

**SECTION 08 51 13  
ALUMINUM WINDOWS**

**PART 1 GENERAL**

**1.1 RELATED DOCUMENTS**

- A. Documents affecting work of this section include but are not necessarily limited to:
  - 1. General Conditions, special provisions and sections in Division 1 of these specifications
  - 2. 03 11 00 – Concrete Formwork
  - 3. 03 30 00 – Cast-in-Place Concrete
  - 4. 03 47 00 – Tilt-up Concrete
  - 5. 04 20 00 – Masonry Unit
  - 6. 04 20 10 – Reinforced Masonry Unit
  - 7. 06 10 00 – Rough Carpentry
  - 8. 07 21 19 – Foamed-in-place Insulation
  - 9. 07 92 00 – Joint Sealants
  - 10. 09 24 00 – Portland Cement Plaster

**1.2 SYSTEM DESCRIPTION**

- A. Provide all labor, materials, and equipment necessary for the complete aluminum window installation as indicated on the drawings and/or specified herein.

**1.3 REFERENCES**

- A. AA (Aluminum Association) - Designation System for Aluminum Finishes
- B. AAMA CW-11 - Design Wind Loads for Buildings and Boundary Layer Wind Tunnel Testing
- C. AAMA 101-85 - Voluntary Specification for Aluminum Prime Window, and Sliding Glass Doors
- D. FMA/AAMA 200 – Standard Practice for the Installation of Windows with Frontal Flanges for Surface Barrier Masonry Construction and Extreme Wind/Water Conditions
- E. AAMA 502— Voluntary Specification for field Testing of Newly Installed Fenestration Products
- F. AAMA 511 – Voluntary Guideline for Forensic Water Penetration Testing of Fenestration Products
- G. AAMA 606.1 – Voluntary Guide Specifications and Inspection Methods for Integral Color Anodic Finishes for Architectural Aluminum
- H. AAMA 607.1 – Voluntary Guide Specification and Inspection Methods for Clear Anodic Finishes for Architectural Aluminum
- I. AAMA 608.1 – Voluntary Guide Specification and Inspection Methods for Electrolytically Deposited Color Anodic Finishes for Architectural Aluminum
- J. AAMA 701/702 - Voluntary Specifications for Pile Weatherstripping and Replaceable Fenestration Weatherseals
- K. AAMA 1503.1 – Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections
- L. ASCE 7 – Minimum Design Loads for Buildings and other Structures
- M. ASTM A123/A123M – Standard Specification for Zinc (Hot Dip Galvanized) Coatings on Iron and Steel Products
- N. ASTM B209 – Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
- O. ASTM B221 – Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
- P. ASTM C509 - Standard Specification for Elastomeric Cellular Preformed Gasket and Sealing Material

- Q. ASTM D2000 - Standard Classification System for Rubber Products in Automotive Applications
- R. ASTM D2287 - Standard Specification for Nonrigid Vinyl Chloride Polymer and Copolymer Molding and Extrusion Compounds
- S. ASTM E283 – Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls and Doors Under Specified Pressure Differences Across the Specimen
- T. ASTM E330 – Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference
- U. ASTM E331 – Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference
- V. ASTM E1105 – Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform or Cyclic Static Air Pressure Difference
- W. ASTM F588 – Standard Test Methods for Measuring the Forced Entry Resistance of Window Assemblies, Excluding Glazing Impact
- X. FED L-S-125B - Screening, Insect, Nonmetallic
- Y. Current Florida Building Code Product Approval
- Z. FBC- Florida Building Code

#### 1.4 QUALITY ASSURANCE

##### A. Standards:

1. Except as otherwise indicated, requirements for aluminum windows, terminology, and standards of performance, fabrication, and workmanship shall be specified and recommended in AAMA 101 and applicable general recommendations published by ASTM, AAMA and AA and compliance with ASCE 7.
2. Manufacturer shall submit written proof of compliance with all the above standards.

##### B. Performance:

1. All single window units and multiple window units furnished under this section shall meet or exceed the following performance requirements.
  - a. Resistance to Air Infiltration, water resistance, uniform load deflector, and load structural tests as set forth in AAMA 101.
  - b. The frame shall not leak when tested in accordance with ASTM E331 at a test pressure of 9.0-psf.
  - c. Systems shall also comply with ANSI A58.1.
2. Structural Design: Design all window systems for a wind velocity and large missile impact protection in compliance with the District Design Criteria-Structural, FBC, and ASCE 7.
  - a. Missile impact protection shall be passive, such as impact glass.
3. Limit air infiltration through assembly to 0.3 CU. FT/Min/SQ FT of assembly surface area as measured at a reference differential pressure across assembly of 1.6-psf when tested per ASTM E283.
4. Testing: Provide certified copy of test results from an approved testing laboratory or agency per the FBC Product Approval System.
  - a. Testing certification must accompany requests for substitutions and approvals.
5. Provide sound transmission rating (STC) for each type of window assembly that shows compliance with the District Design Criteria – Architectural and permit documents.
6. Provide documentation the window assembly complies with the thermal requirements indicated on the plans and in the approved energy code calculations.

