAMA 513-14, Standard Laboratory Test Method for Determination of Forces and Motions Required to Activate Operable Parts of Operable Windows and Doors in Accessible Spaces

AAMA 901-16, Voluntary Specification for Rotary & Linear Operators in Window Applications

AAMA 902-14, Voluntary Specification for Sash Balances

AAMA 904-14, Voluntary Specifications for Multi-Bar Hinges in Window Applications

AAMA 906-15, Voluntary Specification for Sliding Door and Lift and Slide Roller Assemblies

AAMA 920-11, Specification for Operating Cycle Performance of Side-Hinged Exterior Door Systems

AAMA/WDMA/CSA 101/I.S.2/A440-11, North American Fenestration Standard/Specification for windows, doors, and skylights

3.0 DEFINITIONS

3.1 Please refer to the AAMA Glossary (AG-13) for all definitions except for those appearing below (which apply only to this voluntary specification).

3.1 Units of Measurement

The primary units of measurement in this document are metric. The values stated in SI units are to be regarded as the standard. The values given in parentheses are for reference only.

4.0 TEST SAMPLE PREPARATION

4.1 Window and door sizes and configurations shall be as specified in the most recent, approved version of AAMA/WDMA/CSA 101/I.S.2/A440.

4.2 Test Unit

The test unit shall be either a production unit or a prototype. However, all fabrication of the prototype shall match production units; this includes frame and sash/door leaf joinery, glazing technique, fasteners, weepage, etc.

4.3 The test unit shall be glazed utilizing the manufacturer's glazing method for which recognition is sought.

4.4 Test Buck

The test unit shall be mounted in a test buck constructed of dimensional lumber (size determined by testing laboratory) or other suitable framing material. Anchorage of the test unit shall be as required to withstand the testing loads. The method of anchorage of the test window shall be documented in the test report. The manufacturer shall provide the testing laboratory with drawings indicating anchorage locations, fasteners and test buck perimeter construction (consultation with the testing laboratory is recommended).

4.5 Preventive Maintenance Manual/Adjustments

If preventive maintenance is required, each test unit shall be submitted with the manufacturer's maintenance manual for the specific AW product. The maintenance manual shall include, at a minimum, a schedule of which adjustments and lubrications (if any) are required and how often they are to be performed. Only adjustments and lubrication that are capable of being performed by building maintenance personnel shall be permitted. Typical acceptable operations include tightening hardware screws, reinstallation of a weatherstrip corner that has pulled loose, etc. Scheduled replacement of any window component such as weatherstripping, hardware, hinges, fasteners, etc., shall not be permitted on the test unit. The maintenance manual provided with the test unit and with production units shall be the same.

4.6 Qualification Options

The AW test specimen shall be permitted to qualify other product options as long as the waiver of retest condition outlined in AAMA 103 is met. Typical product options include access panels, sealants, weatherstripping, hardware and glazing configurations.

NOTE 1: *The thinnest and/or lightest glazing option may represent the most stringent scenario from a structural performance standpoint, whereas the thickest and/or heaviest glazing option may represent the most stringent scenario from a cycle testing standpoint.*

4.6.1 The thermal and access panel cycling portion of "Order of Testing" below shall be required on only one product per Series. The test unit to be thermally cycled shall be selected by the test lab based on frame depth, operator type, hardware and similarity with other products in the Series, and shall be reported as such. For operator types with more than one panel, it shall be required to test a representative unit with two panels.

5.0 TESTING PROCEDURES

5.1 Order of Testing

5.1.1	Operating Force (Hung and sliding windows, and sliding glass doors only)
5.1.1.a	Force to Latch (Side-hinged Doors)
5.1.2	Air Leakage Resistance
5.1.3	Water Penetration Resistance
5.1.4	Vent/Sash/Door Leaf Cycle Testing (First half)
5.1.5	Locking Hardware Cycle Testing (First half)
5.1.6	Access Panel Cycling (On designated unit, if applicable)
5.1.7	Misuse Testing
5.1.8	Vent/Sash/Door Leaf Cycle Testing (Second half)
5.1.9	Locking Hardware Cycle Testing (Second half)
5.1.10	Operating Force (Hung and sliding windows, and sliding glass doors only)
5.1.10.a	Force to Latch (Side-hinged Doors)
5.1.11	Air Leakage Resistance (Optional)
5.1.12	Water Penetration Resistance (Optional)
5.1.13	Thermal Cycling (On designated unit)
5.1.14	Structural Performance @ Design Pressure (DP) (With deflection limited to L/175)
5.1.15	Air Leakage Resistance
5.1.16	Water Penetration Resistance
5.1.17	Structural Performance @ 1.5 times Design Pressure (DP) (With permanent deformation limited to 0.2% of its span)

NOTE 2: *Vent/sash/door leaf cycling and locking hardware cycling shall be permitted to be performed separately, providing that all loads applied to the hardware and hardware's attachment to the window/door are duplicated in every cycle.*

NOTE 3: *Refer to AAMA 513 for order of testing when accessibility evaluation of AW operating windows is necessary.*

5.2 Vent/Sash/Door Leaf Cycling

5.2.1 All locking hardware designed to provide primary weather proofing shall be permitted to be disengaged (if vent and hardware cycling are to be performed separately) during the vent cycling.

5.2.2 Window opening limiting devices, such as stay bars, limit stops, security locks, etc., shall be disengaged during the vent/door leaf cycling. The intent of this specification is not to test all the different types of window opening limiting devices (both generic and proprietary) that are used on each window type. However, the manufacturer shall be permitted to specify that testing shall include a window opening limiting device to be used on a particular project. If this is required, the testing procedures shall be modified to include the window opening limiting devices.

5.2.3 Operate the vent, sash or door leaf as prescribed in Table 1, complying with the "Order of Testing" in Section 5.1. The total number of cycles shall be as prescribed in Section 5.5 for the window use classification (venting or non-venting) for which certification is being sought.

5.2.3.1 For the purpose of this testing, the "open" position is defined as the full extent of travel except for side hinged doors and terrace doors which shall define "open" position as 80°. The "fully closed" position is defined as the point where locking hardware would normally be engaged. One cycle includes both opening and closing operations.

NOTE 4: *This definition is intended for testing purposes only. In use, latches and locks should always be employed.*

5.2.3.2 During each cycle, the window/door shall be fully closed as defined in 5.2.3.1. However, care shall be exercised to avoid impact loads upon closing. Occupant carelessness and application of excessive operating force is addressed by tests described in Section 5.6, "Misuse Testing", not during cycling.

