
SECTION 08 44 10

GLAZED WINDOW WALL ASSEMBLIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Provide factory finished aluminum framed window wall systems including glass, glazing materials, structural anchors, attachments, shims, and accessories as required for complete weather-tight installation.
 - 1. Window wall systems include storefront systems, curtain wall systems, fixed windows, and aluminum and glass door systems including deck doors, and including glazing and hardware.
 - 2. Provide aluminum composite panel (ACP) system finished to match window wall assemblies.
- B. Related Work:
 - 1. Section 07 90 00: Perimeter sealants and back-up materials.
 - 2. Section 08 42 20: All-glass entrances.
 - 3. Section 08 42 30: All-glass automatic entrances.
 - 4. Section 08 53 00: Vinyl windows and glazed doors.
 - 5. Section 08 71 00: Cylinders for door locks

1.2 REFERENCES

- A. American Architectural Manufacturers Association (AAMA): Metal Curtain Wall, Window, Store Front and Entrance Guide Specifications Manual.
- B. Glass Association of North America (GANA): Glazing Manual and Sealant Manual.
- C. National Association of Architectural Metal Manuf. (NAAMM): Metal Finishes Manual.
- D. Definitions: National Association of Architectural Metal Manufacturers (NAAMM), Glossary of Architectural Metal Terms.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Design/Build: Provide special engineering for glazed window wall assemblies to ensure they comply with applicable codes and Contract Documents.
- B. Coordination: Coordinate methods for making junctures with adjacent surfaces watertight with Section 07 90 00 – Joint Sealants.

1.4 SUBMITTALS

- A. Product Data: Submit manufacturer's specifications and product data for window wall system, glass, and major manufactured components.

- B. Shop Drawings: Indicate pertinent dimensioning, clearances, general construction, anchorage locations, and typical details.
 - 1. Include elevations at 1/4 scale, typical unit elevations at 1" scale and half or full-size detail sections of typical composite members.
 - 2. Indicate joint systems, expansion provisions and glazing details.
- C. Samples:
 - 1. Aluminum: Where color range can be anticipated, submit two sets of range samples indicating anticipated variance in finish.
 - 2. Glass: Submit each type specified except clear glass.
 - 3. Frame: Submit corner construction indicating profile, size and joining method of a mullion and sill at a glass panel.
- D. Test Reports: Submit laboratory reports of tests run on typical section of window wall system.
 - 1. Test for Air Infiltration: ASTM E283 at 6.24 psf pressure difference.
 - 2. Test for Water Penetration under Static Pressure: ASTM E331 using static air pressure difference of minimum 20% of inward acting design wind load pressure, but not less than 6.24 psf.
 - 3. Test for Water Penetration under Dynamic Pressure: AAMA 501.1.
 - 4. Test for Structural Performance: ASTM E330. Minimum test loads shall be those specified.
 - a. Minimum ultimate loads shall be loads specified multiplied by factors of safety specified in California Building Code.
 - b. Measure deflections at member center lines and other critical points as deemed appropriate.
 - c. Safety Factor: Design for specified pressures with no glass breakage, no permanent damage to fasteners, and no permanent deformation of framing in excess of 0.2% of member clear span.
 - 1) Glass safety factor relates to testing procedure, not occurrence of glass breakage in final installation.
- E. Design/Build Certificates: Submit certification signed by California licensed structural engineer indicating compliance with Contract Documents and code requirements.

1.5 QUALITY ASSURANCE

- A. Sustainability Requirements: Comply with CALGreen requirements including those relative to energy efficiency.

- B. Installer Qualifications: Firm acceptable to system manufacturer and with not less than five years successful experience installing systems of comparable type and size.
- C. Mock-Up: Provide mock-up as indicated, as directed by Architect where not otherwise indicated; approved mock-up may be incorporated into Project.

1.6 WARRANTY

- A. Extended Correction Period: Provide for correcting failure of system to resist damage from anticipated sources including damage from wind and water penetration.
 - 1. Repair or replace units which fail in materials or workmanship.
 - a. Excessive air infiltration.
 - b. Excessive deflections.
 - c. Deterioration of finish and deterioration of metal.
 - d. Defects in weather-stripping.
 - e. Defects in glass.
 - 2. Period: Two years.
- B. Manufacturer's Warranty: Submit manufacturer's warranty including special manufacturer services as required for manufacturer's warranty.
 - 1. Period: 20 years.
 - 2. Manufacturer's warranty shall not detract from requirements of extended correction period nor from Owner's rights under implied and expressed warranties regardless of wording of manufacturer's warranty.

