SECTION 084413

GLAZED ALUMINUM CURTAIN WALLS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes glazed aluminum curtain walls installed as stick assemblies.

1.2 PERFORMANCE REQUIREMENTS

A. General Performance: Comply with performance requirements specified, as determined by testing of manufacturer's standard glazed aluminum curtain walls representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.

1. Glazed aluminum curtain walls shall withstand movements of supporting structure including, but not limited to: twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.

2. Failure also includes the following:
   a. Thermal stresses transferring to building structure.
   b. Glass breakage.
   c. Noise or vibration created by wind and thermal and structural movements.
   d. Loosening or weakening of fasteners, attachments, and other components.
   e. Failure of operating units.

B. Delegated Design: Design glazed aluminum curtain walls, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

C. Structural Loads:

1. Wind Loads: 90 mph.
2. Importance Factor: 1.0.
3. Exposure Category: C.

D. Structural-Test Performance: Test according to ASTM E 330

1. Uniform Load Deflection Test
   a. No deflection of any unsupported span L of test unit (framing rails, muntins, etc.) in excess of L/175 at both a positive and negative load of 40 psf (design test pressure).
   b. Structural reinforcing that is not standard on units being furnished is not allowed.

2. Uniform Load Structural Test
   a. Unit to be tested at 1.5 x design test pressure (60 psf), both positive and negative, acting normal to plane of wall.
b. No glass breakage; permanent damage to fasteners, hardware parts, or anchors; damage to make windows inoperable; or permanent deformation of any main frame or ventilator member in excess of 0.2% of its clear span.

E. Deflection of Framing Members: At design wind pressure, as follows:

1. Deflection Normal to Wall Plane: Limited to 1/175 of clear span for spans up to 13 feet 6 inches and to 1/240 of clear span plus 1/4 inch for spans greater than 13 feet 6 inches. Insert deflection limit or an amount that restricts edge deflection of individual glazing lites to 3/4 inch, whichever is less.
2. Deflection Parallel to Glazing Plane: Limited to amount not exceeding that which reduces glazing bite to less than 75 percent of design dimension and that which reduces edge clearance between framing members and glazing or other fixed components to less than 1/8 inch.
3. Cantilever Deflection: Where framing members overhang an anchor point, limit deflection to two times the length of cantilevered member, divided by 175.

F. Water Penetration Under Static Pressure: No evidence of water penetration through fixed glazing and framing areas when tested according to ASTM E 331 at a minimum static-air-pressure differential at 15psf, with water application rate of 5 gallons/hr/sq. ft.

G. Energy Performance: Glazed aluminum curtain wall shall have certified and labeled energy performance ratings in accordance with NFRC.

1. Air Infiltration: Maximum air leakage through fixed glazing and framing areas of 0.06 cfm/sq. ft. of fixed wall area as determined according to ASTM E 283 at a minimum static-air-pressure differential of 6.24 lbf/sq. ft.

H. Condensation Resistance and Thermal Transmittance performance Requirements

1. Perform thermal tests in accordance with the configuration specified in NFRC 100, 200, and 500.
   a. Thermal Transmittance (“U” Factor) shall not exceed 0.46 BTU/hr/sf/deg F at 15 mph exterior wind.
   b. Condensation Resistance (CR) shall not exceed a 51.

2. Test Performance: Meeting criteria for passing based on building occupancy type when tested according to AAMA 501.4 at design displacement and 1.5 times the design displacement.

I. Thermal Movements: Allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures:

1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
2. Test Interior Ambient-Air Temperature: 75 deg F (24 deg C).
3. Test Performance: No buckling; stress on glass; sealant failure; excess stress on framing, anchors, and fasteners; or reduction of performance when tested according to AAMA 501.5.
1.3 ACTION SUBMITTALS

A. Product Data:

B. Shop Drawings: For glazed aluminum curtain walls. Include plans, elevations, sections, full-size details, and attachments to other work.

1. Include details of provisions for assembly expansion and contraction and for draining moisture occurring within the assembly to the exterior.
2. Include full-size isometric details of each vertical-to-horizontal intersection of glazed aluminum curtain walls, showing the following:
   a. Joinery, including concealed welds.
   b. Anchorage.
   c. Expansion provisions.
   d. Glazing.
   e. Flashing and drainage.

C. Delegated-Design Submittal: For glazed aluminum curtain walls indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer registered in the State of Oklahoma responsible for their preparation.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

B. Energy Performance Certificates: For glazed aluminum curtain walls, accessories, and components, from manufacturer.

1. Basis for Certification: NFRC-certified energy performance values for each glazed aluminum curtain wall.

C. Product test reports.

D. Field quality-control reports.

E. Maintenance data.

F. Warranties: Sample of special warranties.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.

B. Energy Performance Standards: Comply with NFRC for minimum standards of energy performance, materials, components, accessories, and fabrication. Comply with more stringent requirements if indicated.