Operator Type	Designator	Cycle Description	Applicable Hardware Standard(s) or Cycling Rate
Architectural Terrace Door	ATD	Fully closed position to 90% of the open position or an opening of not less than 80°, whichever is greater, then back to the fully closed position.	3 to 10 cycles per minute
Awning, Hopper, Projected Window	AP	Fully closed position to 90% of the open position and back to fully closed position.	AAMA 901 (Rotary operators) AAMA 904 (Multi-bar hinges)
Casement Window	C	Fully closed position to 90% of the open position and back to fully closed position.	AAMA 901 (Rotary operators) AAMA 904 (Multi-bar hinges)
Dual Action Window	DAW	Casement (non-venting classification): Fully closed position to 90% of the open position and back to fully closed position. Projected (venting classification): Fully closed position to 90% of the open position and back to fully closed position.	3 to 10 cycles per minute
Horizontally Pivoted Window	HP	Fully closed to 180° open and back to fully closed position, or full 360° depending on window design. For venting classification reverse direction every 100 cycles. For non-venting classification, reverse direction every 10 cycles.	3 to 10 cycles per minute
Vertically Pivoted Window	VP	Fully closed to 360° open and back to fully closed position. For venting classification reverse direction every 100 cycles. For non-venting classification, reverse direction every 10 cycles.	3 to 10 cycles per minute
Horizontal Sliding Window	HS	Fully closed position to 90% of the open position and back to fully closed position.	3 to 10 cycles per minute
Hung Window – Vertical Sliding	H	Fully closed position to within 25 mm (1 in) of balance travel limit at the open position and back to fully closed position.	AAMA 902
Side-Hinged Door	SHD	Fully closed position to 90% of the open position or an opening of not less than 80%, whichever is greater, then back to fully closed position.	Refer to AAMA/WDMA/CSA 101/I.S.2/A440
Side-Hinged Window	SHW	Fully closed position to 90% of the open then back to fully closed position.	3 to 10 cycles per minute
Sliding Door	SD	Fully closed position to 90% of the open position and back to fully closed position.	AAMA 906
Top-Hinged Window	TH	Fully closed position to 90% of the open position and back to fully closed position.	3 to 10 cycles per minute or AAMA 904 (Multi-bar hinges)
Access Panels (Take-out type)	N/A	Remove panel completely and store in a near-vertical self-supporting position. Replace panel.	3 to 10 cycles per minute
Access Panels (Hinged Type)	N/A	Fully closed position to 90% of the open position and back to fully closed position.	3 to 10 cycles per minute
Dual Windows	DW	Open and close each vent/sash of both the exterior and interior window assemblies as specified above.	See above
Parallel Opening Window	POW	Fully closed position to 90% of the open position and back to fully closed position.	AAMA 904 (Multi-bar hinges)

TABLE 1: AW Class Cycling Requirements by Operator Type

5.3 Locking Hardware Cycling

Locking hardware cycling shall be performed on the original locking hardware which was disengaged during the vent/door leaf cycling – no substitution shall be permitted. With the vent in the fully closed position during the entire test period, the hardware shall be locked and unlocked the specified number of cycles. Cycling shall be accomplished by either mechanical or manual means provided that all loads applied to the hardware and the hardware's attachment be duplicated in every cycle. Each piece of locking hardware on the AW product shall undergo the specified number of cycles, even if a multiple number of identical locks exist.

5.4 Access Panel Cycling

Access panel cycling shall be performed on any hinged or take-out AW product component which is designated to operate only for washing or cleaning. Typical examples are dual sash AW products with blinds, tilt sash on hung windows, etc. For hinged applications, one open/close cycle shall consist of beginning in the fully closed position, opening the panel to within 90 percent of its fullest extent and then closing it to the fully closed position. For take-out applications, one cycle shall consist of removing the panel and then reinstalling it. In both cases, one cycle shall include the unlocking and relocking of all hardware associated with the access panel as specified in the manufacturer's maintenance manual.

If hinged or take-out access panels are to be offered by the window manufacturer, they shall be fabricated as part of the test sample and undergo all testing required for the appropriate window type. Specific testing of the access panel and its attachment to the window shall also be performed. Testing of a typical access panel that is used on multiple operator types shall be permitted to be qualified with a single test. Testing of the hinged access panel shall qualify the take-out panel with the same locking mechanisms.

5.5 Window/Sliding Door/Architectural Terrace Door Use Classifications

5.5.1 Venting

This window/sliding door/architectural terrace door is designed primarily to be used for room ventilation and/or as a means of egress/passage and is usually equipped with occupant operated hardware. The total number of vent cycles shall be 4000 and the total number of locking hardware cycles shall be 4000.

5.5.2 Non-Venting

This window/sliding door/architectural terrace door or window/sliding door/architectural terrace door component is normally opened only for cleaning or emergency access and is usually equipped with custodial operated hardware. The total number of vent cycles shall be 100 and the total number of locking hardware cycles shall be 100. All access panels shall be tested for 100 vent cycles and 100 hardware cycles.

5.5.3 Successful testing for the venting classification shall also qualify the window/sliding door/architectural terrace door type for the non-venting classification. For AW Architectural Terrace Doors and side-hinged doors, additional AAMA 920 cycle testing requirements are specified by AAMA/WDMA/CSA 101/I.S. 2/A440.

5.5.3.1 Architectural terrace doors are tested to 4000 cycles, with subsequent air infiltration and water resistance tests, thermal cycling, and design pressure tests, conducted at the conclusion of cycling per the requirements of this specification. To meet the requirements of AAMA/WDMA/CSA 101/I.S.2/A440, cycling is subsequently resumed per AAMA 920, to a total of 25,000 cycles, prior to structural testing at 1.5 times design pressure.

5.6 Misuse Testing

All loads shall be applied for a duration of 10 seconds on fully glazed products, unless specifically stated otherwise. Each misuse test shall be repeated a total of three times. Where more than one vent corner or hardware is tested, the laboratory technician shall alternate the misuse load from point-to-point rather than applying the load three times consecutively to the same point. All reference to "left" and "right" assume the window is viewed from the interior. (See diagrams of window loading configuration.)

5.6.1 Single, Double And Triple-Hung

5.6.1.1 Sash Corner Block Test

As illustrated in Figure 1, block the left corner of each sash open approximately 50 mm (2 in), apply a 670 N (150 lbs) load vertically to the top right most corner of the sash lift rail. Repeat the test by blocking the right-corner and apply the load to the left corner.

