

**SECTION 085113**

**ALUMINUM WINDOWS**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. Aluminum windows of type and size shown, complete with hardware, related components and accessories.
- B. Types:
  - 1. Casement
  - 2. Projected
  - 3. Fixed

**1.2 DEFINITIONS**

- A. Accessories: Mullions, staff beads, casings, closures, trim, moldings, panning systems, sub-sills, clips anchors, fasteners, weather-stripping, insect screens [mechanical operators,] and other necessary components required for fabrication and installation of window units.
- B. Uncontrolled Water: Water not drained to the exterior, or water appearing on the room side of the window.

**1.3 RELATED WORK**

- A. Steel subframes: Section 055000, METAL FABRICATIONS.
- B. Glazing: Section 088000, GLAZING.

**1.4 DELIVERY, STORAGE AND HANDLING**

- A. Protect windows from damage during handling and construction operations before, during and after installation.
- B. Store windows under cover, setting upright.
- C. Do not stack windows flat.
- D. Do not lay building materials or equipment on windows.

**1.5 QUALITY ASSURANCE**

- A. Approval by contracting officer is required of products or service of proposed manufacturers and installers.
- B. Approval will be based on submission of certification by Contractor that:
  - 1. Manufacturer regularly and presently manufactures the specified windows as one of its principal products.
  - 2. Installer has technical qualifications, experience, trained personnel and facilities to install specified items.
- C. Provide each type of window produced from one source of manufacture.

D. Quality Certified Labels or certificate:

1. Architectural Aluminum Manufacturers Association, "AAMA label" affixed to each window indicating compliance with specification.
2. Certificates in lieu of label with copy of recent test report (not more than 4 years old) from an independent testing laboratory and certificate signed by window manufacturer stating that windows provided comply with specified requirements and AAMA 101/I.S.2/A440 for type of window specified.

**1.6 SUBMITTAL**

- A. Submit in accordance with Section 013323, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Shop Drawings:
1. Minimum of 1/2 full scale [types of windows on project].
  2. Identifying parts of window units by name and kind of metal or material, show construction, locking systems, mechanical operators, trim, installation and anchorages.
  3. Include glazing details and standards for factory glazed units.
- C. Manufacturer's Literature and Data:
1. Window.
  2. Sash locks, keepers, and key.
- D. Certificates:
1. Certificates as specified in paragraph QUALITY ASSURANCE.
  2. Indicating manufacturers and installers qualifications.
  3. Manufacturer's Certification that windows delivered to project are identical to windows tested.
- E. Copies of test reports as specified in paragraph QUALITY ASSURANCE.
- F. Samples: Provide 150 mm (six-inch) length samples showing finishes, specified.

**1.7 WARRANTY**

- A. Warrant windows against malfunctions due to defects in thermal breaks, hardware, materials and workmanship, subject to the terms of Article "WARRANTY OF CONSTRUCTION", FAR clause 52.246-21, except provide 10 year warranty period.

**1.8 APPLICABLE PUBLICATIONS**

- A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by basic designation only.
- B. American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE)

1. 90.1-07 Energy Standard of Buildings
- C. American Architectural Manufacturers Association (AAMA):
  1. 101/I.S.2/A440-11 Windows, Doors, and Unit Skylights
  2. 505-09 Dry Shrinkage and Composite Performance Thermal Cycling Test Procedures
  3. 2605-05 Superior Performing Organic Coatings on Architectural Aluminum Extrusions and Panels
  4. TIR-A8-08 Structural Performance of Poured and Debridged Framing Systems
- D. American Society for Testing and Materials (ASTM):
  1. A653/A653M-09 Steel Sheet, Zinc Coated (Galvanized), Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-dip Process
  2. E 90-09 Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions
- E. National Fenestration Rating Council (NFRC):
  1. NFRC 100-10 Determining Fenestration Product U-Factors
  2. NFRC 200-10 Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence
- F. National Association of Architectural Metal Manufacturers (NAAMM):
  1. AMP 500-06 Metal Finishes Manual

## **PART 2 - PRODUCTS**

### **2.1 MATERIALS**

- A. Aluminum Extrusions; Sheet and Plate: AAMA 101/I.S.2/A440.
- B. Sheet Steel, Galvanized: ASTM A653; G90 galvanized coating.
- C. Weather-strips: AAMA 101/I.S.2/A440; except leaf type weather-stripping is not permitted.
- D. Insect Screening:
  1. Regular mesh, 18 by 18, AAMA 101/I.S.2/A440.
  2. Aluminum with dark bronze anodized finish unless specified otherwise.
- E. Fasteners: AAMA 101/I.S.2/A440. Screws, bolts, nuts, rivets and other fastening devices to be non-magnetic stainless steel.
  1. Fasteners to be concealed when window is closed. Where wall thickness is less than 3 mm (0.125 inch) thick, provide backup plates or similar reinforcements for fasteners.
  2. Stainless steel self tapping screws may be used to secure Venetian blind hanger clips, vent guide blocks, friction adjuster, and limit opening device.
  3. Attach locking and hold-open devices to windows with concealed fasteners. Provide reinforcing plates where wall thickness is less than 3 mm (0.125 inch) thick.

