

SECTION 08520  
ALUMINUM WINDOWS

## PART 1 GENERAL

## 1.1 RELATED DOCUMENTS:

- A. Documents affecting work of this section include but are not necessarily limited to, General Conditions, special provisions and sections in Division I of these specifications.

## 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 (American Architectural Manufacturers' Association) - Curtain Wall Manual #10 - Care and Handling of Architectural Aluminum from Shop to Site.
- C. AAMA Series No. 11 - Design Wind Loads for Buildings and Boundary Layer Wind Tunnel Testing.
- D. AAMA 606.1 - Specifications and Inspection Methods for Integral Color Anodic Finishes for Architectural Aluminum.
- E. AAMA 607.1 - Specifications and Inspection Methods for Clear Anodic Finishes for Architectural Aluminum.
- F. AAMA 608.1 - Specification and Inspection Methods for Electrolytically Deposited Color Anodic Finishes for Architectural Aluminum.
- G. AAMA 1502.7 - Test Methods for Condensation Resistance of Windows, Doors and Glazed Wall Sections.
- H. ASCE 7-98 – Minimum Design Loads for Buildings and other Structures.
- I. ASTM A123/A123M – Standard Specification for Zinc (Hot Dip Galvanized) Coatings on Iron and Steel Products.
- J. ASTM B209 – Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
- K. ASTM B221 – Standard Specification for Aluminum-Alloy Extruded Bar, Rod, Wire, Shape and Tubes.
- L. ASTM E283 – Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls and Doors.
- M. ASTM E330 – Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
- N. ASTM E331 – Standard Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
- O. ASTM E1105 – Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Curtain Walls, and Doors by Uniform or Cyclic Static Air Pressure Difference.
- P. ASTM F588 – Standard Test Methods for Measuring the Forced Entry Resistance of Window Assemblies, Excluding Glazing Impact.
- Q. FS L-S-125 - Screening, Insect, Nonmetallic.
- R. FS RR-W-365 - Wire Fabric (Insect Screening).
- S. FBC – Florida Building Code.

## T. Current Florida Building Code Product Approval.

## 1.4 QUALITY ASSURANCE:

## A. Design Criteria:

1. The specifications and drawings are prepared based on a specific manufacturer's type and model of aluminum windows.
2. The Contractor may submit equivalent window types of other listed manufacturers for consideration.
3. Architect/Owner may consider an equivalent type window under the following:
  - a. Deviations in dimensions and profile are minor and do not materially detract from design concept.
  - b. The design and performance requirements comply with the building codes and specification requirements.

## B. 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.

## C. 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 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.

## D. 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.

## E. 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.

## F. 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.
- G. Inspections: Provide on-site weekly inspections by Owner's representative during and after installation of window system.
- H. 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: Submit shop drawings for the fabrication and installation of aluminum window units. Details of associated scale: typical unit elevations at 1" scale, and full size detail sections of every typical composite member. Show fasteners, anchors, joint system, material, profiles, thicknesses, hardware, weather-stripping, expansion provisions and other elements not included in manufacturer's data. Include glazing details and assembly and erection details in conjunction with other trades.
- B. Manufacturer's Certificate: Certify that Products meet or exceed specified requirements and performance criteria tests.
- C. Samples: Submit samples of each exposed member and finish.
- D. Product Approval: Supply copy to Florida Tech Facilities 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 one year of date of Substantial Completion for the project. Failure of material or workmanship shall include, but shall not be limited to, excessive 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 01700 – Project Closeout.
- B. Provide written warranty from manufacturer against material defects in manufacturing for a minimum period of five-years from the date of Substantial Completion for the project. Include coverage for degradation of the color finish.

### PART 2 PRODUCTS

#### 2.1 COMMERCIAL – CASEMENT WINDOWS

- A. Shall be based on Series 3062, 0.125" inches thick, 2" inches deep, casement window as manufactured by SOL-A-TROL Aluminum Products, Inc., with impact resistant glass. Equivalent products to the Sol-A-Trol units described under each window type by the following companies are acceptable:
  - 1. Construction Glass Industries (CGI), Miami, Florida
  - 2. EFCO Corporation, Monett, Missouri
  - 3. RL Glass Systems, Inc, Lauderdale Lakes, Florida
  - 4. Superior Window Corp, Hialeah Gardens, Florida
  - 5. YKK AP America Inc, Austell, Georgia
- B. Equivalent products by EfcO, YKK AP America and Superior Window Corp are acceptable.
- C. Other 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 Florida Tech Facilities Department. A Professional Engineer registered in the State of Florida must certify compliance with all listed standards.
- D. Approval: Window system must meet current Florida Building Code 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 the FBC requirements for missile impact resistance and any other code requirements.