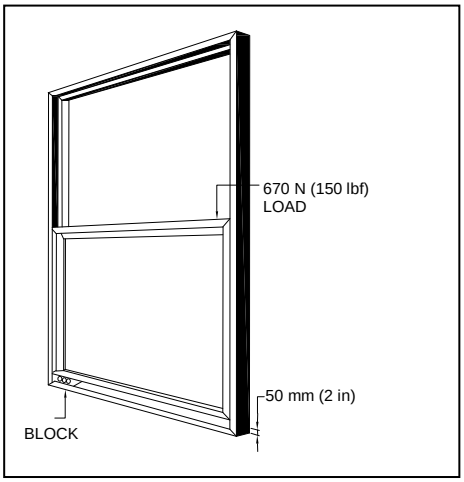


FIGURE 1: Hung Sash Corner Block Test

5.6.1.2 Sash Removal Test (Tilt Windows only)

As illustrated in Figure 2, open each sash 50 mm (2 in), leave the right tilt mechanism(s) engaged and disengage the left tilt mechanism(s). Apply a 330 N (75 lbf) load to the left sash corner perpendicular to the plane of the glass (attempting to tilt the sash inward). Repeat the test by locking the left tilt mechanism(s), disengage the right and apply the load, this time, to the right sash corner.

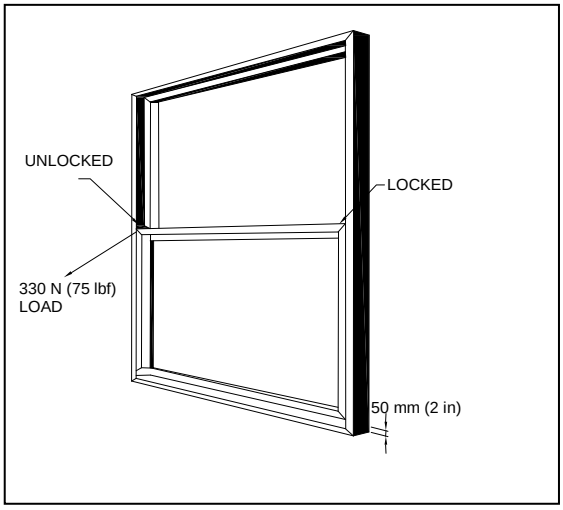


FIGURE 2: Hung Sash Removal Test- Tilt Windows

5.6.1.3 Sash Removal Test (Sideloader/Takeout Sash only)

As illustrated in Figure 3, disengage the balances and rotate the sash clockwise until the upper left and lower right hand corners of the sash are unsupported. Apply a 330 N (75 lbf) load to the unsupported upper left hand corner of the sash in a direction perpendicular to the plane of the glass (attempting to remove the sash). Repeat the test by rotating the sash counter-clockwise until the upper right and lower left hand corners are unsupported and apply the loading on the upper right hand corner.

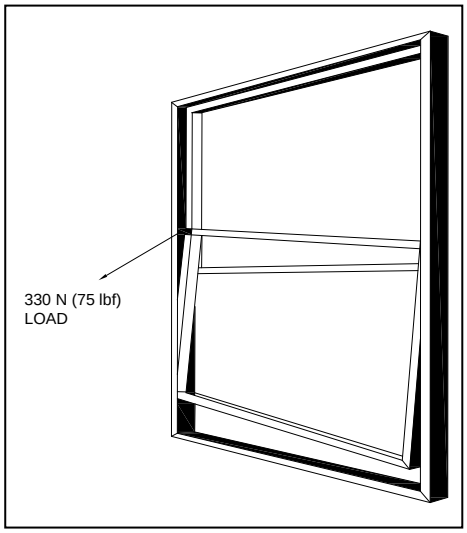


FIGURE 3: Hung Sash Removal Test- Sideloader/Takeout Sash

5.6.2 Casements

5.6.2.1 Ventilator Torsion Test

As illustrated in Figure 4, lock only the bottommost hardware handle and leave all remaining handles unlatched. Apply a 330 N (75 lbf) force to the uppermost unlatched handle perpendicular to the glass (attempting to open the vent). Repeat the test by locking the top handle, unlatching the bottom handle and applying the load to the unlatched handle.

NOTE 5: *This test is not required if a multipoint locking system is actuated by a single lock handle.*

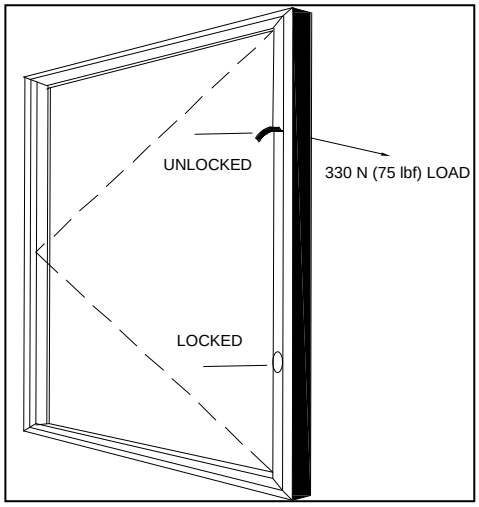


FIGURE 4: Casement Ventilator Torsion Test

5.6.2.2 Ventilator Vertical Load Test

As illustrated in Figure 5, open the vent 90^{o} or as far as the hardware type permits (whichever is less). Apply a 670 N (150 lbf) load at the extreme edge of the lower corner. Remove the load and close the vent.

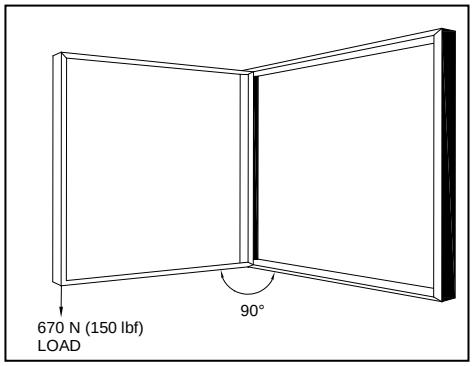


FIGURE 5: Casement Ventilator Vertical Load Test

5.6.3 Horizontal Sliding Window And Sliding Glass Door

5.6.3.1 Sash/Door Panel Corner Block Test

As illustrated in Figure 6, block the bottom corner of the sash open approximately 50 mm (2 in). Apply a 670 N (150 lbf) load parallel to the plane of the glass (tending to close the sash) at the center of the lock stile.

