DIVISION 8

SECTION 8C HIGH EFFICIENCY 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" for "High Efficiency Aluminum Double Hing Windows".

8C.03 WORK INCLUDED IN THIS SECTION

A. Material: Aluminum windows as indicated on the drawings and specified in this section.

B. Installation: Labor, tools, and material needed to install aluminum windows.

C. Glass and glazing.

8C.04 WORK NOT INCLUDED

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

8C.05 RELATED SECTIONS

A. Division 6, Section 6A "Rough Carpentry"

B. Division 7, Section 7D "Weather-Stripping, Saddles and Caulking"

8C.06 REFERENCES

A. AAMA - American Architectural Manufacturers Association

1. AAMA/WDMA/CSA 101/I.S.2/A440-08 "Standard/Specification for Windows, Doors, and Unit Skylights"

2. AAMA 502-08 "Voluntary Specification for Field Testing of Newly Installed Fenestration Products"

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

4. AAMA 701/702-04 "Voluntary Specification for Pile Weatherstripping and Replaceable Fenestration Weatherseals"

5. AAMA 800-07 "Voluntary Specifications and Test Methods for Sealants"

6. AAMA 902-07 "Voluntary Specification for Sash Balances"

7. AAMA 910-93 “Voluntary “Life Cycle” Specifications and Test Methods for Architectural Grade Windows and Sliding Glass Doors”

8. AAMA 2603-02 “Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels”

9. AAMA 2604-05 “Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels”

10. AAMA 2605-05 “Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels”

11. 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 Measurement of Airborne Sound Transmission Loss of Building Partitions"

2. ASTM E 283-04 "Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen"

3. ASTM E 330-02 "Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights, and Curtain Walls by Uniform Static Air Pressure Difference"

4. ASTM E 547-00 "Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Cyclic Static Air Pressure Differential"

5. ASTM E 2190-02 "Standard Specification for Insulating Glass Unit Performance and Evaluation"

C. NFRC - National Fenestration Rating Council

1. NFRC 100-04 “Procedure for Determining Fenestration Product U Factors”

2. NFRC 500-04 “Procedure for Determining Fenestration Product Condensation Resistance Values”

D. IGCC – Insulating Glass Certification Council

E. SGCC – Safety Glazing Certification Council

1. ANSI Z97.1-04 “American National Standard for Safety Glazing Materials used in Buildings – Safety Performance Specifications and Methods of Test”

2. 16 CFR 1201 “Consumer Product Safety Commission Safety Standard for Architectural Glazing Materials – codified at Title 16, Part 1201 of the Code of Federal Regulations”

8C.07 SYSTEM DESCRIPTION

A. Aluminum Double Hung Tilt Thermal Aluminum & Glass Window:

1. AAMA Designation: CW-PG50-H.

B. Windows: NexGen™ Technology 3-1/4" frame depth consisting of extruded aluminum profiles with integral structural NexGen Thermal Barrier System™. Thermal break made with glass-reinforced nylon strips installed by the window manufacturer in the frame and sash members, equal-leg frame, exterior and interior finishes applied by the window manufacturer. Frames and sash assembled by the window manufacturer.

C. Configuration: Double hung thermal aluminum window with top and bottom tilt-in sashes for glass cleaning (By building maintance – only).

D. Glazing: Factory glazed 7/8” thick isulating glass units with TRACO NexGen Energy Spacer™ - warm edge, non-metallic airspacer system for high performance heat insulation and 2-part structural silicone glazing.

8C.08 PERFORMANCE REQUIREMENTS

A. Conformance to CW-PG50-H specifications in AAMA/WDMA/CSA 101/I.S.2/A440-08 when tests are performed on the prescribed 48" x 84" minimum test size with the following test results:

1. Air Infiltration: not to exceed AAMA 101 standard of maximum 0.3 cfm/square foot when tested per ASTM E 283-04 at a static air pressure difference of 1.6 psf.

2. Water Penetration: no uncontrolled water leakage when tested per ASTM E 547-00 and ASTM E331-00 at a static air pressure difference of 10 psf. No more then 3 field tests required.

3. Uniform Load Deflection at Design Load: No member shall deflect more than L/175, where L is the length of the unsupported span at an static air pressure difference of 50psf.

4. Uniform Structural Load: no glass breakage or permanent damage to fasteners, and maximum 0.3% permanent deformation of the span of any frame member when tested per ASTM E 330-02 at a static air pressure difference of 75 psf.

B. U Value Simulation: thermal computer simulation per NFRC 100-04, at the prescribed 48”x 60" Non-Residential Size, glazed with 7/8” insulating glass made with 1/8” clear exterior glass lite, thermoplastic butyl spacer, argon gas, and 1/8” glass with a soft coat low E coating on the #3 surface of the interior lite: Thermal Transmittance to be maximum 0.38 BTU/HR/SQ.FT/°F.

