DIVISION 8

SECTION 8C ALUMINUM DOUBLE HUNG WINDOWS

8C.01 GENERAL: Comply with all of the Contract Documents.

8C.02 SCOPE OF WORK: Refer to "Division Scope of Work"

8C.03 WORK INCLUDED IN THIS SECTION

A. Material: aluminum windows as shown on drawings and specified in this section.

B. Installation of the windows.

C. Glass and glazing.

8C.04 WORK NOT INCLUDED

A. Installation of child guards (See Section 5A.15 Child window guards)

8C.05 REFERENCES

A. AAMA – American Architectural Manufacturers Association

1. AAMA/WDMA 101/I.S.2/A440-05 "Voluntary Specifications For Aluminum, Vinyl (PVC) and Wood Windows and Glass Doors"

2. AAMA 502-02 "Voluntary Specification for Field Testing of Windows and Sliding Glass Doors"

3. AAMA 611-98 "Voluntary Specification for Anodized Architectural Aluminum"

4. AAMA 701-04 "Voluntary Specification for Pile Weatherstripping"

5. AAMA 800-92 "Voluntary Specification and Test Methods for Sealants"

6. AAMA 902-99 "Voluntary Specification for Sash Balances"

7. AAMA 1503-98 "Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors, and Glazed Wall Sections"

8. AAMA 2604-02 "Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels"

9. AAMA CW-10-04 “Care and Handling of Architectural Aluminum from Shop to Site”

B. ASTM – American Society for Testing and Materials

1. ASTM E 90-04 “Standard Test Method for Laboratory Measurements of Airborne Sound Transmission Loss of Building Partitions and Elements”

2. ASTM E 2190-02 “Standard Specification for Insulating Glass Unit Performance and Evaluation”

C. NFRC – National Fenestration Rating Council: NFRC 100-04 “Procedure for Determining Fenestration Product U Factors”

8C.06 PERFORMANCE REQUIREMENTS

A. General: Windows shall be capable of complying with performance requirements, based on testing manufacturer’s windows that are representative of those specified and that are of minimum test size required by AAMA/WDMA 101/I.S.2.A440-05

B. Structural Performance: Windows shall be capable of withstanding the following, including wind loads based on passing AAMA/WDMA 101/I.S.2.A440-05, Uniform Load Structural Test, at basic wind indicated:

1. Basic Wind Speed: As indicated in miles per hour at 33 feet above grade. Determine wind loads and resulting design pressures applicable to Project according to ASCE 7, “Minimum Design Loads for Buildings and Other Structures,” Section 6.4.2, “Analytic Procedure”; based on mean roof heights above grade as indicated on drawings.

2. Deflection: The Uniform Load Deflection test data, when tested at maximum DP (design pressure) of 50 psf, shall be recorded for this product for information only.

C. Air Leakage Resistance per ASTM E 283: Maximum rate not more than .3 cfm per square foot of glazing area when tested at a pressure of 1.6 psf (75 Pa).

D. Water Penetration Resistance per ASTM E 547 and E 331: No water leakage as defined in AAMA/NWWDA referenced test methods at a water test pressure equaling (362 Pa) 7.52 pounds per square foot.

E. Forced-Entry Resistance: Comply with Performance Type A, Grade 10 Requirements when tested according to ASTM F 588.

F. Condensation-Resistance Factor: Windows tested for thermal performance according to AAMA 1503, showing a minimum CRF of 34.

G. Thermal Transmittance: Provide windows with a whole-window U-value maximum of .46 at 15 mph exterior wind velocity and winter condition temperatures when tested according to NFRC 100-2004.

H. Certification of all the above requirements shall be made to the ArchitectEngineer by an officially authorized AAMA testing laboratory.

8C.07 WINDOW MATERIALS AND CONSTRUCTION

A. Aluminum Double Hung Tilt-Wash Windows, System description:

1. AAMA Designation: H-C50:

   Aluminum double hung window, with independent laboratory tests which certify that the window meets or exceed the H-C50 classifications as specified herein and shall show continuing compliance by furnishing a Notice of Product Certification from the Administrator/Validator of the American Architectural Manufacturing Association (AAMA) Certification Program.