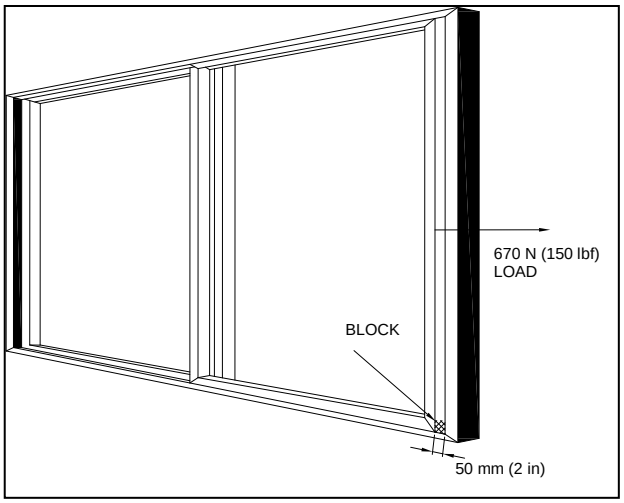


FIGURE 6: Sliding Sash/Door Panel Corner Block Test

5.6.3.2 Sash/Door Panel Removal Test

As illustrated in Figure 7, remove stops as necessary, partially open sash, and rotate the sash clockwise until the upper right and lower left hand corners of the sash are unsupported. Apply a 330 N (75 lbf) load to the unsupported lower left hand corner of the sash in the direction perpendicular to the plane of the glass (attempting to remove the sash). Rotate the sash counter-clockwise until the upper left and lower right hand corners are unsupported and repeat loading of the upper left hand corner.

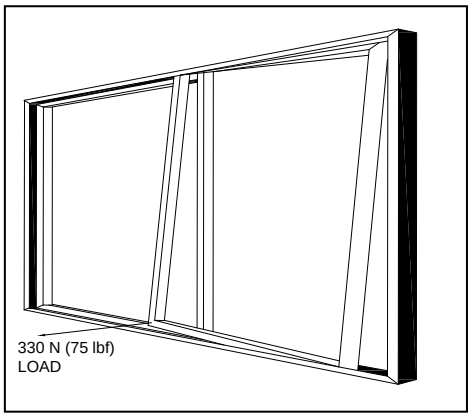


FIGURE 7: Sliding Sash/Door Panel Removal Test

5.6.5 Horizontally and Vertically Pivoted

5.6.5.1 Vertical Concentrated Load on the Open Ventilator (Vertically Pivoted only)

As illustrated in Figure 8, open the ventilator to 90°. Apply a 670 N (150 lbf) vertical load to the extreme end of the lower interior corner. Rotate the vent 180° and apply the 670 N (150 lbf) vertical load to the other corner.

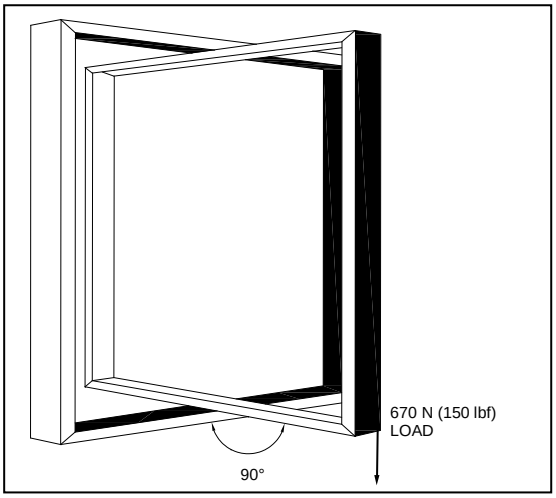


FIGURE 8: Vertical Pivoting Window- Vertical Concentrated Load Test

5.6.5.2 Horizontal Concentrated Load on the Open Ventilator (Vertically Pivoted only)

As illustrated in Figure 9, open the ventilator to 90°. Apply a 330 N (75 lbf) horizontal load to the lower interior corner in a direction away from the vent and parallel to the glass. Remove the load, rotate the vent 180° and apply the 330 N (75 lbf) load to the other lower corner.

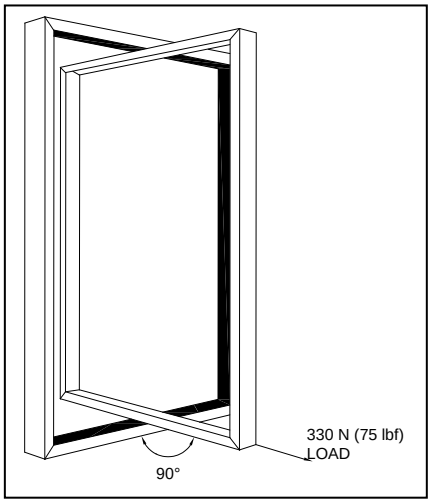


FIGURE 9: Vertical Pivoting Window- Horizontal Concentrated Load Test

5.6.5.3 Horizontal Concentrated Load on the Open Ventilator (Horizontally Pivoted only)

As illustrated in Figure 10, open the ventilator 90° and apply a 330 N (75 lbf) horizontal force to the interior right corner of the vent. The 330 N (75 lbf) load shall be applied first parallel to the vent bottom rail and then perpendicular to the vent bottom rail. Repeat on the left hand interior corner.

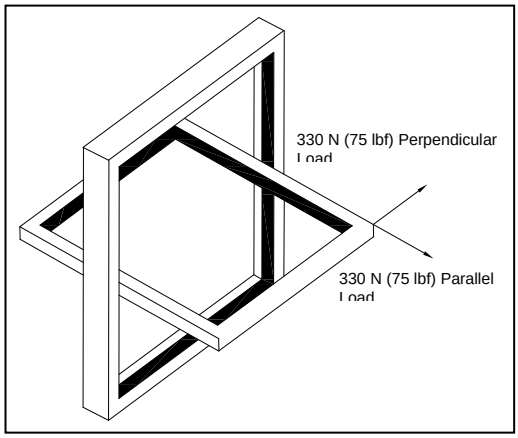


FIGURE 10: Horizontal Pivoting Window- Horizontal Concentrated Load Test

5.6.5.4 Ventilator Torsion Test (Both Horizontally and Vertically Pivoted)

As illustrated in Figures 11 and 12, unlock all hardware with the exception of the upper right lock. Apply a 330 N (75 lbf) horizontal load to the lower left ventilator corner in a direction simulating an attempt to open the vent. Repeat the test by locking only the upper left hardware and apply the load to the lower right hand corner.

