

## SECTION 084413 – GLAZED ALUMINUM CURTAIN WALLS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Section Includes
  - 1. Pre-engineered, conventionally exterior glazed aluminum screw spline curtain wall and related accessories.
  - 2. Curtin wall glazing.
  - 3. Sun control devices and accessories.
- B. Related Sections
  - 1. Division 08 Section "Aluminum-Framed Entrances and Storefronts" for coordination among aluminum fenestration units.
  - 2. Division 08 Section "Glazing" for additional glazing requirements.
  - 3. Division 08 Section "Aluminum Windows" for incorporating aluminum windows into glazed curtain walls and for coordination among aluminum fenestration units.

#### 1.3 REFERENCES

- A. AAMA – Aluminum curtain wall design guide manual 1989.
- B. ASTM E283 – Standard test method for determining the rate of air leakage through exterior windows, curtain walls, and doors under specified pressure differences across the specimen; 1991 (Reapproved 1999).
- C. ASTM E331 – Standard test method for water penetration of exterior windows, skylights, doors and curtain walls by uniform static air pressure difference; 2000.
- D. ASTM E330 – Standard test method for structural performance of exterior windows, doors, skylights and curtain walls by uniform static air pressure difference; 2001.
- E. AAMA 1503/1/98 – Test method for condensation resistance factor (CRF) and test method for thermal transmission coefficient (U Value).
- F. AAMA 501.2 – Field check of metal storefronts, curtain walls, and sloped glazing systems for water leakage; American Architectural Manufacturers Association; 1994 (part of AAMA 501).

#### 1.4 SUBMITTALS

- A. Product Data: Include construction details, material descriptions, fabrication methods, dimensions of individual components, profiles, and finishes.
- B. Shop Drawings: Include plans, elevations, sections, details, attachments to other work, installation details, and the following:
  - 1. Mullion details, including reinforcement and stiffeners.
  - 2. Joinery details.
  - 3. Weather-stripping details.
  - 4. Glazing details.
- C. Samples for Initial Selection: For units with factory-applied color finishes.
- D. Maintenance Data: Include cleaning instructions for glass and metal finishes in maintenance manuals.
- E. Test Reports and Calculations: Submit certified independent laboratory test reports showing compliance with the specified requirements.

#### 1.5 QUALITY ASSURANCE

- A. Product Requirements: For maximum performance, windows for this project must meet both the testing requirements as contained herein and the minimum material requirements specified. Windows that carry the applicable AAMA rating but do not meet the material thicknesses, depths, etc. shall not be acceptable for use on this project.
- B. Installer Qualifications: An installer acceptable to aluminum window manufacturer for installation of units required for this Project.
- C. Source Limitations: Obtain all aluminum windows and curtain wall through one source from a single manufacturer; refer to Division 08 Section "Aluminum Windows".
- D. Product Options: Drawings indicate size, profiles, and dimensional requirements of aluminum windows and are based on the specific system indicated. Do not modify size and dimensional requirements.
  - 1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.
- E. Fenestration Standard Comply with AAMA/WDMA/CSA 101/I.S.2/A440-08, "Standard/Specification for Windows, Doors, and Unit Skylights" for definitions and minimum standards of performance, materials, components, accessories, and fabrication. Comply with more stringent requirements if indicated.
  - 1. Provide AAMA-certified aluminum windows.
- F. Glazing Publications: Comply with published recommendations of glass manufacturers and with GANA's "Glazing Manual" unless more stringent requirements are indicated.
- G. Preinstallation Conference: If requested, conduct conference at project site to review methods and procedures related to aluminum windows including, but not limited to, the following:

1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
2. Review, discuss, and coordinate the interrelationship of aluminum windows with other exterior wall components.
3. Review and discuss the sequence of work required to construct a watertight and weathertight exterior building envelope.
4. Inspect and discuss the condition of substrate and other preparatory work performed by other trades.

#### 1.6 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace aluminum curtain wall that fail in materials or workmanship within specified warranty period.
1. Failures include, but are not limited to, the following:
    - a. Failure to meet performance requirements.
    - b. Structural failures including excessive deflection, water leakage, or air infiltration.
    - c. Deterioration of metals or other materials beyond that which is normal.
    - d. Failure of insulating glass.
  2. Warranty Period:
    - a. Curtain Wall: Two years from date of Substantial Completion.
    - b. Insulated Glazing: 10 years from date of Substantial Completion.
    - c. Painted Metal Finishes: Twenty years from date of Substantial Completion for AAMA 2605 Superior Performance Finishes.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Basis-of-Design Product: The design for aluminum curtain wall systems is based on "Series 1800 Aluminum Curtain Wall" manufactured by Architectural Window Manufacturing Corporation.
1. Subject to compliance with requirements, provide the named product or a comparable product by an approved manufacturer.