- C. Installer Qualifications: An installer acceptable to aluminum window manufacturer for installation of units required for this Project.
  - 1. Installer's responsibilities include providing professional Florida structural engineering services needed to assume engineering responsibility.
  - 2. Engineering Responsibility: Preparation of data for aluminum windows, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.
- D. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
  - 1. Build mockup for type of window in location to be determined.
  - 2. A minimum of one mock-up will be required for each different wall condition.
- E. Pre-Installation Conference:
  - 1. Prior to installation of windows, conduct a pre-installation site conference.
  - 2. Attendance: Owner (MP&O and PM), Building Department Inspector, Architect, Contractor, job superintendent, subcontractors, and suppliers related to window work.
  - 3. Agenda to include but not be limited to:
    - a. Review of surface preparation and window installation procedures.
    - b. Review of submittals shop drawings, product approval, etc.
    - c. Review of special details and situations.
    - d. Discuss sequence of construction, responsibilities and schedule for subsequent operations.
    - e. Review full-scale mockup and water test the mockup; the mockup may be separate or several units in the building.
- F. Inspections: Provide on-site weekly inspections by Owner's representative during and after installation of window system.
- G. The Owner may request random water test after installation of window units.
  - 1. Contractor shall cooperate with the Owner, Architect, or Owner's Representative in conducting the water test.
  - 2. Contractor shall correct any defective installation without any additional cost to the Owner.

#### 1.5 SUBMITTALS

- A. Shop Drawings:
  - 1. Submit shop drawings for the fabrication and installation of aluminum window units.
  - 2. Details of associated scale: typical unit elevations at 1" scale, and full size detail sections of every typical composite member.
  - 3. Show fasteners, anchors, joint system, material, profiles, thicknesses, hardware, weather-stripping, expansion provisions, and other elements not included in manufacturer's data.
  - 4. Include glazing details and assembly and erection details in conjunction with other trades.
- B. Manufacturer's Certificate: Provide certification that all products meet or exceed specified requirements and performance criteria tests of this specification.
- C. Samples: Submit samples of each exposed member and finish.
- D. Product Approval: Supply copy to SDPBC Building Department.

#### 1.6 PROJECT WARRANTY

- A. The Contractor shall provide a written warranty signed by manufacturer, installer, and Contractor, agreeing to replace aluminum window units that have defects or failures in materials or workmanship within 5-years of date of Substantial Completion for the project.

- B. Failure of material or workmanship shall include, but not be limited to, water leakage or air infiltration, excessive deflections, faulty operation of sash, deterioration of finish or metal in excess of normal weathering, defects in hardware, weather-stripping, and other components of work.

#### 1.7 WINDOW WARRANTY

- A. Section 01 77 00 – Contract Closeout.
- B. Provide written warranty from manufacturer against material defects in manufacturing for a minimum period of 5-years from the date of Substantial Completion for the project.
  - 1. Include coverage for degradation of the color finish.

### **PART 2 PRODUCTS**

#### 2.1 GENERAL

- A. All Window units shall carry an AAMA label, or the manufacturer shall provide documentation of compliance with AAMA requirements from independent testing agency.
- B. All window units shall be a minimum AW60 AAMA performance class & performance grade.
  - 1. If the structural engineer's plans require a higher load than 60, the window shall be the closest higher grade than what the engineer plans state as the minimum.
- C. Manufacturers seeking approval shall submit the required product information, certified test data, samples, and evidence of meeting the FBC "Product Approval Requirements" for review and acceptance by the Architect and the Districts Building Department.
  - 1. A Professional Engineer registered in the State of Florida must certify compliance with all listed standards.
- D. Approval: Window system must meet current FBC Product Approval in compliance with ASCE 7 wind and missile impact requirements for the window system.
- E. Furnish any additional reinforcing materials determined to be required for compliance with ASCE 7 under this section.
- F. All window units shall meet all other code requirements.