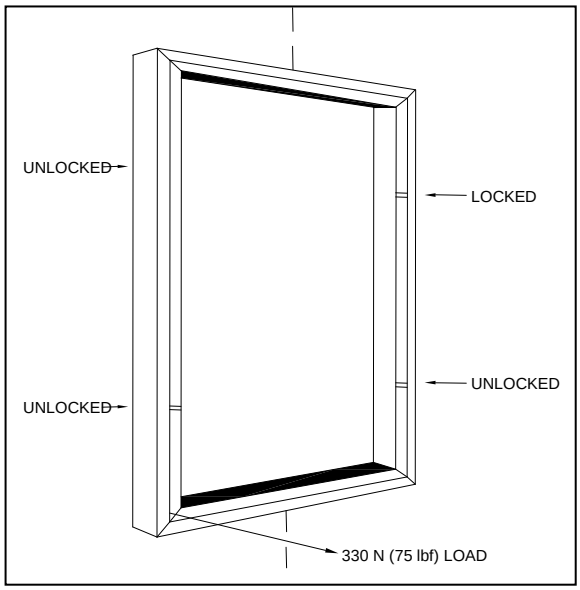


FIGURE 11: Vertical Pivoting Window- Ventilator Torsion Test

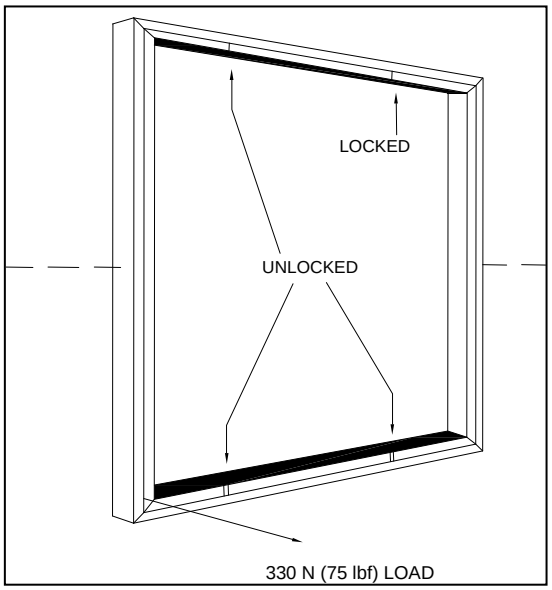


FIGURE 12: Horizontal Pivoting Window- Ventilator Torsion Test

5.6.6 Projected

5.6.6.1 Ventilator Torsion Test

As illustrated in Figure 13, lock the right hardware handle and leave the left handle unlocked. Apply a 330 N (75 lbf) horizontal force to the left handle attempting to open the vent. Repeat the test by locking the left handle, unlocking the right handle and placing the load on the right handle.

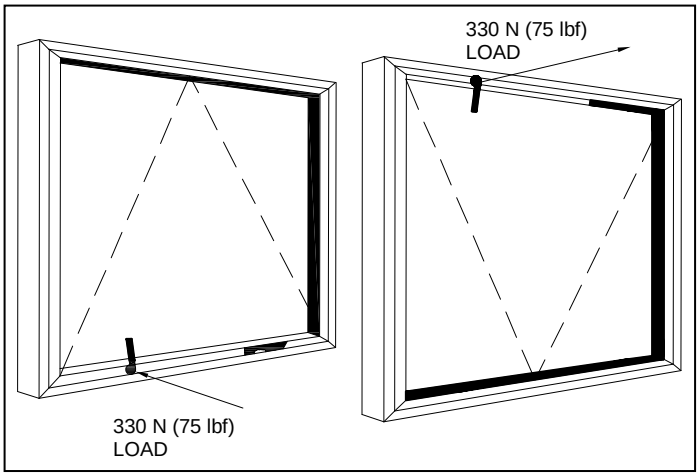


FIGURE 13: Projected Window- Vent Torsion Test

NOTE 6: *This test is not required if a multipoint locking system is actuated by a single lock handle.*

5.6.6.2 Balance Arm Load Test

As illustrated in Figure 14, open the vent to 45^{o} or the fullest extent, whichever is less, and block the extreme left corner open. Apply a 330 N (75 lbf) horizontal load to the extreme right corner of the vent in a direction that attempts to close the vent. Repeat by blocking the right corner and applying the load to the left corner.

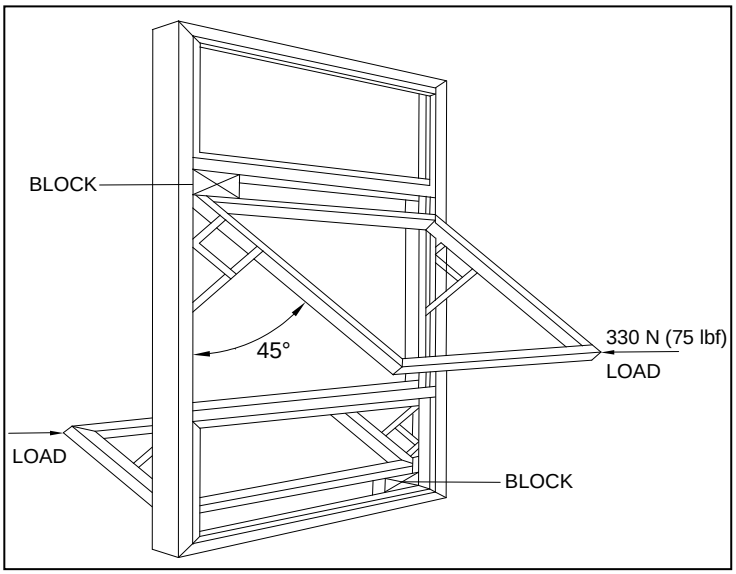


FIGURE 14: Projected Window- Balance Arm Load Test

5.6.6.3 Vent Lateral Racking Test

As illustrated in Figure 15, open the vent to 45^{o} or the fullest extent, whichever is less. Apply a 330 N (75 lbf) horizontal load parallel to the plane of the glass at the extreme edge of the vent, first in one direction and then in the other direction.

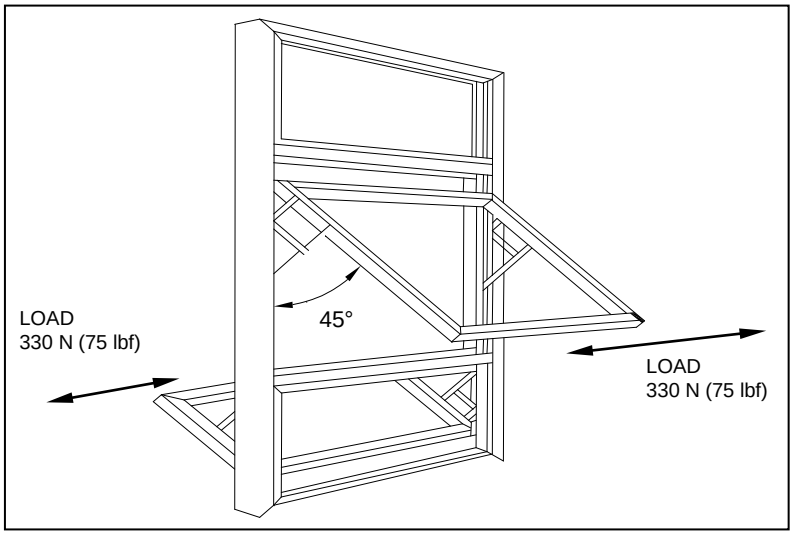


FIGURE 15: Projected Window- Vent Lateral Racking Test

5.6.7 Top Hinged Inswinging

5.6.7.1 Hold Open Arm/Stay Bar Test

As illustrated in Figure 16, with the vent fully extended and held in the normal cleaning position by the hold open arms, or stay bars, apply a 670 N (150 lbf) vertical load to the right corner of the vent perpendicular to the glazing. Repeat the test for the left corner of the vent.