2. Windows frame and sashes shall be of extruded aluminum alloy 60630T5 (Federal Specification QQ-A-274) having a nominal wall thickness of .062 inch for all members except sill members, which shall have a nominal thickness of .078 inch. The term “nominal thickness” shall be as defined in the latest AAMA Specification.

3. Windows: 3 ¼” frame depth; extruded aluminum with integral continuous structural thermal break consisting of poured-in-place polyurethane in the frame and sash members; equal-leg frame assembled with insect screen; weather-stripping; all necessary hardware and factory-applied finish.

4. Configuration; double hung window with operating sashes, tilt in for glass cleaning.

   Note: Tilt latches shall have open limit restrictor, for maintenance operation only.

5. Sash glazing: Hermetically sealed combination of two glass lites (outboard lite and inboard lite), separated by spacer and airspace. The glass lites of an insulating glass unit can be annealed, heat-strengthened, tempered or laminated, to meet Building Code Requirements, safety glazing standards and design requirements.

6. Spacers: “Intercept™” warm edge spacers or desiccated spacers are dually sealed with polyisobutylene sealant.

7. Window size: Maximum allowed width of the window should be 42". Where masonry opening exceeds 42", two (2) equal windows shall be installed with "H" vertical mullion, or under certain conditions one (1) oversized window can be provided, as indicated on window schedule *.

   * Note: <u>For oversized windows consult Window Manufacturer regarding type of window frame, sash frame and type of sash balances.</u>

8. At second means of egress, when any windows opens onto a fire escape, one of the windows, with open sash, must provide minimum (not less) of 30 inches high (clear) and 24 inches wide (clear). The sill of the window shall not be more than 36" above the floor. This window must provide maximum ease of egress onto the fire escape. No insect screen shall be provided and installed.

<u>8C.08 SUBMITTALS</u>

A. Shop drawings:

   1. Typical window elevations and cross sections.

   2. Details of assemblies, hardware, and glazing details for factory-glazed units.

   3. Installation drawings with indication of window sub-frame, anchorage, caulking, etc., based on field condition.

B. Manufacturer's Specification

C. Structural and Thermal Performance Test Reports, performed at an independed AAMA-accredited testing laboratory.

D. Valid AAMA "Notice of Product Certification", indicating that the windows for the project conform to AAMA/NWWDA 101/I.S.2/A440-05.

E. Samples:

   1. Aluminum window sample with specified finish, hardware and attached;

      a. Valid AAMA Certification "Gold Label" with indication of;

         1) Manufacturer's Code Number
         2) Specification Identification
         3) Window Type, Product Class
         4) Manufacturer's Series Number

F. "Product Certification" from aluminum extruder, indicating that aluminum extrusions made in USA from commercial quality 60630T5 alloy, according Federal Specification

QQ-A-274, with a guaranteed minimum ultimate tensile strength of 22,000 psi and yield of 16,000 psi. (AAMA standard and ASTM B 221).

G. Manufacturer's warranties:

1. Windows; warrant all materials and hardware for two (2) years against defects in material or workmanship under normal use.

2. Insulating units; warrant seal for (5) five years against visual obstruction from film formation or moisture collection between internal glass surfaces, excluding that caused by glass breakage or abuse.

3. Paint; warrant paint finish for five (5) year against chipping, peeling, cracking or fading.

8C.09 MANUFACTURERS

A. Window shall be the product of Crystal Window & Door Systems, Model 2000A (HPD), LTM, Modern Metro Window Mfg., Corp., Model 2000, or other acceptable manufacturers that have demonstrated a successful history of windows manufacturing for five (5) years equivalent products, approved by Architect/Engineer.

8C.10 MATERIALS

A. Frame:

1. Aluminum extrusion; Extruded in USA from commercial quality 60630T5 alloy, free from defects impairing strength and durability.

B. Glazing:

1. Glass Unit; Both sashes shall utilize ~ 7/8" thick insulating glass unit, consisting of two sheets of clear glass lites and "Intercept™" warm edge spacers or desiccated spacers are dually sealed with polyisobutylene sealant. A sealant shall be extruded around the perimeter of the spacer to achieve a seal. Both sashes shall be marine-glazed with the glass unit set in a wrap-around vinyl-glazing channel.