#### 2.2 MATERIALS

- A. Frame and vent members shall be at a minimum extruded aluminum shapes of 6063-T5 alloy.
- B. Fasteners: Nonmagnetic stainless steel warranted by manufacturer to be non-corrosive and compatible with the aluminum window members, trim, hardware, anchors, and others components of the window units.
  - 1. Reinforcement: Where fasteners screw anchor into aluminum less than 0.125" thick, reinforce interior with nonmagnetic stainless steel to receive screw threads, or provide standard non-corrosive pressed in spline grommet nuts.
  - 2. Do not use exposed fasteners except where unavoidable for application of hardware.
    - a. Match finish of adjoining metal.
  - 3. Use Phillips flat head machine screws for exposed fasteners.
  - 4. Anchor the frame to the structure using fasteners as specified in the manufacturer's instructions and the product approval details.
    - a. If anchor head is exposed, provide in a color that match the window frame.
- C. Anchors, Clips, and Window Accessories: Fabricate units of aluminum, nonmagnetic stainless steel, or hot-dip zinc coated steel per ASTM A123/A123M.
- D. Compression Glazing Strips and Weather-stripping: At manufacturer's option, provide molded neoprene gaskets complying with ASTM D2000 Designation 2BC415 to 3BC620, molded PVC

gaskets complying with ASTM D2287, or molded expanded neoprene gaskets complying with ASTM C509, Grade 4.

- E. Sealant: Unless otherwise indicated for sealants required within fabricated window units, provide type recommended by window manufacturer for joint size and movement, to remain permanently elastic, non-shrinking, and non-migrating.
  - 1. Comply with paragraph 3.02 for application and installation of project sealants.
- F. Friction Shoes: Provide nylon or other non-abrasive, non-metallic, non-staining, non-corrosive durable material.

## 2.3 CONSTRUCTION AND FABRICATION

- A. All frame-to-frame attachments shall be air and watertight.
- B. General:
  - 1. Fabrication and accessories shall comply with the specified standards and windows units shall be re-glazable without dismantling of sash framing.
  - 2. Include complete system for assembly of components and anchorage of window units.
  - 3. Prepare sash for job site glazing if sashes are not factory glazed.
- C. Window Sizes and Profiles:
  - 1. Required sizes of window units and profile requirements are as indicated on the Drawings.
- D. Coordination of Fabrication: Verify actual window openings by accurate field measurement before fabrication and show recorded measurements on final shop drawings.
  - 1. Coordinate fabrication schedule with construction progress to avoid delay of work.
- E. Glazing Fabrication:
  - 1. Install all glazing in the factory - jobsite glazing is not acceptable.
  - 2. Comply with requirements of Glazing Section 08 80 00.
- F. Provide means of drainage for water and condensation, which may accumulate in members of window units.
- G. Sliding Weather-stripping: Provide double weather-stripping using silicone-coated woven pile with polypropylene fin center complying with AAMA 701/702.
- H. Provide sub-frames with anchors for all window units as detailed, of profile and dimensions as indicated on plans, but not less than 0.062" thickness extruded aluminum, finish matching window units.
- I. Provide mullions and cover plates as detailed, matching window units, and complete with anchors for support and installation.
  - 1. Allow for erection tolerances and provide for movements of window units due to thermal expansion and building deflections.
  - 2. Seal mullion joints between windows per manufacturer's requirements to prevent water intrusion.

## 2.4 HARDWARE

- A. All hardware used in the construction of the window units shall be stainless steel, see 2.4.B.4 of this spec for anchorage of frame to structure.
- B. Sash lock: Lever handle with cam lock.
- C. Threshold: Extruded aluminum sloped to exterior.
- D. Casement and hopper type windows shall have devices allowing the sash to remain in open position when opened.

## 2.5 GLAZING

- A. Refer to Section 08 80 00 for glass type for glazing.

- B. Comply with applicable codes and regulations and with the Consumer Product Safety Commission CPSC 16 CFR 1201 and with applicable recommendations of Flat Glass
- C. Provide labels showing glass manufacturer's identity, type of glass, thickness, and quality.
  - 1. Labels shall remain on glass until inspection and approved by the Architect and District Building Department.

#### 2.6 SCREENS

- A. If drawing indicate screen for venting sash units, provide standard screens of an extruded aluminum frame with 18 by 16 dark coated fiberglass mesh and retain the unit with either fixed rigid clips or integral extruded members with aluminum plungers.
  - 1. Provide screens in food preparation areas kitchens and other areas as shown on the plans.

#### 2.7 FINISH

- A. Sections shall be free of scratches and other serious surface blemishes and chemically cleaned.
- B. Both interior and exterior aluminum sections shall have the following finish:
  - 1. A44 anodized to 215-R1, prepared with a chemical C pre-treatment, standard color as selected by the Architect.