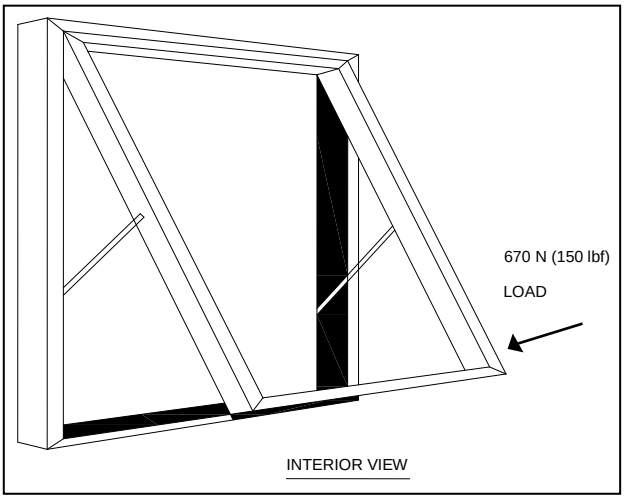


FIGURE 16: Top Hinged Inswing Window- Hold Open Arm/Stay Bar Test

5.6.7.2 Vent Torsion Test

As illustrated in Figure 17, unlock all hardware with the exception of the top most handle on the right jamb. Apply a 330 N (75 lbf) load to the left-most sill hardware in a direction perpendicular to the plane of the glass. Repeat the test by unlocking the right jamb hardware and locking the top most handle on the left jamb. Repeat the loading for the right-most sill hardware.

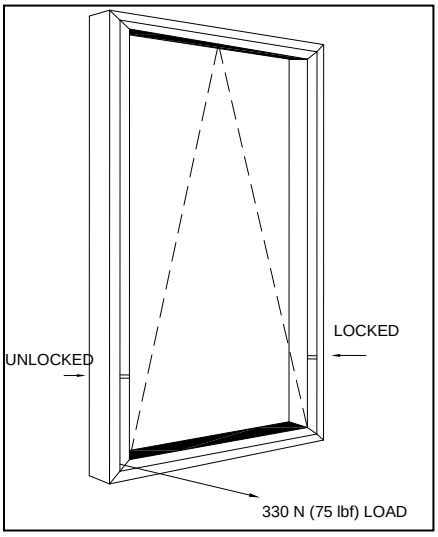


FIGURE 17: Top Hinged Inswing Window- Vent Torsion Test

NOTE 7: *This test is not required if a multipoint locking system is actuated by a single lock handle.*

5.6.7.3 Vent Lateral Racking Test

As illustrated in Figure 18, open the vent and engage the hold-open arms or stay bars. Apply a 330 N (75 lbf) horizontal load parallel to the plane of the glass at the extreme edge of the vent, first in one direction and then in the other direction.

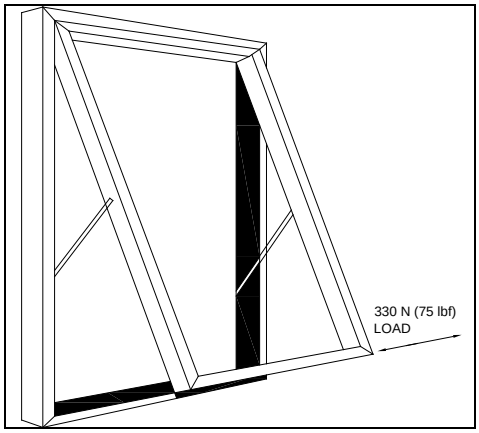


FIGURE 18: Top Hinged Inswing- Vent Lateral Racking Test

5.6.8 Dual Action

5.6.8.1 Stabilizing Arm Load Test

As illustrated in Figure 19, open the ventilator inward from the top, to the full ventilating position, approximately 150 mm (6 inches), which is supported solely by the stabilizing arm at one jamb. Perform two separate tests by applying a 670 N (150 lbf) vertically concentrated load at each upper ventilator corner in the downward direction.

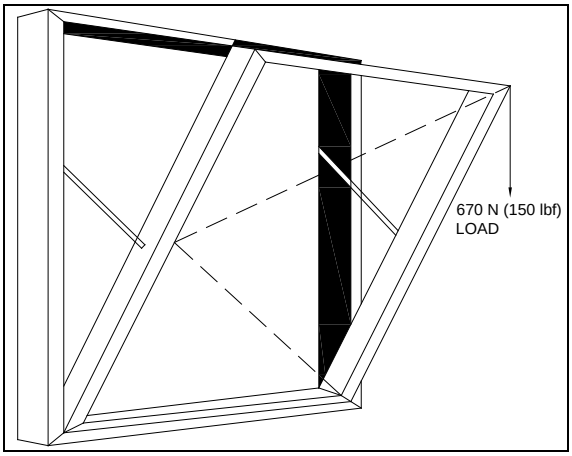


FIGURE 19: Dual Action- Stabilizing Arm Load Test

5.6.8.2 Cleaning Position Vertical Load Test

As is illustrated in Figure 20, open the vent in the cleaning position to 90^{o} or as far as the hardware type permits (whichever is less). Apply a 670 N (150 lbf) vertical load at the extreme edge of the lower corner. Remove the load and close the vent.

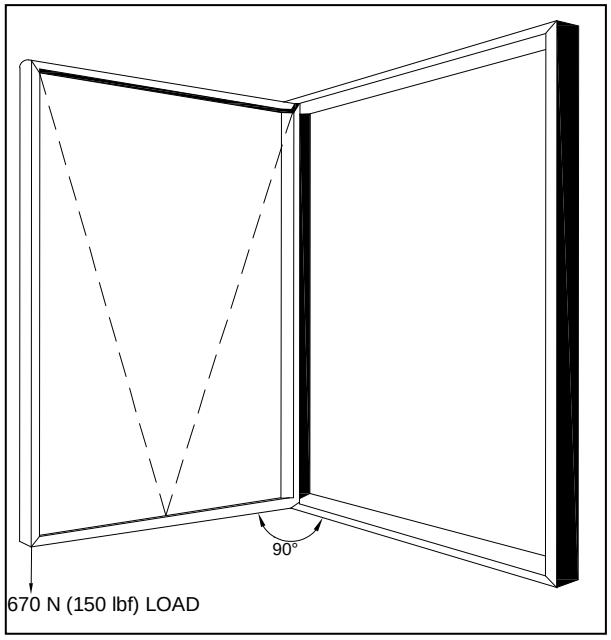


FIGURE 20: Dual Action- Cleaning Position Vertical Load Test

5.6.9 Architectural Terrace Doors

5.6.9.1 Leaf Vertical Load Test

As illustrated in Figure 21, open the door leaf 90^{o} or as far as the hardware type permits (whichever is less). Apply an 890 N (200 lbf) load at the extreme edge of the lower corner. Remove the load and close the leaf.