2. Glass Unit Performance Data;

Glass Unit Thickness	– 7/8" min.
Glass thickness	– 1/8" min.
Air space thickness	– 5/8" min (90% argon filled glazing cavity)
Emissivity (Coated Surface)	– Low emissivity (Low-E) coated of soft type (magnetic sputtered vacuum deposition application method) on surface # 3. Low emmissivity coating

shall be Comfort Ti-PS with a low emissivity rating of 0.05, or approved equal.

U-Factor (Argon Filled)	– 0.26 Btu/hr/sq.ft/degree F (Winter)
	– 0.20 Btu/hr/sq.ft/degree F (Summer)
Transmittance (%)	– 30 (UV)
	– 72 (Visible)
	– 46 (Solar)
Shading Coefficient	– 0.53
Solar Heat Gain Coefficient	– 0.36

3. Bathroom and airshaft windows shall have insulating glass units with obscure plate glazing, unless otherwise specified.

C. Hardware;

1. Meeting rail lock made from white-bronze (nickel/copper alloy) or stainless steel – one (1) set per window under 42" wide, two (2) sets on wider windows.

2. Tilt latches made from zinc alloy with tamper-resistant screw, open limit for maintenance operation only, spring loaded for automatic jamb engagement when the sash is in the vertical position.

3. Anti-Drift top sash lock made from extruded aluminum and attached to the window frame header.

4. Balances;

   a. Block and tackle balances* engineered and manufactured for specific tilt sash weights and sizes, for regular window sizes.

   * Note – Spiral balances for regular window sizes, are unacceptable.

   b. The "Ultra-Lift", heavy-duty balances, a combination of an extension spring and a torsional inner spring, engineered and manufactured for oversized window tilt sashes.

   c. All balances shall be rust proof and shall meet AAMA 902.1 requirements.

5. Insect screens (half full) set into extruded tubular aluminum frame, with the same as window finish, held in exterior integral tracks with side flat springs. All corners of screen frame shall be keyed. The screen frame shall be fitted with18x16-mesh rewireable charcoal fiberglass screen cloth or aluminum screen wire mesh, secured to screen frame with flexible PVC spline.

8C.11 WINDOW FABRICATION

A. Window frame must be measured to the fullest size with clearance requirements. Head, sill, and jambs of the window shall be straight and true.

B. Joints of the frames and sash members shall be square, neatly fitted to a hairline with no gaps and secured in a manner, which will develop the full strength of the connected members and absolutely weather tight. All four corner joints of the frame and each sash shall be mitered or butt-joined, securely assembled at each corner of frame with a minimum of one # 8 x 1 ¼" stainless steel type 18-8 non magnetic self-tapping screws, engaging continuous screw spline channels. Sash members must be coped to insure rigidity.

C. For double window frame, one-piece continuous head and sill member shall be provided. Top and bottom of mullion of double window frame shall be fastened to head and sill member with minimum of four (two on top and two at the bottom) # 8 x 1 ¼" stainless steel type 18-8 non magnetic self-tapping screws per connection, engaging screw spline channels in mullion extrusion. As an option, and with Architect's/Engineer's approval, contractor may provide two separate windows joined together with a built-up "H" mullion, which provides additional support between the windows.

D. Bottom rails of lower sash and top rails of upper sash shall each be provided with an approved continuous integrally extruded lift and pull, having a thickness of .062 inch. On top rail, top sash only, a lift handle may be provided in lieu of extruded lift and pull or a recessed finger grip may be provided in lieu of extruded as an option approved by Architect/Engineer. Handle and finger grip shall be continuous for full width of sash.

E. Sash of the window shall be designed to accept 7/8" overall thickness insulating glass unit and shall be provided with weep holes in bottom member of bottom sash. Glazing sash shall be constructed to allow re-glazing by suitably trained maintenance staff. Sash shall be not removable to the outside. All sashes must have full travel (except beyond sash stops).

F. All windows shall have;

   1. Factory applied NFRC, AAMA label with manufacturer's code number affixed on top, inside portion of the frame in such manner as to last the life of the window.