PART 2 - PRODUCTS

2.1 SYSTEMS MANUFACTURERS

- A. Arcadia, Inc.
- B. Kawneer Company, Inc.
- C. Oldcastle Building Envelope, Vistawall.
- D. Substitutions: Refer to Section 01 25 00.

2.2 MATERIALS

- A. System Description: Provide factory finished aluminum framed window wall systems including glass, glazing materials, structural anchors, attachments, shims, and accessories, and including storefronts, curtain walls, windows, and entry doors.
- B. Regulatory Requirements: Comply with requirements of applicable codes.
 - 1. Safety Glass: Comply with applicable building code, CPSC 16 CFR 1201, and pass ANSI Z97.1.

2. Accessibility: Provide for assuring access for persons with disabilities in accordance with state and federal regulations.
 - a. California Regulations: Comply with California Building Standards Code.
 - b. Federal Regulations: Comply with Americans with Disabilities Act (ADA) Standards.
 3. Energy: Comply with California Energy Commission requirements regarding energy performance of window wall assemblies.
 - a. Manufacturer shall be responsible for providing information required by authorities necessary to verify conformance.
 - b. Entire assembly, including glass and glazing, shall be certified by National Fenestration Rating Council (NFRC) and shall bear NFRC Label indicating energy performance technical information.
- C. Design Criteria: Provide complete system with joints, gaps, and penetrations made watertight.
- D. Performance Criteria:
1. Deflections and Thermal Movements: Size primary members for deflection limitations and temperature variations as follows; fabricate, assemble and erect work to maintain limitations.
 - a. Normal-to-wall deflection of $L/175$ of span; except $L/250$ of span for glass supporting members.
 - b. Parallel-to-wall deflection of less than 75% of glass edge clearances.
 - c. Thermal expansion and contraction movements resulting from not less than ambient temperature range of 100 degrees F, which may cause a material temperature range of 160 degrees F.
 2. Water and Air Leakage: Installed system shall be free of significant leakage of both water and air.
 - a. Water leakage is defined as uncontrolled penetration of water (not including condensation) to interior of building.
 - b. Air leakage is defined as infiltration of air at any area of window wall, at a rate in excess of 0.06 cfm/sf of area, based on measurement of single complete module of system.
 3. Condensation: Design system to prevent excessive condensation on indoor faces, with heating and ventilating system in operation, and under following conditions.
 - a. Outdoor: Ambient temperature 20 degrees F; 15 mph wind.
 - b. Indoor: Ambient temperature 75 degrees F; relative humidity of 25%.
 - c. Excessive Condensation: Visible water on more than 10% of interior exposed surface of any section, or accumulation or uncontrolled flow of water from condensation at any location.

- E. Glazed Aluminum Framed Window Wall Systems: Systems with profiles as indicated on Drawings; provide extruded aluminum security type glass stops of profile to suit frame design.
 - 1. Basis of Design: Arcadia/OPG 1900, TC670, and TC470 Series as indicated, with thermally broken frames.
 - 2. Aluminum Type: As recommended by manufacturer for application indicated, but not less than extruded aluminum, ASTM B221, 6061 or 6063-alloy and T5 or T6 temper.
 - a. Provide thicknesses to comply with loading requirements.
 - 3. Finish, High Performance Organic Coating: AA-C12C42R1x, prepared, pretreated, and coated with minimum two coat system; AAMA 2605.
 - a. PVDF Manufacturers:
 - 1) Arkema Group/Kynar 500.
 - 2) Solvay Solexis/Hylar 5000.
 - 3) Substitutions: Refer to Section 01 25 00.
 - b. Paint Manufacturers:
 - 1) PPG Industries.
 - 2) Valspar Corp.
 - 3) Akzo Nobel.
 - 4) Substitutions: Refer to Section 01 25 00.
 - c. Color: Custom non-metallic color as directed by Architect.
- F. Aluminum Composite Panel (ACP) System:
 - 1. Panel System Manufacturers: Basis of Design is Reynobond.
 - a. Alcoa Architectural Products/Reynobond Composite Panels.
 - b. Alcan Inc./Alucobond.
 - c. Alpolc Materials Division Mitsubishi Chemical FP America/Alpolc Panels.
 - d. Substitutions: Refer to Section 01 25 00.
 - 2. Face Sheets: Minimum 0.020" thick aluminum sheet.
 - 3. Total Composite Panel Thickness: Minimum 4 mm (0.157").
 - 4. Panel Construction: Two sheets of aluminum sandwiching a core of extruded thermoplastic (polyethylene) formed in continuous process with no glue or adhesive between core and face sheets.
 - 5. Fire Rating Evaluation: Provide composite aluminum panel systems with NFPA 285 evaluation relating to fire conditions.
 - 6. Finish: Match window wall finish.