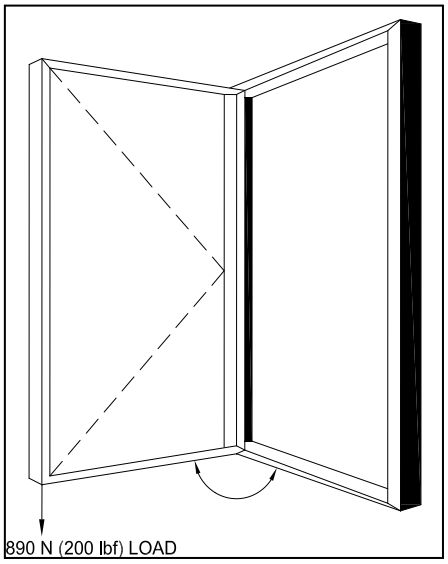


FIGURE 21: ATD- Leaf Vertical Load Test

5.6.9.2 Leaf Corner Block Test

As illustrated in Figure 22, block the bottom corner of the leaf open approximately 50 mm (2 in). Apply a 330 N (75 lbf) load perpendicular to the plane of the glass (tending to close the leaf) at the center of the leaf lock stile.

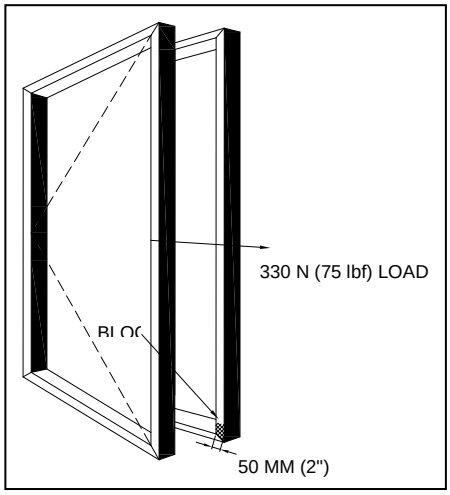


FIGURE 22: ATD- Leaf Corner Block Test

5.6.10 Parallel Opening Window

5.6.10.1 Ventilator Torsion Test

As illustrated in Figure 23, lock the right hardware handle and leave the left handle unlocked. Apply a 330N (75 lbf) horizontal force to the left handle attempting to open the vent. Repeat the test by locking the left handle, unlocking the right handle and placing the load on the right handle.

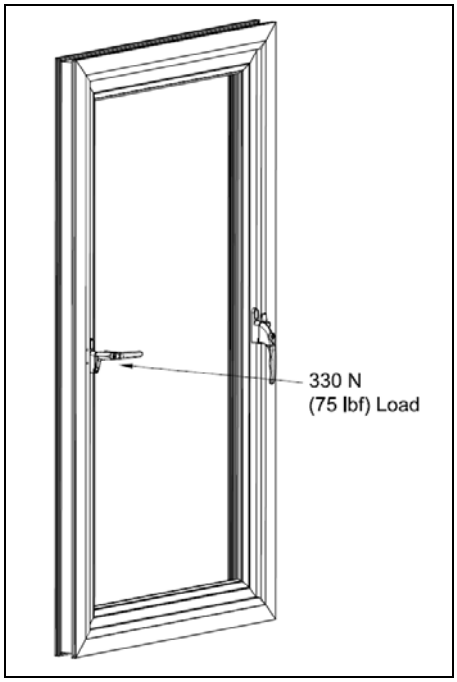


FIGURE 23: POW- Ventilator Torsion Test

5.6.10.2 Ventilator Vertical Load Test

As illustrated in Figure 24, open the vent to the fullest extent that the hardware permits . Apply a 670N (150 lbf) load from the middle of the lower sash stile. Remove the load and close the vent.

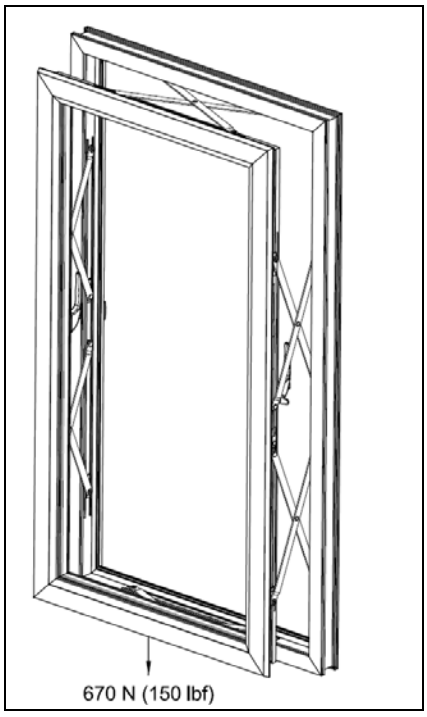


FIGURE 24: POW- Ventilator Vertical Load Test

5.6.10.3 Vent Lateral Racking Test

As illustrated in Figure 25, open the vent to its fullest extent. Apply a 330N (75 lbf) horizontal load parallel to the plane of the glass at the extreme edge of the vent, first in one direction and then in the other direction.

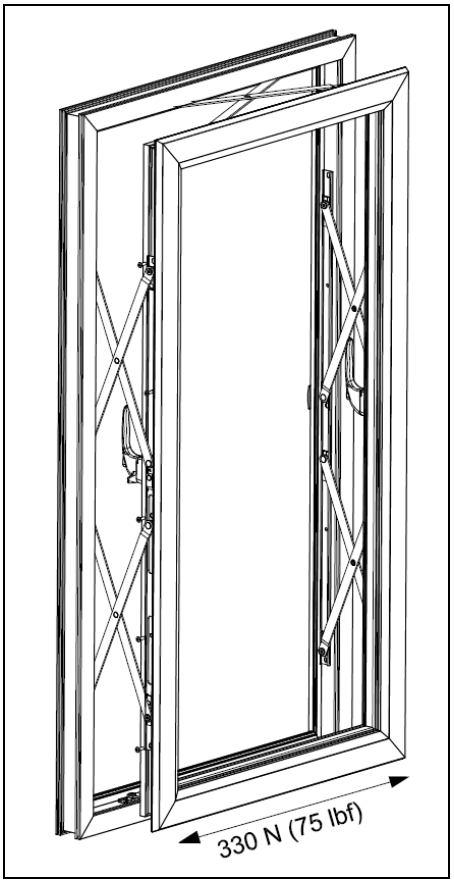


FIGURE 25: POW- Vent Lateral Racking Test

5.7 Thermal Cycling

All AW products shall be subjected to thermal cycling per AAMA 501.5, with the exception that six thermal cycles shall be performed. The high temperature shall be an ambient air temperature of 82°C (180°F) and the low temperature shall be an ambient air temperature of -18°C (0°F).

