SECTION 08 51 13
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. Fixed

1.2 DEFINITIONS

A. Accessories: Mullions, staff beads, casings, closures, trim, moldings, panning systems, sub-sills, clips anchors, fasteners, weather-stripping, 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. Glazing: Section 08 80 00, 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 for type of window specified.

1.6 SUBMITTAL

A. Submit in accordance with Section 01 33 23, 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:

Window.

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. Test Reports:

Copies of test reports as specified in paragraph QUALITY ASSURANCE.

1.7 WARRANTY

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)

90.1-07.....Energy Standard of Buildings

C. American Architectural Manufacturers Association (AAMA):

101/I.S.2/A440-08.....Windows, Doors, and Unit Skylights

505-09.....Dry Shrinkage and Composite Performance Thermal Cycling Test Procedures

2605-05.....Superior Performing Organic Coatings on Architectural Aluminum Extrusions and Panels

TIR-A8-08.....Structural Performance of Poured and Debridged Framing Systems

D. American Society for Testing and Materials (ASTM):

A653/A653M-09.....Steel Sheet, Zinc Coated (Galvanized), Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-dip Process

E 90-09.....Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions

E. National Fenestration Rating Council (NFRC):

NFRC 100-10.....Determining Fenestration Product U-Factors

NFRC 200-10.....Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence

F. National Association of Architectural Metal Manufacturers (NAAMM):

AMP 500-06.....Metal Finishes Manual

PART 2- PRODUCTS

2.1 MATERIALS

A. Aluminum Extrusions; Sheet and Plate: AAMA 101/I.S.2.

B. Sheet Steel, Galvanized: ASTM A653; G90 galvanized coating.

C. Weather-strips: AAMA 101/I.S.2; except leaf type weather-stripping is not permitted.

D. Fasteners: AAMA 101/I.S.2. 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 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.

E. Weather-strips: AAMA 101/I.S.2.

F. 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. 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.

G. Frame:
1. 4 7/8" deep frame with 1 7/8" typical face width.

2.2 THERMAL AND CONDENSATION PERFORMANCE

A. Condensation Resistance Factor (CRF): Minimum CRF of C 67 for fixed units and 64 for casement units.

B. Thermal Transmittance:
1. Maximum U value for insulating glass windows: U=0.34 for fixed units and 0.43 for casement units.

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.

B. Glazing:
1. Factory glaze in accordance with Section 08 80 00, GLAZING.
2. Windows reglazable without dismantling sash framing.
3. Design rabbet to suit glass thickness and glazing method specified.

4. Glaze from interior except where not accessible.
5. Provide removable fin type glazing beads.

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.
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. Two parallel glass fiber-reinforced nylon strips installed continuously and mechanically bonded to the aluminum.
2. Low conductance thermal barrier.
3. Capable of structurally holding sash in position and together.
4. All Thermal Break Assemblies 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.

F. Subsills:
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. Sill back edge behind face of window frame. Do not extend to interior surface or bridge thermal breaks.

2.4 FIXED WINDOWS

A. AMMA 101/I.S.2; Class and Grade FW-HC90.

B. AAMA certified product to the AAMA 101/I.S.2 standard.

2.5 CASEMENT WINDOWS

A. AMMA 101/I.S.2; Class and Grade AP-HC90.

B. AAMA certified product to the AAMA 101/I.S.2 standard.

2.6 FINISH

A. In accordance with NAAMM AMP 500 series.

B. Finish exposed aluminum surfaces as follows:

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

PART 3 - EXECUTION

3.1 PROTECTION (DISSIMILAR MATERIALS): AAMA 101/I.S.2.

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.

E. 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.

B. Provide one emergency ventilating operating handle for every four windows.

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