## 2.2 COMMERCIAL - FIXED WINDOWS

- A. All window units shall conform to Class CW PG60 C requirements of the voluntary specifications in AAMA/WDMA/CSA 101.
  - 1. Provide units labeled with AAMA, CSA, or WDMA labels.
- B. Shall be based on 0.125" inches thick, 2" inches deep, fixed window as manufactured by SOL-A-TROL Aluminum Products, Inc., with impact resistant glass.
- C. Equivalent products by EfcO, YKK AP America, and Superior Window Corp are acceptable.
- D. Other 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 Florida Tech Facilities Department. A Professional Engineer registered in the State of Florida must certify compliance with all listed standards.
- E. Approval: Window system must meet current Florida Building Code Product Approval in compliance with ASCE 7 wind and missile impact requirements for the window system.
- F. Furnish any additional reinforcing materials determined to be required for compliance with ASCE 7 under this section.
- G. All window units shall meet the FBC requirements for missile impact resistance and any other code requirements.

## 2.3 COMMERCIAL –HUNG WINDOWS

- A. All window units shall conform to Class CW PG60 C requirements of the voluntary specifications in AAMA/WDMA/CSA 101.
  - 1. Provide units labeled with AAMA, CSA, or WDMA labels.
- B. Shall be based on Series 500-S, 0.078" inches thick, 2.75" inches deep, frame, manufactured by SOL-A-TROL Aluminum Products, Inc., with impact resistant glass.

- C. Equivalent products by Efco, YKK AP America and Superior Window Corp are acceptable.
- D. Other 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 Florida Tech Facilities Department. A Professional Engineer registered in the State of Florida must certify compliance with all listed standards.
- E. Approval: Window system must meet current Florida Building Code Product Approval in compliance with ASCE 7 wind and missile impact requirements for the window system.
- F. Furnish any additional reinforcing materials determined to be required for compliance with ASCE 7 under this section.
- G. All window units shall meet the FBC requirements for missile impact resistance and any other code requirements.

## 2.4 MATERIALS

- A. Frame and vent members shall be extruded aluminum shapes of 6063-T5 alloy, having a minimum tensile strength of 22,000 PSI and minimum yield strength of 16,000 PSI.
- 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. Exposed fasteners shall not be used except where unavoidable for application of hardware. Match finish of adjoining metal.
  - 3. Phillips flat head machine screws shall be used 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 matches the window frame.
- C. Anchors, Clips, and Window Accessories: Depending on strength and corrosion-inhibiting requirements, fabricate units of aluminum, nonmagnetic (Series 300) stainless steel, or hot-dip zinc coated steel or iron complying with 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. Comply with paragraph 3.02 for application and installation of project sealants.
- F. Friction Shoes: Nylon or other non-abrasive, non-metallic, non-staining, non-corrosive durable material.

## 2.5 CONSTRUCTION AND FABRICATION

- A. Frame joints shall be neatly fitted with intersections between horizontal and vertical members notched and mechanically joined with two or more screws in integral screw grooves. Vent corners shall be mitered and welded to form a hairline watertight joint and afford maximum rigidity.

- B. General: Fabrication and accessories shall comply with the specified standards and windows units shall be re-glazable without dismantling of sash framing. Include complete system for assembly of components and anchorage of window units. Prepare sash for job site glazing if sashes are not pre-glazed at the factory.
- C. Window Sizes and Profiles: Required sizes of window units and profile requirements are as indicated on the Drawings. Details on Drawings are based upon standard details by on manufacturer. It is intended that similar details by other manufacturers will be acceptable, provided they comply with size requirements, minimum/maximum profile requirements, and performance standards as indicated or specified.
- D. Coordination of Fabrication: Verify actual window openings of construction work by accurate field measurement before fabrication and show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delay of work.
- E. Pre-glazed Fabrication: At option of Contractor, pre-glaze window units at factory in lieu of job site glazing. Comply with requirements of ANSI/AAMA 102-88 and Glazing Section 08800.
- 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.
- H. Provide sub-frames with anchors for all window units as detailed, of profile and dimensions indicated but not less than 0.062" thickness extruded aluminum; with mitered or coped corners, welded and dressed smooth or with concealed mechanical joint fasteners; finish to match window units.
- I. Provide mullions and cover plates as detailed, matching window units, and complete with anchors for support and installation. Allow for erection tolerances and provide for movements of window units due to thermal expansion and building deflections.