1. Provide NFRC-certified glazed aluminum curtain walls with an attached label.
1.6 WARRANTY

A. Aluminum Curtain Wall Warranty.

1. Products: Submit a written warranty, executed by the window manufacturer, for a period of 2 years (10 years for insulated glass seal failure) from the date of manufacture, against defective materials or workmanship, including substantial non-compliance with applicable specification requirements and industry stands, which results in premature failure of the curtain walls, finish, glass, or parts, outside of normal wear.

   a. In the event that curtain walls or components are found defective, manufacturer will repair or provide replacements without charge at manufacturer’s option.

   b. Warranty for all components must be direct from the manufacturer (non-pass through) and non-prorated for the entire term. Warranty must be assignable to the non-residential owner, and transferable to subsequent owners through its length.

2. Installation: Submit a written warranty, executed by the window installer, for a period of 2 years from the date of substantial completion, against defective materials or workmanship, including substantial non-compliance with applicable specification requirements, which result in premature failure.

   a. In the event that installation of windows or components is found to be defective, installer will repair or provide replacements without charge at the installer’s option.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design:

   1. Manko Window Systems, Inc. 250 Series Curtain Wall.

B. Substitutions

   1. Other manufacturers’ products that meet or exceed specified design requirements may be considered. Submit the following information with request for substitutions at least ten (10) working days prior to bid date.

      a. Test reports specified in 1.02 SYSTEM PERFORMANCE REQUIREMENTS.

      b. Full proposal details and samples specified in 1.03 SUBMITTALS

      c. Copy of manufacturer’s warranty specified in 1.06 WARRANTY

      d. Other information as requested for evaluation.

2. Substitute products not pre-approved by the Architect via addenda will not be considered.

2.2 MATERIALS

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


   2. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
4. Structural Profiles: ASTM B 308/B 308M.
5. Welding Rods and Bare Electrodes: AWS A5.10/A5.10M.

2.3 FRAMING

A. Framing Members: Manufacturer's standard extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.

B. Manufactured Units
   1. Principal curtain wall frame members will be a minimum 0.094” in thickness at all structural areas, hardware mounting webs, and section flanges.
   2. Extruded or formed trim components will be a minimum 0.062” in thickness.

C. Fabrication
   1. Frame depth shall be 7-5/8”.
   2. Face depth 2-1/2”.
   3. Frame sections must be tubular.

D. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.

E. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.

F. Concealed Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials

G. Framing Sealants: Manufacturer's standard sealants.

2.4 GLAZING

A. Glazing: 1” Solarban-70 and #2 surface clear fully tempered glass. Sealed units shall meet ASTM E2190.

B. Glazing materials: Manufacturer's standard sealed-corner pressure-glazing system of black, resilient elastomeric glazing gaskets, setting blocks, and shims or spacers.
   2. Back-bedding tapes, expanded cellular glazing tapes, toe beads, heel beads and cap beads shall meet the requirements of applicable specifications cited in AAMA 800.
   3. Structural silicone sealant where used shall meet the requirements of ASTM C 1184.
   4. Spacer tape in continuous contact with structural silicone shall be tested for compatibility and approved by the sealant manufacturer for the intended application. Gaskets in continuous contact with structural silicone shall be extruded silicone or compatible material.
2.5 COMPONENTS

A. All steel components including attachment fasteners to be 300 series stainless steel except as noted.

B. Extruded aluminum components 6063-T5 or 6063-T6.

C. Glazing gaskets shall comply with ASTM C864 and be extruded of a silicone compatible EPDM rubber, or other suitable compound.

D. Sealants

   1. All sealants shall comply with applicable provisions of AAMA 800 and/or Federal Specifications FS-TT-001 and 002 Series.
   2. Frame joinery sealants shall be suitable for application specified and as tested and approved by window manufacturer.

E. Steel Components

   1. Provide steel reinforcements as necessary to meet the system performance requirements of 1.02.
   2. Concealed steel anchors and reinforcing shall be factory painted after fabrication with rust-inhibitive primer complying with Federal Specification TT-P-645.

2.6 FABRICATION

A. General:

   1. Finish, fabricate and shop assemble frame and sash members into complete windows under the responsibility of one manufacturer.
   2. No bolts, screws or fastenings to bridge thermal barrier or impair independent frame movement.
   3. Fabricate to allow for thermal movement of materials when subjected to a temperature differential form -30 degrees F to +180 degrees F.

B. Frames:

   1. Mechanically fasten each horizontal over a solid extruded aluminum shear block leaving only hairline joinery, then seal weather tight.

C. Glass Drainage:

   1. Provision shall be made to insure that water will not accumulate and remain in contact with the perimeter area of sealed insulated glass.

2.7 ACCESSORY MATERIALS

A. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos, formulated for 30-mil thickness per coat.
2.8 ALUMINUM FINISHES


PART 3 - EXECUTION

3.1 INSTALLATION

A. General:
   1. Install windows in accordance with AAMA 101/I.S.2.
   2. Comply with manufacturer's written instructions. Do not install damaged components.
   3. Fit joints to produce hairline joints free of burrs and distortion.
   4. Rigidly secure nonmovement joints.
   5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
   6. 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 will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape or installing nonconductive spacers as recommended by manufacturer for this purpose.
   2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

C. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within glazed aluminum curtain wall to exterior.

D. Install components plumb and true in alignment with established lines and grades.

3.2 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.