- G. Doors, Frames, and Hardware: Barrier-free entry doors meeting code requirements for providing access for people with physical disabilities; by entrance manufacturer.
 - 1. Type: Wide stile (nominal 5" side stiles and head rail) with 10" bottom rail unless otherwise indicated.
 - 1. Metal and Finish: Match window wall system.
 - 2. Hardware: Provide complete hardware system except as indicated; match window wall system finish unless otherwise directed by Architect. Coordinate with Section 08 71 00 – Door Hardware.
 - a. Hinges: Extra heavy-duty ball bearing full mortise (butt) hinges complying with requirements specified in Section 08 71 00.
 - b. Closers: Concealed adjustable type closer, maximum 5-pound operating pressure when installed in final application.
 - c. Push/Pulls: Types as indicated on Drawings; where not otherwise indicated manufacturer's standard types as selected by Architect; match finish of similar hardware as specified in Section 08 71 00.
 - d. Security Locks: Manufacturer's standard.
 - 1) Cylinders: Provided under Section 08 71 00.
 - e. Weather-Stripping, Sweep Strips: Manufacturer's recommended standard type, to suit application.
 - f. Thresholds: Maximum 1/2" height above adjacent surfaces, with maximum 1/4" vertical section and remainder maximum 1:2 slope.
- H. Glass: Provide minimum thicknesses specified, but no less than thicknesses required based on window size and configuration and anticipated wind loading.
 - 1. Manufacturers:
 - a. PPG Industries, Inc., Glass Group.
 - b. Oldcastle Glass.
 - c. Guardian Industries Corp.
 - d. Viracon.
 - e. Substitutions: Refer to Section 01 25 00.
 - 2. Insulated Glass: Preassembled units consisting of organically sealed panes of glass enclosing a hermetically sealed dehydrated air space with minus 20-degree F dew point.
 - a. Performance: Certified to ASTM E2190 by Insulating Glass Certification Council.
 - b. System: Manufacturer's standard dual seal system compatible with glazing system, and including spacers, desiccant, and standard corner construction.

- c. Glass:
 - 1) Float Glass (Typical): Select glazing quality, clear float glass, ASTM C1036; nominal thickness 1/4".
 - 2) Tempered Glass (Where Indicated and Where Safety Glazing is Required): Select glazing quality, clear float glass, fully tempered, ASTM C1048; nominal thickness 1/4"; safety glass.
 - 3) Low Emissivity Coating: Provide high performance Low E coating on Number 2 surface, comparable to PPG/SolarBan 67.
- d. Total Unit Thickness: 1".
- I. Glazing Materials: Of type recommended by system manufacturer to suit security locations and applications for glazing installation; designed to maintain glass in place and prevent movement.
 - 1. Setting Blocks: Neoprene or EPDM, 80-90 Shore A durometer hardness; 4" long by 3/8" thick by 1/4" high; ASTM C864.
 - 2. Spacer Shims: Neoprene or EPDM; 45-55 Shore A durometer hardness; 3" long by 3/32" thick by 1/4" high; ASTM C864.
 - 3. Edge Blocks: Neoprene or EPDM, 60-70 Shore A durometer hardness; 4" long with minimum two per jamb located at top and bottom edges of glass; ASTM C864.
 - 4. Glazing Gaskets: Exterior neoprene or EDPM; interior neoprene, EPDM or vinyl; miter corner joints at exterior applications; conform to ASTM C509 or C864.
 - 5. Glazing Sealants: ASTM C920, Type S, Grade NS, elastomeric one-component silicone glazing sealants as recommended by sealant manufacture for application involved.
- a. Manufacturers:
 - 1) Dow Corning Corp.
 - 2) General Electric Co.
 - 3) Pecora Corp.
 - 4) Tremco Inc.
 - 5) Substitutions: Refer to Section 01 25 00.
- b. Color: As indicated, as selected by Architect from manufacturer's full range of available colors where not otherwise indicated.
- J. Miscellaneous Materials:
 - 1. Fasteners: Aluminum or non-magnetic stainless steel of type which will not cause electrolytic action or corrosion.
 - a. Do not use exposed fasteners except where unavoidable for assembly or for application of hardware.