## 2.6 HARDWARE

- A. All hardware shall be stainless steel.
- B. Sash lock: Lever handle with cam lock.
- C. Threshold: Extruded aluminum sloped to exterior.
- D. Insect Screen Frames: Rolled aluminum of rectangular sections; fit frames with adjustable hardware.

## 2.7 GLAZING

- A. Vents shall be inside glazed using a preformed butyl tape at the exterior and an EPDM drive in wedge at the interior with ¼" neoprene setting blocks at the sill and spacer shims at other sides. Glazing rabbet shall be a minimum of ¾" with a minimum edge bite on glass of ½". Full height aluminum glazing bead shall be supplied with nominal wall thickness of .050". Vents shall be designed to accommodate glass thicknesses from ¼" minimum up to 1" maximum. Unless otherwise indicated, glass thickness for this project shall be ¼" thickness. Refer to Section 08800 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. Labels shall remain on glass until it has been set and approved by the Architect.

## 2.8 SCREENS

- A. Screens shall be provided for each venting sash units indicated on the Drawings. Standard screens shall be an extruded aluminum frame with 18 by 16 dark coated fiberglass mesh. Screens shall be retained with either fixed rigid clips or integral extruded members with aluminum plungers as required.

## 2.9 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. Finish to be anodized to a 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 one of the following with slope to exterior:
    - a. "Stucco Tier Sill" by Wekiwa Concrete Products, Inc., [www.wekiwaconcrete.com/sills.htm](http://www.wekiwaconcrete.com/sills.htm)
    - b. "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. Other manufacturers with equal profiles of the specified unit are acceptable.
    - b. Provide exterior overhang with drip relief as directed by the Architect.
    - c. 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 1/2" 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.

### 3.2 ALUMINUM WINDOW INSTALLATION

- A. Window units, hardware, operators and miscellaneous components shall be installed in accordance with the details shown on the drawings, approved shop drawings, and in strict accordance with the manufacturer's directions. The Contractor shall prepare openings plumb and square and of a size and configuration compatible with the windows to be installed. Window units shall be set plumb, level, and true line, without warp or rack of frames of sash. Proper and acceptable separation of aluminum and other corrodible surfaces from sources of corrosion or electrolytic action. Window units shall be set true in exact alignment with the

surrounding building materials and construction. Anchoring units securely in place shall be in strict accordance with good practice, shall be consistent with the design and structural requirements of the specifications and the manufacturer's recommendations. Sufficient caulking shall be used to render a tight seal between components of window units and their surrounding construction. See Perimeter Caulking below.

### 3.3 PERIMETER CAULKING

- A. General: Perimeter caulking with sealant 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 shall be provided and installed.
- B. Sealant Application: Joints to receive sealant shall have widths of approximately  $\frac{1}{8}$ " minimum and  $\frac{1}{4}$ " maximum. The depth of sealant shall not exceed the width of joints. Sealants shall be applied in properly prepared and primed joints. Apply sealant so that joints will not trap water.

### 3.4 FIELD TESTING

- A. Newly installed fenestration products shall be field tested 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 first completely installed unit for air leakage resistance and then water penetration resistance as specified by AAMA 502.
  - 1. Notify the Owner and Architect at least 3 normal business days prior to any testing.
  - 2. Make necessary installation correction to pass the test.
  - 3. 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 and on at least two different elevations of each building.
  - 1. Any failures shall require additional testing of additional fenestrations.
- F. Conduct air leakage resistance tests at a uniform static test pressure of 1.6 psf, with a maximum allowable air leakage rate of 0.3 cfm/sf.
- G. Conduct the initial water penetration resistance test at a static test pressure of 9 psf, with no water penetration as defined in section 4.3.4 of AAMA 502.

### 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, aluminum windows (and the surfaces of materials adjoining these units which have been soiled because of work performed under this section) shall be thoroughly cleaned of foreign materials.
- C. Clean aluminum surfaces promptly after installation of windows, exercising care to avoid damage to protective coatings and finishes. Remove excess glazing and sealant compounds, dirt, and other substances. Lubricate hardware and moving parts.
- D. Clean glass of pre-glazed units promptly after installation of windows.
- E. After being cleaned, units shall be protected against damage or deterioration until final acceptance of the work. Damaged or defective units shall be replaced without additional cost to the Owner.



END OF SECTION