C. Condensation Resistance: per NFRC 500-04, at the prescribed 48”x 60" Non-Residential Size, glazed with 7/8” insulating glass made with 1/8” clear exterior glass lite, thermoplastic butyl spacer, argon gas, and 1/8” glass with a soft coat low E coating on the #3 surface of the interior lite: Condensation Resistance to be minimum 50.

D. Sound: testing per ASTM E 90-04 with 7/8" insulating glass made with 1/4" laminated glass and 1/8" annealed glass: minimum 33 STC and 27 OITC.

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

8C.09 SUBMITTALS

A. Shop drawings:

1. Window location chart.

2. Typical window elevations.

3. Details of assemblies and hardware and glazing details for units glazed by window manufacturer.

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

B. Product data: manufacturer's specifications and valid test reports from an AAMA-accredited laboratory.

C. “Product Certification” from aluminum manufacturer, 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).

D. 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

    b. IGCC Certification Label

    c. SGCC Certification Label (if included on the project)

8C.10 QUALITY ASSURANCE

A. Furnish a valid AAMA "Authorization for Product Certification" indicating that the windows for the project conform to AAMA/WDMA/CSA 101/I.S.2/A440-08.

B. Furnish visible, permanent IGCC certification labels indicating conformance to ASTM E 2190-02 on insulating glass units.

C. Furnish visible, permanent SGCC certification labels indicating conformance to ANSI Z97.1-04 and/or 16 CFR 1201 on tempered glass lites, if included on the project, and laminated glass lites, if included on the project.

D. Manufacturer's warranties:

1. Windows: warrant for one (2) year against defects in material or workmanship under normal use.

2. Insulating glass units: warrant seal for ten (10) 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 PPG Duracron™ organic paint finish for five (5) years against chipping, peeling, cracking or fading.

8C.11 MANUFACTURERS

A. Window shall be the product of TRACO Model NX-500 3 ¼" Double Hung Tilt Thermal Aluminum Window featuring the NexGen Energy Spacer™ and NexGen Thermal Barrier System™ or other equivalent aluminum windows meeting all the requirements of this Specification by manufacturers that have demonstrated a successful history of windows manufacturing for five (5) years as approved by Architect/Engineer.

8C.12 WINDOW MATERIALS AND CONSTRUCTION

A. Frame:

1. Aluminum extrusions: extruded in the USA by the window manufacturer from commercial quality 6063-T5 alloy, free from defects impairing strength and durability.

2. Thermal break shall be integral structural thermal break made with glass-reinforced nylon strips installed by the window manufacturer in the frame and sash members.

B. Hardware:

1. Bronze die cast sweep lock - one (1) per window up to 32" window width, two (2) on wider windows.

2. Aluminum automatic anti-drift head lock - one (1) per top sash.

3. Stainless steel pivot bars - two (2) per sash. Pivot bars engage balance shoes when sash are tilted parallel to the floor.

4. Internal tilt release latches - two (2) per sash with temper resistance open restrictor, accessible for maintance only, releases are spring-loaded for safety by automatically engaging the frame jamb when the sash are in their normal vertical position.

5. Spiral balances conforming to AAMA 902-07 Class 4 with capacity to hold sash stationary and permit it to operate freely.

6. Nylon balance shoes which locks when tilted to prevent sash travel.

C. Weatherstrip:

1. Weaterstripping secured in extruded ports; double rows on sash perimeters: pile conforming to AAMA 701/702-04 with polypropylene center fin.

D. Insect screens:

1. Half full screen cover bottom operable sash of double hung window, held in exterior tracks with stainless steel leaf springs.

2. 5/16" x 1-1/2" x .045" extruded tubular aluminum frame with mitered, reinforced and crimped corners.

3. 18 x 16 dark fiberglass or aluminum mesh with PVC spline.

4. Finish same as finish of the window.

E. 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: For oversized windows consult Window Manufacturer regarding type of window frame, sash frame and type of sash balances.

F. At the 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.

8C.13 WINDOW FABRICATION

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

B. Frame:

1. Head and sill coped and fastened to jambs with two stainless steel screws per corner;
Frame sill has two weep holes covered with weep covers for drainage;
Corners sealed by window manufacturer with sealant conforming to AAMA 800-07.

C. Sash:

1. Tubular horizontal sash rails coped and fastened to double-tubular vertical sash stiles with a telescope-design joint secured with one stainless steel screw per corner;
Corners sealed by window manufacturer with sealant conforming to AAMA 800-07.

D. Sash design:

1. Continuous extruded pull-down rail on top sash interior/exterior and lift rail on bottom sash interior; mechanical meeting rail interlock.