F. Weather-strips: AAMA 101/I.S.2/A440.

G. Hardware:

1. Locks: Two position locking bolts or cam type tamperproof custodial locks with a single point control located not higher than five feet from floor level. Locate locking devices in the vent side rail. Fastenings for locks and keepers shall be concealed or nonremovable.
2. Locking Device Strikes: Locate strikes in frame jamb. Strikes shall be adjustable for locking tension. Fabricate strikes from Type 304 stainless steel or white bronze.
3. Fabricate hinges of noncorrosive metal. Hinges may be either fully concealed when window is closed or semi-concealed with exposed knuckles. All exposed knuckle hinges shall have hospital tips, at both ends. Surface mounted hinges will not be accepted.
4. Guide Blocks: Fabricate guide blocks of injection molded nylon. Install guide block fully concealed in vent/frame sill.
5. Hardware for Emergency Ventilation of Windows:
  - a. Provide windows with a hold open linkage for emergency ventilation.
  - b. Hold open hardware shall provide for maximum six inches of window opening and shall include an adjustable friction shoe to provide resistance when closing the window.
  - c. Handles shall be removable.
6. Hardware for Maintenance Opening of Windows: Opening beyond the six inch position shall be accomplished with a window washers key. The release device shall capture the key when window is in the open position.
7. Design operating device to prevent opening with standard tools, coins or bent wire devices.

## 2.2 THERMAL AND CONDENSATION PERFORMANCE

- A. Condensation Resistance Factor (CRF): Minimum CRF of C 55.
- B. Thermal Transmittance:
  1. Maximum U value class for dual glazed windows: 50 (U=0.50), or as required by ASHRAE 90.1.
- C. Solar Heat Gain Coefficient (SHGC): Less than or equal to 0.40.

## 2.3 FABRICATION

- A. Fabrication to exceed or meet requirements of Physical Load Tests, Air Infiltration Test, and Water Resistance Test of AAMA 101/I.S.2/A440.
- B. Glazing: Triple glazed with insulating glass (exterior) and separate single glazing (interior) **in operable casement interior sash for access to integral blinds or translucent glass as indicated on Drawings.**
  1. Factory or field glazing optional.

2. Glaze in accordance with Section 088000, GLAZING.
3. Windows reglazable without dismantling sash framing.
4. Design rabbet to suit glass thickness and glazing method specified. [Increase rabbet depths for plastic glazing when used; minimum, depth of 25 mm (1-inch).]
5. Glaze from interior except where not accessible.
6. Provide removable fin type glazing beads.
7. Provide integral commercial quality blinds between exterior insulating glass and interior single glazing. Include tilt mechanism to operate blinds without removing interior glass pane.

C. Trim:

1. Trim includes casings, closures, and panning.
2. Fabricate to shapes shown of aluminum not less than 1.6 mm (0.062 inch) thick
3. Extruded or formed sections, straight, true, and smooth on exposed surfaces. [Curved sections true to line.]
4. Exposed external corners mitered and internal corners coped; fitted with hairline joints.
5. Reinforce 1.6 mm (0.062 inch) thick members with not less than 3 mm (1/8-inch) thick aluminum.
6. Except for strap anchors, provide reinforcing for fastening near ends and at intervals not more than 305 mm (12 inches) between ends.
7. Design to allow unrestricted expansion and contraction of members and window frames.
8. Secure to window frames with machine screws or expansion rivets.
9. Exposed screws, fasteners or pop rivets are not acceptable on exterior of the casing or trim cover system.

D. Thermal-Break Construction:

1. Manufacturer's Standard.
2. Low conductance thermal barrier.
3. Capable of structurally holding sash in position and together.
4. All Thermal Break Assemblies (Pour & Debridge, Insulbar or others) shall be tested as per AAMA TIR A8 and AAMA 505 for Dry Shrinkage and Composite Performance.
5. Location of thermal barrier and design of window shall be such that, in closed position, outside air shall not come in direct contact with interior frame of the window.

E. Mullions: AAMA 101/I.S.2/A440.

F. Subsills and Stools:

1. Fabricate to shapes shown of not less than 2 mm (0.080 inch) thick extruded aluminum.

2. One piece full length of opening with concealed anchors.
3. Sills turned up back edge not less than 6 mm (1/4 inch). Front edge provide with drip.
4. Sill back edge behind face of window frame. Do not extend to interior surface or bridge thermal breaks.
5. Do not perforate for anchorage, clip screws, or other requirements.

G. Insect Screens:

1. AAMA 101/I.S.2/A440.
2. Vinyl clad aluminum screen cloth.

**2.4 CASEMENT WINDOWS**

- A. AAMA 101/I.S.2/A440; Type: C-AW65.
- B. AAMA certified product to the AAMA 101/I.S.2/A440. - 11 standard.

**2.5 PROJECTED WINDOWS**

- A. AAMA 101/I.S.2/A440; Type: C-AW65.
- B. AAMA certified product to the AAMA 101/I.S.2/A440. - 11 standard.
- C. Operation:
  1. Hopper vents: Project-in from top and slide up from bottom.

