SECTION 08 51 13

ALUMINUM WINDOWS

PART 1 - GENERAL

1.1 GENERAL CONDITIONS: The General Conditions and Supplementary General Conditions shall apply to each and every contract and contractor, person or persons supplying material, labor or entering into the work, directly or indirectly.

1.2 SCOPE: This Section includes all labor, materials, equipment and related services necessary for the fabrication and delivery to the job site of the items shown on the drawings and/or specified herein, including but not limited to the following:

A. Aluminum windows.
   1. Include factory glazing of window units.
   2. Include approval by the National Park Service for historic appropriateness.

1.3 RELATED WORK SPECIFIED ELSEWHERE

A. Glass and Glazing 08 80 00

1.4 LABORATORY TESTING AND PERFORMANCE REQUIREMENTS

A. Test Units
   1. Air, water, and structural test unit shall conform to requirements set forth in AAMA/NWWDA 101/I.S.2 – 97 and manufacturer's standard locking/operating hardware and insulated glazing configuration.
   2. Thermal test unit sizes shall be 48" (1219 mm) x 72" (1828 mm). Unit shall consist of a fixed double hung window.

B. Test Procedures and Performances
   1. The air, water, and structural tests shall conform to AAMA/NWWDA 101/I.S.2 - 97 requirements for the window type referenced in 1.01.B. In addition, the following specific performance requirements shall be met.
   2. Air Infiltration Test
      a. With ventilators closed and locked, test unit in accordance with ASTM E 283 at a static air pressure difference of 1.57 psf (299 Pa).
      b. Air infiltration shall not exceed .10 cfm/SF (.50 l/s•m²) of unit.
   3. Water Resistance Test
      a. With ventilators closed and locked, test unit in accordance with ASTM E 331/ASTM E 547 at a static air pressure difference of 11.0 psf (479 Pa).
      b. There shall be no uncontrolled water leakage.
   4. Uniform Load Structural Test
      a. With ventilators closed and locked, test unit in accordance with ASTM E 330 at a static air pressure difference of 97.5 psf (4668 Pa), both positive and negative.
      b. At conclusion of test there shall be no glass breakage, permanent damage to fasteners, hardware parts, support arms or actuating mechanisms, nor any other damage that would cause the window to be inoperable.
   5. Forced Entry Resistance

a. Windows shall be tested in accordance to ASTM F 588 or AAMA 1302.5 and meet the requirements of performance level 10.

6. Condensation Resistance Test (CRF)
   a. With ventilators closed and locked, test unit in accordance with AAMA 1503.1.
   b. Condensation Resistance Factor (CRF) shall not be less than 46 (frame) and 42 (glass) when glazed with 1" (25 mm) insulated – 1/4" (6 mm) clear, 1/2" (12 mm) air, 1/4" (6 mm) clear glass.
7. Thermal Transmittance Test (Conductive U-Value)
   a. With ventilators closed and locked, test unit in accordance with AAMA 1503.1.
   b. Conductive thermal transmittance (U-Value) shall not be more than 0.59 BTU/hr•ft^2•°F (3.35 W/m²•k) when glazed with 1" (25 mm) insulated – 1/4" (6 mm) clear, 1/2" (12 mm) air, 1/4" (6 mm) clear glass.

1.5 Quality Assurance

A. Provide test reports from AAMA accredited laboratories certifying the performance as specified in 1.4.

B. Test reports shall be accompanied by the window manufacturer's letter of certification, stating the tested window meets or exceeds the air, water, and structural testing criteria for the appropriate AAMA/NWWDA 101/I.S.2 – 97 window type.

1.6 Submittals

A. Contractor shall submit shop drawings; finish samples, test reports, and warranties.
   1. Samples of materials as may be requested without cost to owner, i.e., metal, glass, fasteners, anchors, frame sections, mullion section, corner section, etc.

1.7 Warranties

A. Total Window System
   1. The responsible contractor shall assume full responsibility and warrant for one year the satisfactory performance of the total window installation which includes that of the windows, hardware, glass (including insulated units), glazing, anchorage and setting system, sealing, flashing, etc., as it relates to air, water, and structural adequacy as called for in the specifications and approved shop drawings.
   2. Any deficiencies due to such elements not meeting the specifications shall be corrected by the responsible contractor at his expense during the warranty period.