8C.12 FINISHES

A. All exposed surfaces shall receive a powder coated finish with (0) zero VOC emission in accordance with AAMA Paint Specification 2604-02. Dry film thickness shall be 2-3 mils minimum, except inside corners and channels. The painting process is preceded by chrome or chrome-free coating for proper adherence.

B. Color of paint shall be chosen from manufacturer's standard color * chart or shall be as specified by Architect/Engineer.

* Note: – Powder coating standard colors:

- Bronze – PCSZ20107
- White – PCT80296
- Beige – PCSZ20109
- Black – PCSZ90101
- Green – PCSZ40102

C. As an option exposed aluminum surfaces may receive an anodized coating, finished in accordance with Aluminum Association designation AAC22A42 Architectural Class 1, minimum coating .7 microns in thickness, finish to be clear or medium bronze.

8C.13 MEASUREMENTS VERIFICATION

A. All openings to receive windows shall be field measured for verification of dimensions prior to fabrication.

8C.14 WINDOW INSTALLATION

A. The windows shall be installed square, plumb and level in a secure and workmanlike manner to assure neat and weather tight construction in accordance with the manufacturer's instructions. The windows shall be screwed to (1" x 6") preservative-treated wood frame (for details see Section 6A - Rough Carpentry). Fasteners shall be spaced 2'-6" on center at head, jamb and sill. In addition, caulking shall be applied to entire perimeter of window frame to insure further weather tightness.

B. Contractor shall carefully adjust sash balances and hardware for all windows. All windows shall work freely and smoothly and the entire installation shall be in proper condition.

C. The windows shall be installed so exposed surfaces are uniformly proportioned, both inside and outside, for attractive appearance. Proper tolerances must be allowed to install the windows square and aligned. Any window not installed in accordance with such requirements will be rejected and must be reinstalled in the proper manner.

8C.15 WINDOW CAULKING

A. Exterior caulking shall meet Federal Specification TT-S-00230. It shall be self-priming silicon. Caulking shall be applied in accordance with manufacturer's instructions, including surface preparation but excluding any weep holes in the frame. Closed-cell polyethylene backer-rod must be used in all joints deeper or wider than ¼ inch; such joints shall be kept to a minimum in any event. Caulk shall be a guaranteed non-staining, non-sagging type capable of 100% elongation under ASTM D412-68. Caulk color shall match closely the finish of the newly installed windows.

B. Interior caulking shall be paintable non-silicone caulk sealer.

C. Joints and spaces to be caulked shall be thoroughly clean, dry, free of paint, putty oils, grease, dust and other foreign matters, and shall be primed if necessary. All old caulking shall be removed from areas to receive new caulk. All surfaces to accept caulk shall be left broom clean before new application.

D. Application of caulk to the masonry, plaster and metal surfaces shall be provided in a manner recommended by the manufacturer. Caulk beads should be smooth and slightly concave. Excess, messy, or convex caulking will not be permitted, nor beads in excess of 3/8" width.

E. All caulking shall be done using approved type of caulking gun and applying the material under pressure, except where the use of gun is not practicable. Caulk joint shall be tooled immediately upon application to assure maximum adhesion and neat joint appearance.

8C.16 FINAL CLEANING AND ADJUSTMENTS OF WINDOWS

A. All broken and defective parts, hardware, glass shall be replaced, by this contractor.

B. Immediately prior to occupancy, all window components shall be cleaned on inside and outside of all mortar, plaster, paint, caulking, and other foreign matters to present a neat appearance and prevent from fouling of weathering surfaces and weather-stripping.

C. Lubricate as necessary window components in accordance with manufacturer's recommendations.

D. The contractor shall carefully adjust all sash and hardware. All window components shall work freely and smoothly and entire window installation shall be in proper working condition with AAMA identification label and manufacturer's Code number.

E. Limit restrictor must be engaged for safety at all tilt latches prior to occupancy.

8C.17 GUARANTEES

A. Guarantee all items of work furnished and installed under this Section for (1) one year, in addition to manufacturer's standard warranties. All guarantees to be from the date, when **Final Certificate of Occupancy** is issued from Department of Buildings.

END OF SECTION