### **PART 3 EXECUTION**

#### 3.1 OPENINGS

- A. Openings for aluminum windows shall be prepared as part of the work of other sections to the proper size, plumb, square, level, and in the proper location and alignment as shown on the Architect's Drawings and the approved shop drawings.
- B. Sill and Bucks
  - 1. Sills shall provide a top surface profile equivalent to the following with a slope to exterior:
    - a. "HiDri" by Cast Crete, [www.castcrete.com](http://www.castcrete.com)
  - 2. Use a sill created by cast-in-place concrete or built-up waterproof non-absorbent materials as detailed on plans and coordinated with the Architect.
    - a. Provide signed and sealed engineer plans on the anchoring of the pre-cast unit or the built-up units to the structure.
    - b. Other manufacturers with equal profiles of the specified unit are acceptable.
    - c. Provide exterior overhang with drip relief as directed by the Architect.
    - d. Provide sills as detailed on plans and install in compliance with FMA/AAMA 200.
  - 3. Provide bucks at the head and jambs for all openings receiving unequal leg flanged windows.
    - a. Install buck plumb and square with anchors as specified on the plans.
    - b. Install one ½" wide x 1/8" thick strip of caulk between the buck and wall opening at the exterior edge and one at the interior edge the full length of the buck.
    - c. Install buck so that the exterior edge of the buck receiving the window flange does not cause gaps between the buck and the flange, and the interior edge does not extend more than 1/16" into the interior.
    - d. Align bucks properly with the sill.
    - e. Install bucks in compliance with FMA/AAMA 200.
  - 4. Contractor shall coordinate the installation of the Sill, Bucks, and Window units with the proper Contractor, Subcontractor, Architect, and Engineer.
  - 5. Window installer shall not install window units if window openings do not meet these specifications.

6. Sills and Bucks to be set in a bed of caulking, see Sealants, below.

### 3.2 ALUMINUM WINDOW INSTALLATION

- A. Install window units, hardware, operators, and miscellaneous components in accordance with the details shown on the drawings, approved shop drawings, and in strict accordance with the manufacturer's directions and product approval requirements.
  1. The Contractor shall prepare openings plumb and square and of a size and configuration compatible with the windows to be installed.
  2. Set window units plumb, level, and true line, without warp or rack of frames of sash.
  3. Provide proper and acceptable separation of aluminum and other corrodible surfaces from sources of corrosion or electrolytic action.
  4. Set window units true in exact alignment with the surrounding building materials and construction.
  5. Anchor the units securely in place in strict accordance to the structural requirements, product approval requirements, and the manufacturer's recommendations.
  6. Provide sufficient caulking to render a tight seal between components of window units and their surrounding construction, see Sealants below.

### 3.3 SEALANTS

- A. General: Provide and install sealants as specified herein, indicated on the drawings, and as otherwise required to make a watertight seal between the windows and frames and window frames and their surrounding construction.
- B. Sealant Application:
  1. Joints to receive sealant shall have widths of approximately  $\frac{1}{8}$ " min and  $\frac{1}{4}$ " max.
  2. The depth of sealant shall not exceed the width of joints.
  3. Apply sealants in properly prepared and if necessary primed joints.
  4. Apply sealant so that joints will not trap water, with additional attention given to the bottom flange of the window.
  5. All joints shall have physical barriers to control the width and depth of sealant.
  6. Provide sealant rated to perform for a minimum of 20-years.
  7. The District's Building Envelope section shall review and accept the contractor's sealant selection.

### 3.4 FIELD TESTING

- A. The District shall field test newly installed window fenestration products using an AAMA accredited independent testing agency in accordance with AAMA 502.
- B. Test existing fenestration products in accordance with AAMA 511.
- C. The initial testing is at the Owner's expense, the contractor pays for any additional testing due to failed test.
- D. Test the unit selected by the District from the first five units completely installed unit for air leakage resistance and then water penetration resistance as specified by AAMA 502.
  1. Make necessary installation correction to pass the test, on the test windows and units installed.
  2. Inform the contractor and installer of necessary changes for proper installation of the units before proceeding with installation of the remaining units.
- E. The Owner or Architect shall identify an additional fenestration testing of not less than 5% of the project.
  1. Test at least three windows.
  2. Test at least one of each type of window unit.

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3. Test units from at least two different elevations.
  4. In case of failures, the Owner shall require additional testing of the failed unit, plus two additional fenestrations.
  5. All additional testing because of failed test is at the contractor's expense.
  - F. Conduct air-leakage resistance tests at a uniform static test pressure per AAMA 502 requirements.
  - G. Conduct the initial water penetration resistance test per AAMA 502 requirements.
- 3.5 ADJUSTMENTS, CLEANING, AND PROTECTION
- A. Adjust operating sash and hardware to provide tight fit at contact points and at weather-stripping, and to insure smooth operation and weather-tight closure.
  - B. Upon completion of work specified under this section, thoroughly clean aluminum windows and surrounding surfaces of excess material and soil from the work of this section.
  - C. Clean aluminum surfaces promptly after installation of windows, exercising care to avoid damage to protective coatings and finishes.
    1. Remove excess glazing and sealant compounds, dirt, and other substances.
    2. Lubricate hardware and moving parts.
  - D. Clean glass of pre-glazed units promptly after installation of windows.
  - E. After cleaning, protect the units against damage or deterioration until final acceptance of work.
    1. Replace all damaged or defective units without additional cost to the Owner.

END OF SECTION