#### 2.2 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide aluminum curtain wall capable of withstanding the effects of the following loads as well as the design wind load indicated but in no case less than 30 psf.
1. Uniform Load Deflection Test: No deflection of any unsupported span L of test unit in excess of  $L/175$  ( $L/240 + 1/4"$  at spans exceeding 13'6";  $2L/175$  at unsupported cantilevers) at a test pressure of 60 psf (positive and negative) when test in accordance with ASTM E330.
  2. Uniform Load Structural Test: Units to be tested at 1.5 times the design pressure (positive and negative) acting normal to the plane of the wall in accordance with ASTM E330.

- a. No glass breakage or permanent set of any main frame member in excess of 0.2% of its clear span.
- B. Air Infiltration: Maximum rate not more than indicated when tested according to ASTM E283, Air Infiltration Test.
  1. Maximum Rate: 0.07 cfm/sq. ft. of area at an inward test pressure of 6.24 lbf./sq. ft.
- C. Water Resistance: No uncontrolled water leakage at a water test pressure equaling that indicated, when tested according to ASTM E331 (static) and AAMA 501.1 (dynamic), Water Resistance Tests.
  1. Test Pressure (Static and Dynamic): 20 lbf/sq. ft.
- D. Seismic Performance: Glazed aluminum curtain walls shall withstand the effects of earthquake motions determined according to ASCE/SEI 7 for Seismic Design Category C.
- E. Energy Performance: Certify and label energy performance according to NFRC as follows:
  1. Thermal Transmittance (U-factor): Fixed glazing and framing areas shall have U-factor of not more than 0.45 Btu/sq. ft. x h x deg F as determined according to NFRC 100.
  2. Solar Heat Gain Coefficient: Fixed glazing and framing areas shall have a solar heat gain coefficient of no greater than 0.30 as determined according to NFRC 200.
- F. Windborne-Debris Impact Resistance: Pass missile-impact and cyclic-pressure tests when tested according to ASTM E 1886 and testing information in ASTM E 1996 for Wind Zone 2.
  1. Large-Missile Test: For glazed openings located within 30 feet of grade.
  2. Small-Missile Test: For glazed openings located more than 30 feet above grade.
- G. Thermal Movements: Provide structural-sealant-glazed curtain-wall systems that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
  1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
  2. Test Performance: No buckling, stress on glass, glazing edge-seal failure, sealant failure, excess stress on curtain-wall framing, anchors and fasteners, or reduction of performance when tested according to AAMA 501.5.
    - a. Test High Exterior Ambient Air Temperature: That which produces an exterior metal surface temperature of 180 deg F (82 deg C).
    - b. Test Low Exterior Ambient Air Temperature: 0 deg F (minus 18 deg C).
    - c. Test Interior Ambient Air Temperature: 75 deg F (24 deg C).

## 2.3 FRAMING SYSTEM AND ACCESSORIES

- A. Aluminum Extrusions: Extruded aluminum prime billet 6063-T5 recommended by aluminum curtain wall manufacturer for strength, and application of required finish to meet the requirements of ASTM B221 and not less than 0.125-inch thickness at any location.
- B. Face Dimension/Frame Depth: 2-½" face dimension; 6" overall frame depth with custom exterior cover plate, profiles to match approved shop drawings.

- C. Fasteners: Aluminum, nonmagnetic stainless steel, epoxy adhesive, or other materials warranted by manufacturer to be noncorrosive and compatible with aluminum curtain wall members, anchors, and other components.
  - 1. All fasteners must be concealed except where unavoidable for application of hardware.
  - 2. For application of hardware, where required, use non-magnetic stainless steel Phillips machine screws.
- D. Anchors, Clips, and Accessories: Aluminum, non-magnetic stainless steel, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions; provide sufficient strength to withstand design pressure indicated.
- E. Concealed Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials.
- F. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos, formulated for 30-mil thickness per coat.

## 2.4 VENTING WINDOWS

- A. Aluminum Windows: As specified in Section 085113 "Aluminum Windows."

## 2.5 ENTRANCES

- A. Entrances: Comply with Section 084113 "Aluminum-Framed Entrances and Storefronts."