8C.14 INSULATING GLASS UNITS

A. Materials;

1. 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.

2. IGU: Insulated glazing units to be fabricated by the window manufacturer. Both sashes shall utilize ~ 7/8" thick insulating glass unit, consisting of two sheets of 1/8" thick clear glass lites and sealant. A sealant shall be extruded around the perimeter of the spacer to achieve a complete seal.

3. Spacer: TRACO NEXGEN Energy Spacer™ - Warm edge technology extruded thermoplastic butyl with integrated desiccant.

NOTE: Metalic and PVC spacers are not alowwed

4. Spacer color: Black

5. Secondary seal: Silicone

6. Airspace fill: Argon

B. Performance;

1. Dual-seal durability: conformance to ASTM E 2190-02; visible, permanent IGCC certification label on air spacer.

2. Maximum U value of .254 Btu/hr*ft^2*F

3. Maximum SHGC of .466

4. Minimum VT of .722

C. Exterior glass lite;

1. Thickness: 1/8"

2. Tint: Clear

3. Type: Annealed or tempered if required

D. Interior glass lite

1. Thickness: 1/8"

2. Tint: Clear

3. Type: Annealed or tempered if required

4. Coating: Soft coat low E on #3 surface by PPG Industries

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

8C.15 FINISHES

A. All exposed surfaces shall receive PPG Duracron™ coating with acrylic resin, conforming to AAMA Paint Specification 2603-02. Dry film thickness shall be a minimum .8 mils on exposed surfaces, except inside corners and channels.

B. Pretreatment: five-stage; zinc chromate conversion coating.

C. Application: electrostatic spray and oven bake by approved applicator.

D. Coating quantity: minimum one (1) color coat.

E. Color of paint shall be chosen from manufacturer's standard color * chart or shall be as specified by Architect/Engineer (See Scope of Work and Finish Schedule for Requirements).

* Note: – PPG Duracron™ standard colors:

- Standard on Exterior:

- Standard White – UC 92428
- Standard Bronze – UC 85613
- Colonial White – UC 50369
- Standard Ivory – UC 50250
- Beige – UC 55831
- Fashion Gray – UC 55334
- Palace Blue – UC 66928
- Hardwood Green – UC 90716
- River Rouge Red – UC 53979
- Black – UC 85511
- Silversmith – UC 101510
- Antique Bronze – UC 45311

- Standard on Interior:

- Standard White – UC 92428
- Colonial White – UC 50369
- Standard Ivory – UC 50250

F. As an option exposed aluminum surfaces may receive an anodized coating (See Scope of Work and Finish Schedule for Requirements).

1. Coating: Anodize coating conforming to AAMA 611

2. Factory-applied, two-step anodized finishes, Class I ;

- # 215 Clear
- # 311 light bronze
- # 312 medium bronze
- # 313 dark bronze
- # 315 black

3. Thickness: AAM10C22A41, Class I - .7 mils.

8C.16 INSTALLATION ACCESSORIES

A. Provide extruded aluminum installation accessories to match window color and finish performance with all concealed fasteners as required by Manufacturers installation instruction and project requirements.

8C.17 MEASUREMENTS VERIFICATION

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

8C.18 WINDOW INSTALLATION

A. Prepare openings to be in tolerance, plumb, level, provide for secure anchoring, and in accordance with approved shop drawings.

B. Install windows in accordance with AAMA IPCB-08 and window manufacturer's recommendations and approved shop drawings with skilled crafts people who have demonstrated a successful history of installing windows for (5) years.

C. Provide required support and securely fasten and set windows plumb, square, and level without twist or bow in 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 spacedaccording manufacturers requirements.

D. Apply sealant/caulking at all joints between window frame and masonry to insure further weather tightness.

1. Exterior caulking shall meet Federal Specification TT-S-00230. It shall be self priming silicone.Caulking shall be applied in accordance with manufacturer’s

instructions including surface preparation but excluding any weep holes in the frame.

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

3. Closed cell polythylene backer-rod must be used along with a culk-stop in all joints deeper or wider than 1/4 – inch.

4. Caulking shall be guaranteed non-staining, non-sagging type capable of 100% elongation under ASTM D412-68.

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

6. All caulking applications shall be done using approved type of caulking gun.

7. 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.

8. Caulk color shall match the finishof newly installed windows.

E. 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.

F. 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.19 FIELD TESTING

A. Test installed units in conformance with AAMA 502-08 minimum requirements for air and water infiltration with the Window Manufacturer, General Contractor, HPD Architect/Engineer Representative, and Window Installer present.

B. Select test units as directed by HPD Architect/Engineer Representative.

8C.20 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.21 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