- b. Indicate exposed fasteners on shop drawings for specific approval; exposed fasteners shall be Phillips flat-head screws or Allen screws with finish matching item fastened.
 - c. Provide concealed fasteners for glazing stops.
- 2. Steel Reinforcement and Brackets: Manufacturer's standard with minimum 2 oz. hot-dip zinc coating, ASTM A123, applied after fabrication.
- 3. Bituminous Paint: Cold-applied mastic, SSPC Paint 12, compounded for 30 mil thickness per coat.
- 4. Flashing: Provide sub-sill flashing members for fixed exterior framing; minimum 22 gage sheet aluminum of sizes and shapes indicated and required to drain water to exterior.
 - a. Finish: Match adjacent aluminum primary members.
- 5. Anchoring Devices: Corrosion resistant type capable of supporting window wall system and superimposed design loads; design to allow adjustments of system prior to being permanently fastened in place.

2.3 FABRICATION

- A. Fabricate systems to allow for adequate clearances around perimeter and to enable proper installation; allow for thermal movement within window wall construction.
- B. Fabricate components allowing for accurate and rigid fit of joints and corners; match components carefully ensuring continuity of line and color, with joints and connections flush, hairline and weatherproof.
- C. Provide structural reinforcing within framing members where required to maintain rigidity and as required to accommodate design loads.
- D. Allow moisture entering joints and condensation occurring within framing members to drain to exterior.
 - 1. Design drainage system to hold maximum anticipated moisture for 100 year rain cycle without overflowing.
- E. Complete cutting, fitting, forming, drilling and grinding of metal work prior to cleaning, finishing, treatment, and application of coating.
- F. Finishing: After fabrication, prepare surfaces for finishing in accordance with recommendations of aluminum producer and finish manufacturer.
 - 1. Finish components to attain uniformity of color.
- G. Weld by methods recommended by metal manufacturer and AWS; grind exposed welds smooth and restore mechanical finish; remove arises from cut edges and corners to a radius of approximately 1/64".

- H. Fit and assemble work at shop to greatest extent possible; disassemble only as required for shipment and erection.
- I. Reinforce work as necessary for performance requirements and for support.
 - 1. Provide internal reinforcing for hardware.
- J. Separate dissimilar materials with bituminous paint or preformed separators which will prevent corrosion.
- K. Separate metal surfaces at moving joints with plastic inserts or other non-abrasive concealed inserts which permanently prevent "freeze-up" of joint.
- L. Fabricate doors and apply hardware in shop. Disassemble only as required for transportation and installation.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install glazed aluminum window wall assemblies in accordance with manufacturer's recommendations and installation instructions, and to meet design criteria and performance criteria indicated, for weather-tight installation.
 - 1. Separate aluminum and other corrodible metal surfaces from sources of corrosion or electrolytic action at points of contact with other materials.
- B. Ensure assembly is plumb, level and free of warp or twist; maintain dimensional tolerances and alignment with adjacent work.
- C. Tolerances: Accurately align and locate components to column lines and floor levels; adjust work to conform to following tolerances.
 - 1. Plumb: 1/8" in 10'-0"; 1/4" in 40'-0"; non-cumulative.
 - 2. Level: 1/8" in 20'-0"; 1/4" in 40'-0"; non-cumulative.
 - 3. Alignment: Limit offset to 1/16" where surfaces are flush or less than 1/2" out of flush and separated by less than 2" (by reveal or protruding work); otherwise limit offsets to 1/8".
 - 4. Location: 3/8" maximum deviation from measured theoretical location (any member, and location).
- D. Install sufficient anchorage devices to securely and rigidly fasten system to building.
- E. Provide anchors to be installed in other work, and setting details, in time for proper installation by trades concerned; verify correct placement.
- F. Set sill members and similar members in bed of compound, joint fillers or gaskets to provide weather-tight construction.

- G. Install hardware in accordance with manufacturer's recommendations, using proper templates.
 - 1. Install doors to operate freely and smoothly, with a maximum operating pressure of 5 pounds in accordance with California Building Code, Chapter 11B, Division III, Section 1133B2.5.
 - 2. Coordinate installation of cylinders with Section 08 71 00 - Hardware.
 - 3. Install sill members and thresholds in bed of compound, joint fillers or gaskets to provide weather-tight construction.
- H. Install glass in accordance with glass manufacturer's instructions and with GANA "Glazing Manual".
 - 1. Do not allow glass to touch metal surfaces.

3.2 CLEANING

- A. Clean aluminum surfaces promptly after installation of components, exercising care to avoid damage of finish.
- B. Remove excess sealant compounds, dirt and other foreign substances.
- C. Mark glass after installation by crossed streamers attached to framing and held away from glass; do not apply markers to surface of glass.
- D. Remove nonpermanent labels immediately after sealant cures; cure sealants for high early strength and durability.

3.3 PROTECTION

- A. Remove and replace glass which is broken, chipped, cracked, abraded or damaged during construction period, including natural causes, accidents and vandalism.

END OF SECTION