## 2.6 SUN CONTROL

- A. Basis-of-Design Product: The design for sunshade system is based on "Solar Eclipse" system by Oldcastle Building Envelope. Subject to compliance with requirements, provide the named product or a comparable product by an approved manufacturer, including, but not limited to one of the following:
  - 1. Alcoa Inc.
  - 2. Construction Specialties (C/S).
  - 3. Kawneer.
- B. Sunshades: Assemblies consisting of manufacturer's standard outrigger brackets, louvers, and fascia, designed for attachment to curtain wall with mechanical fasteners.
  - 1. Orientation: Horizontal.
  - 2. Projection from Wall: As indicated on Drawings.
  - 3. Outriggers: Straight with square edges.
  - 4. Louvers:
    - a. Number: Four louvers per unit.
    - b. Shape: Planar.
    - c. Width: 6 inches.
    - d. Mounting Angle: 25degrees.
  - 5. Fasciae: Rectangular.
  - 6. Finish: Match adjacent glazed aluminum curtain wall.

- C. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.

1. Sheet and Plate: ASTM B 209.
2. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
3. Extruded Structural Pipe and Tubes: ASTM B 429/B 429M.
4. Structural Profiles: ASTM B 308/B 308M.

## 2.7 GLAZING

- A. Curtain Wall Glazing: Hermetically sealed 1" insulating glass units with a dual seal of polyisobutylene and silicone and a desiccant filled aluminum spacer. Insulated glass shall be outside glazed and held in place with extruded aluminum pressure plates anchored to the mullions using stainless steel fasteners and must be glazed in accordance with AAMA Metal Curtain Wall Manual and FGMA Glazing Manual for the specified glass type.

1. Exterior Glazing Insulated Unit:
  - a. Thickness: 1/4"
  - b. Tint: Opti-Blue
  - c. Type: Tempered Glass
  - d. Coating: Solar Ban z50 (#2 Surface)

2. Interior Glazing Insulated Unit:
  - a. Thickness: 1/4"
  - b. Tint: Clear
  - c. Type: Tempered

- B. Alternate Curtain Wall Glazing: Triple glazed unit consisting of access panel and integral binds. Refer to Division 01 Section "Alternates" and as follows:

1. Exterior Glazing Insulated Unit:
  - a. Thickness: 1/4"
  - b. Tint: Opti-Blue
  - c. Type: Tempered Glass
  - d. Coating: Pyrolitic Low-E (#2 Surface)
2. Interior Glazing Insulated Unit:
  - a. Thickness: 1/4"
  - b. Tint: Clear
  - c. Type: Annealed
3. Integral Louver Blinds: Provide remotely operated horizontal louver blinds in the space between two panes of dual glazing. Construct blinds of aluminum slats, approximately 5/8-inch wide, with polyester fiber cords, equipped for tilting by standard operating hardware located on inside face of sash. Blind controls exceeding 72" above the finished floor shall utilize pole operated white bronze hardware.
4. Access Vision Panel: Wrap around (marine) glazed into a removable access panel. Access panels shall be hollow extruded sections with minimum wall thickness of 0.062 inches and shall be miter cut and assembled with stainless steel screws for ease of repair. Tamper resistant security fastenings shall be installed at the bottom of each panel to securely attach panels to sash. For

safety purposes, access panels shall be encased within channels at the top and bottom to prevent the panel from falling out even if the security fastening is removed.

- a. Thickness: 1/4"
- b. Tint: Clear
- c. Type: Tempered

C. SPANDREL GLASS

1. Exterior Glazing:

- a. Thickness: 1/4
- b. Tint: Opti-Blue
- c. Type: Tempered
- d. Coating: Solar Ban z50 (#2 Surface)

2. Interior Glazing:

- a. Thickness: 1/4"
- b. Tint: Clear
- c. Type: Tempered
- d. Coating: 109 Warm Gray Frit on (#4 surface)

D. Gaskets: Comply with ASTM C864, Option II; EPDM, in a hardness suitable for its intended use. 70 Shore A Durometer for Preset Gaskets.

- 1. Color: Black.
- 2. All corners of glazing gaskets shall be bed in silicone sealant compatible with glazing gaskets.

E. Setting Blocks: EPDM85 Shore A Durometer; minimum 4" long per glass manufacturer's requirements.

- 1. Verticals and horizontals shall have a silicone compatible elastomer thermal separator which will adhere to silicone sealant.
- 2. Framing intersections to incorporate silicone compatible "end dams". All horizontal glazing pockets will have weep holes to drain all water to exterior of the system.

F. Sealant: ASTM C 920 for Type S; Grade NS; Class 25; Uses NT, G, A, and O; chemically curing silicone formulation that is compatible with other system components with which it comes in contact; type recommended by curtain wall manufacturer.