5.8 Pass/Fail Criteria

5.8.1 The AW test specimen shall meet all specified criteria. No architectural class fenestration product shall be partially tested to this specification. No qualifications or exceptions are permitted. If a component fails, the part shall be permitted to be repaired or replaced and the testing sequence shall be restarted from the beginning.

5.8.2 The manufacturer's representative shall be permitted to make any adjustments or modifications prior to the start of testing. When the testing sequence has commenced, no further adjustments shall be permitted. During the cycle and misuse testing, only the adjustments and lubrication outlined in the manufacturer's maintenance manual shall be performed. The manufacturer's representative and the test lab personnel shall pre-determine when to stop the cycle testing to coincide with the maintenance manual schedule. In no case shall the scheduled maintenance be more frequent than every 500 cycles.

5.8.3 At the completion of the testing there shall be no damage to fasteners, hardware parts, support arms, actuating mechanisms or any other damage which causes the window or door to malfunction.

5.8.4 Air Leakage Resistance

5.8.4.1 Air leakage shall not exceed the rate allowed by the most recent version of AAMA/WDMA/CSA 101/I.S.2/A440 standard.

5.8.4.2 Pre-cycling and post-cycling tests shall be conducted at the same test pressure.

5.8.5 Water Penetration Resistance

5.8.5.1 There shall be no uncontrolled water penetration as defined by the most recent version of AAMA/WDMA/CSA 101/I.S.2/A440 standard, or AAMA 501.1, whichever is more stringent.

5.8.5.2 The rating shall be the lower of the pre-cycling or post-cycling results.

6.0 REPORT

6.1 The report shall include the following information:

6.1.1 Date(s) of the test and the report.

6.1.2 Identification of the specimen (manufacturer, source of supply, dimensions, model types, materials and other pertinent information).

6.1.3 Detailed drawings of the specimen, showing dimensioned section profiles, sash dimensions and arrangement, framing location, panel arrangement, weatherstripping, locking arrangement, hardware, sealants, glazing details, and any other pertinent construction details. Any modifications made on the specimen to obtain the reported values shall be noted on the drawings.

6.1.4 Detailed drawings of the product installation including the test buck, anchorage type and anchor spacing.

6.1.5 A description of the type, quantity and location(s) of the locking and operating hardware.

6.1.6 Glass thickness and type, and method of glazing.

6.1.7 A statement as to whether the window type was tested to a venting or non-venting use classification.

6.1.8 If maintenance is performed, a copy of the manufacturer's maintenance manual shall be included as part of the test report. The type and frequency of adjustments and lubrication preformed during the testing shall be recorded.

6.1.9 Results of the two air leakage resistance and two water penetration resistance tests.

6.1.10 A visual check of the condition of the window following the:

- First half of the cycle testing
- Misuse testing
- Second half of the cycle testing
- Completion of all testing

6.1.11 A statement indicating:

- The tests were conducted in accordance with this method; or, a full description of any deviations from this method.
- A concise statement as to whether the window passed or failed the test criteria.

6.1.12 If several essentially identical specimens of a component are tested, results for all specimens shall be reported, each specimen being properly identified, noting any distinguishing features or differing adjustments. A separate drawing for each specimen shall not be required if all differences between them are noted on the drawings provided.

Changes from AAMA 910-10 to AAMA 910-16

- Various editorial changes were made
- Added Section 3.0 Definitions
- Referenced documents were updated
- Added reference to AAMA 501.1 and 513
- Updated Figure 16

Changes from AAMA 910-93 to AAMA 910-10

- Various editorial changes were made
- Changed title of the document to be “AW Class” instead of “Architectural Grade”
- Removed “Sliding Glass” throughout the document (reads just “doors” now)
- Added a new first paragraph to the “Introduction” section
- Added two new exclusions for misuse
- Removed reference to “hinged or take-out access panels” in “Introduction”
- Changed “architectural grade” to “architectural class” throughout the document
- Changed reference from “101” to “most recent, approved version of AAMA/WDMA/CSA 101/I.S.2/A440” throughout the document
- Removed old Sections 1.3.1, 1.3.2, 1.3.3 and 1.3.4
- Removed reference to “other glazing systems” in Section 2.3
- Added requirement for the manufacturer to provide test laboratory with drawings in Section 2.4
- Added new Sections 2.6 and 2.6.1
- Added numerous requirements to Section 3.1, “Order of Testing” – 3.1.3, 3.1.10a-3.1.17;
- Added new Sections 3.2.3, 3.2.3.1 and 3.2.3.2
- Added new Table 1
- Removed old Sections 2.2.4-2.2.4.6
- Added statement regarding take-out panels to Section 3.4
- Added new Sections 3.5, 3.5.1, 3.5.2 and 3.5.3
- Changed requirement from 100 lbs to 150 lbs load in Sections 3.6.1.1, 3.6.2.2, 3.6.3.1, 3.6.5.1, 3.6.7.1, 3.6.8.1 and 3.6.8.2
- Changed requirement from 50 lbs to 75 lbs load in Sections 3.6.1.2, 3.6.1.3, 3.6.2.1, 3.6.3.2, 3.6.5.2, 3.6.5.3, 3.6.5.4, 3.6.6.1, 3.6.6.2, 3.6.6.3, 3.6.7.2 and 3.6.7.3
- Added new NOTE 2
- Added new Section 3.6.4
- Added new NOTE 3
- Added new NOTE 4
- Removed old Sections 2.6, 2.6.1 and 2.6.2
- Added new Sections 3.6.9, 3.6.9.1, 3.6.9.2, 3.6.10, 3.6.10.1, 3.6.10.2 and 3.6.10.3
- Changed Section 3.7 thermal cycle requirement to six per AAMA 501.5
- Removed old Sections 2.7 and 2.7.1
- Added statement that scheduled maintenance shall not be more frequent than 500 cycles in Section 3.8.2
- Added new Section 4.1.4
- Changed requirement in Section 4.1.8 to only be needed if maintenance is performed

American Architectural Manufacturers Association
1827 Walden Office Square, Suite 550
Schaumburg, IL 60173
PHONE (847)303-5664 FAX (847)303-5774
EMAIL webmaster@aamanet.org
WEBSITE www.aamanet.org