PART 2 - PRODUCTS

2.1 All windows shall be Series 400 Heavy Commercial Double Hung (Fixed) by Universal Window and Door, Marlborough, MA. (www.universalwindow.com). Other manufacturers requesting approval to bid their product as an equal must submit the following information fifteen days prior to close of bidding.
   1. Test reports documenting compliance with requirements of Section 1.4.

2.2 Materials

A. Aluminum
   1. Extruded aluminum shall be 6063-T5 alloy and tempered.

B. Hardware
   1. Windows shall be fixed units, without operating hardware.

C. Weather-Strip
   1. All weather-strip shall be vinyl or fin pile or equal.

D. Thermal Barrier
   1. All exterior aluminum shall be separated from interior aluminum by a rigid, structural thermal barrier. For purposes of this specification, a structural thermal barrier is defined as a system that shall transfer shear during bending and, therefore, promote composite action between the exterior and interior extrusions.
   2. No thermal short circuits shall occur between the exterior and interior.
   3. Barrier material shall be poured-in-place, two-part polyurethane. A nonstructural thermal barrier is unacceptable.

E. Glass
   1. Insulated glass shall be 3/4" (19.4 mm) as consisting of 3.7mm exterior, 12mm air spacer, and 3.7mm interior, Cardinal LoE^2-272 or approved equal.

      a. Type: Soft-coat Low-E
      b. Color: Clear
      c. Air Space: Argon filled
      d. U Value: 0.30 (winter nighttime value)
      e. Solar Heat Gain Coefficient 0.37
      f. Glass Spacers "Warm Edge" type

   2. Provide spacers between glass surfaces which match the layout of the exterior muntins.

2.3 Fabrication

A. General
   1. Mechanical fasteners, welded components, and hardware items shall not bridge thermal barriers. Thermal barriers shall align at all frame and vent corners.
   2. Depth of frame shall not be less than 3 1/4" (82 mm).

B. Frame
   1. Frame components shall be mortise and tenon. Other means of mechanically fastening, i.e., screws shall not be permitted.
   2. Appearance of frame shall replicate a putty-glazed steel frame.
   3. Include extruded brick molding trim as shown.

C. Ventilator
   1. All vent extrusions shall be tubular.
   2. Each corner shall be mitered, reinforced with an extruded corner key, hydraulically crimped, and "cold welded" with epoxy adhesive.
   3. Each vent shall have one exterior row of weather stripping installed in specifically designed dovetail grooves in the extrusion and one interior row of drive-in glazing gasket that also forms the interior seals. The exterior gasket will be omitted at the vent bottom rail for project-out vents allowing pressure air to pressure equalize the void between the vent and frame.
   4. Appearance of vent frame shall replicate putty-glazed steel vents.

D. Muntins
   1. Muntins shall be shop attached (non-removable), exterior grid designed to replicate historic putty-glazed sash.

E. Glazing: Units shall be “marine” glazed with wrap around vinyl gasket.

F. Finish
   1. Organic
      a. Finish all exposed areas of aluminum windows and components. Color shall be black.

AA Description	Description	AAMA Guide Spec.
AA-M12-C42-R1X	70% PVDF Ultrapon™	2605-98
AA-M12-C42-R1X	50% PVDF Ultraflur™	2604-98

PART 3 - EXECUTION

3.1 Inspection

A. Job Conditions
   1. Verify that openings are dimensionally within allowable tolerances, plumb, level, clean, provide a solid anchoring surface, and are in accordance with approved shop drawings.

3.2 Installation

A. Use only skilled tradesmen with work done in accordance with approved shop drawings and specifications.

B. Plumb and align window faces in a single plane for each wall plane, and erect windows and materials square and true. Adequately anchor to maintain positions permanently when subjected to normal thermal movement, specified building movement, and specified wind loads.

C. Adjust windows for proper operation after installation.

D. Furnish and apply sealants to provide a weather tight installation at all joints and intersections and at opening perimeters. Wipe off excess material and leave all exposed surfaces and joints clean and smooth.

3.3 Anchorage

A. Adequately anchor to maintain positions permanently when subjected to normal thermal movement, specified building movement, and specified wind loads.

3.4 Protection and Cleaning

A. After completion of window installation, windows shall be inspected, adjusted, put into working order and left clean, free of labels, dirt, etc. Protection from this point shall be the responsibility of the general contractor.

END OF SECTION 08 51 13