2.8 FABRICATION

- A. Fabricate aluminum curtain wall in sizes indicated. Include a complete system for assembling components and anchoring curtain walls.
- B. Thermally Improved Construction: Frame and pressure plates shall be thermally separated using a continuous 1/4" thick extruded EPPM spacer.
- C. Weather Stripping: Weather stripping shall be closed cell EPDM installed in integral raceways in framing members and pressure plates.
- D. Weep Holes: Provide weep holes and internal passages to conduct infiltrating water to exterior.

- E. Mullions: Provide mullions and cover plates as shown, complete with anchors for support to structure and installation of curtain wall units. Allow for erection tolerances and provide for movement of curtain wall units due to thermal expansion and building deflections, as indicated.
- F. Special Profile Mullions: All mullion covers must match profiles and dimensions depicted on the drawings

## 2.9 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
- C. Curtain Wall-Exterior
  - 1. Superior-Performance Organic Finish: AA-C12C40R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with AAMA 2605 and with coating and resin manufacturer's written instructions.
    - a. Fluoropolymer Three-Coat System: Manufacturer's standard three-coat thermocured system consisting of specially formulated inhibitive primer, fluoropolymer color and clear topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 2605.
    - b. Color: Silver II Metallic UC95731F
- D. Curtain Wall-Interior
  - 1. Baked-Enamel Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Apply baked enamel complying with paint manufacturer's written instructions for cleaning, conversion coating, and painting.
    - a. Organic Coating: Thermosetting, modified-acrylic enamel primer/topcoat system complying with AAMA 2603 Organic Coating: Thermosetting, modified-acrylic enamel primer/topcoat system complying with AAMA 2603.
    - b. Color: PPG Duracron S600 DEF UC103536 (Metallic) or as selected by Architect from manufacturer's standard colors. (Note: Exterior color may be different from interior color.)

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work. Verify rough opening dimensions and levelness of sill plate. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure a coordinated, weathertight curtain wall installation.
  - 1. Masonry Surfaces: Visibly dry and free of excess mortar, sand, and other construction debris.



2. Wood Frame Walls: Dry, clean, sound, well nailed, free of voids, and without offsets at joints. Ensure that nail heads are driven flush with surfaces in opening and within inches of opening.
3. Metal Surfaces: Dry; clean; free of grease, oil, dirt, rust, corrosion, and welding slag; without sharp edges or offsets at joints.
4. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

#### A. General: Screw-spline system

1. Comply with manufacturer's written instructions.
2. Do not install damaged components.
3. Fit joints to produce hairline joints free of burrs and distortion.
4. Rigidly secure non-movement joints.
5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
6. Where welding is required, weld components in concealed locations to minimize distortion or discoloration of finish. Protect glazing surfaces from welding.
7. Seal joints watertight unless otherwise indicated.

#### B. Metal Protection:

1. Where aluminum is in contact with dissimilar metals, protect against galvanic action by painting contact surfaces with primer, applying sealant or tape, or installing nonconductive spacers as recommended by manufacturer for this purpose.
2. Where aluminum is in contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

#### C. Install curtain wall level, plumb, and square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support.

#### D. Install curtain wall and components to drain condensation, water penetrating joints, and moisture migrating within curtain wall to the exterior.

#### E. Install operable units level and plumb, securely anchored, and without distortion. Adjust weather-stripping contact and hardware movement to produce proper operation.

#### F. Install glazing as specified in Section 088000 "Glazing."

### 3.3 ERECTION TOLERANCES

#### A. Erection Tolerances: Install glazed aluminum curtain walls to comply with the following maximum tolerances:

1. Plumb: 1/8 inch in 10 feet; 1/4 inch in 40 feet.
2. Level: 1/8 inch in 20 feet; 1/4 inch in 40 feet.
3. Alignment:
  - a. Where surfaces abut in line or are separated by reveal or protruding element up to 1/2 inch wide, limit offset from true alignment to 1/16 inch.
  - b. Where surfaces are separated by reveal or protruding element from 1/2 to 1 inch wide, limit offset from true alignment to 1/8 inch.

- c. Where surfaces are separated by reveal or protruding element of 1 inch wide or more, limit offset from true alignment to 1/4 inch.
- 4. Location: Limit variation from plane to 1/8 inch in 12 feet; 1/2 inch over total length.

3.4 ADJUSTING, CLEANING, AND PROTECTION

- A. Installer shall remove all labels and shipping bumpers from glass.
- B. Manufacturer shall clean all aluminum prior to shipment.
- C. Protection of newly installed curtain wall and/or final cleaning of glass and aluminum to remove any accumulations that may have occurred during the construction period is to be the responsibility of the General Contractor or Owner.
- D. Comply with manufacturer's written recommendations for final cleaning and maintenance.

END OF SECTION 084413