**2.6 FIXED WINDOWS**

- A. AAMA 101/I.S.2/A440; Type F-AW65.
- B. AAMA certified product to the AAMA 101/I.S.2/A440. - 11 standard.

**2.7 FINISH**

- A. In accordance with NAAMM AMP 500 series.
- B. Finish exposed aluminum surfaces as follows to match existing windows:
  1. Anodized Aluminum:
    - a. Finish in accordance with AMP 501 letters and numbers.
    - b. Clear anodized Finish: AA-C22A41 Medium matte, clear anodic coating, Class 1 Architectural, 0.7 mils thick.
    - c. Colored anodized Finish: AA-C22A42 (anodized) or AA-C22A44 (electrolytically deposited metallic compound) medium matte, integrally colored coating, Class 1 Architectural, 0.7 mils thick.
      - 1) Dyes not accepted.
      - 2) Coated Aluminum:
      - 3) Variation of more than 50 percent of maximum shade range approved will not be accepted in a single window or in adjacent windows and mullions on a continuous series.
        - a) AMP 501 and 505.

b) Fluorocarbon Finish: AAMA 2605, superior performing organic coating.

C. Hardware: Finish hardware exposed when window is in the closed position: Match window color.

### **PART 3 - EXECUTION**

#### **3.1 PROTECTION (DISSIMILAR MATERIALS):**

A. AAMA 101/I.S.2/A440.

#### **3.2 INSTALLATION, GENERAL**

- A. Install window units in accordance with manufacturer's specifications and recommendations for installation of window units, hardware, operators and other components of work.
- B. Where type, size or spacing of fastenings for securing window accessories or equipment to building construction is not shown or specified, use expansion or toggle bolts or screws, as best suited to construction material.
  - 1. Provide bolts or screws minimum 6 mm (1/4-inch) in diameter.
  - 2. Sized and spaced to resist the tensile and shear loads imposed.
  - 3. Do not use exposed fasteners on exterior, except when unavoidable for application of hardware.
  - 4. Provide non-magnetic stainless steel Phillips flat-head machine screws for exposed fasteners, where required, or special tamper-proof fasteners.
  - 5. Locate fasteners to not disturb the thermal break construction of windows.
- C. Set windows plumb, level, true, and in alignment; without warp or rack of frames or sash.
- D. Anchor windows on four sides with anchor clips or fin trim.
  - 1. Do not allow anchor clips to bridge thermal breaks.
  - 2. Use separate clips for each side of thermal breaks.
  - 3. Make connections to allow for thermal and other movements.
  - 4. Do not allow building load to bear on windows.
  - 5. Use manufacturer's standard clips at corners and not over 600 mm (24 inches) on center.
  - 6. Where fin trim anchorage is shown build into adjacent construction, anchoring at corners and not over 600 mm (24 inches) on center.
- E. Sills and Stools:
  - 1. Set in bed of mortar or other compound to fully support, true to line shown.
  - 2. Do not extend sill to inside window surface or past thermal break.

3. Leave space for sealants at ends and to window frame unless shown otherwise.

F. Replacement Windows:

1. Do not remove existing windows until new replacement is available, ready for immediate installation.
2. Remove existing work carefully; avoid damage to existing work to remain.
3. Perform all other operations as necessary to prepare openings for proper installation and operation of new units.
4. Do not leave openings uncovered at end of working day, during precipitation or temperatures below 16 degrees C (60 degrees F.).

**3.3 MULLIONS CLOSURES, TRIM, AND PANNING**

- A. Cut mullion full height of opening and anchor directly to window frame on each side.
- B. Closures, Trim, and Panning: External corners mitered and internal corners coped, fitted with hairline, tightly closed joints.
- C. Secure to concrete or solid masonry with expansion bolts, expansion rivets, split shank drive bolts, or powder actuated drive pins.
- D. Toggle bolt to hollow masonry units. Screwed to wood or metal.
- E. Fasten except for strap anchors, near ends and corners and at intervals not more than 300 mm (12 inches) between.
- F. Seal units following installation to provide weathertight system.

**3.4 ADJUST AND CLEAN**

- A. Adjust ventilating sash and hardware to provide tight fit at contact points, and at weather-stripping for smooth operation and weathertight closure.
- B. Clean aluminum surfaces promptly after installation of windows, exercising care to avoid damage to protective coatings and finishes.
- C. Remove excess glazing and sealant compounds, dirt, and other substances.
- D. Lubricate hardware and moving parts.
- E. Clean glass promptly after installation of windows. Remove glazing and sealant compound, dirt and other substances.
- F. Except when a window is being adjusted or tested, keep locked in the closed position during the progress of work on the project.

**3.5 OPERATION DEVICES**

- A. Provide wrenches, keys, or removable locking operating handles, as specified to operate windows.
  1. Provide custodial key to open interior casement sash for access to integral blinds.



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- B. Provide one emergency ventilating operating handle for every four windows.
- C. Provide maintenance or window washer operating handles as directed by Contracting Officer.

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