SECTION 08 44 13 - GLAZED ALUMINUM CURTAIN WALLS

1.1 CONTROLLED SECTION

A. This specification is controlled by Division 08 Section 08 40 00 “Exterior Enclosure System Requirements”. In addition to the requirements of this document, all requirements of Controlling Documents must also be met. The more onerous conditions of this document or the Controlling Document must be met.

1.2 SUMMARY

A. Provide the work of this Section in accordance with requirements of the Contract documents

B. This Section Includes, but is not limited to:

1. Glazed aluminum curtain wall systems EWS-01A, EWS-01B, EWS-01C, EWS-01D, EWS-02A, EWS-02B:

    a. Conventionally glazed.
    b. Two-sided, structural-sealant-glazed.
    c. Aluminum bent plate spandrel **MTP-05** and **MTP-06** at new curtain wall**.**
    d. Aluminum bent plate spandrel **MTP-08** at existing curtain wall
    e. Related trim such as sill extenders, interior and exterior mullion covers.
    f. Shop applied coating finishes on curtain wall.
    g. Integration of adjacent enclosure materials and components to create an air and watertight exterior enclosure system.
    h. Fire safing insulation, including supporting clips, between curtain wall and edges of floor slab construction to maintain and continue the fire resistance rating of floor slabs.
    i. Vents and weeps, weep tubes, bellows, closures, gutters, end dams, flashings, trim and cutouts as shown or as may be required in conjunction with the system or to join the system to adjacent construction.
    j. Fasteners, anchors, shims, fasteners, inserts, expansion devices, accessories, support brackets, support struts and attachments
    k. Construction of performance mock-up(s) of size as may be approved by the Architect, including all coordination of chamber construction.
    l. Construction of Visual Mockups
    m. Coordination of testing of mockup(s) with independent testing agency engaged by the Owner, including all coordination of testing and testing procedures.
    n. On-site testing for water leakage.
    o. Glazing is physically and thermally isolated from framing members.

C. Related Work:

1. Division 07, Section 07 21 00 “Thermal Insulation”.
2. Division 07, Section 07 27 26 “Fluid-Applied Air and Water Barriers”.
3. Division 07, Section 07 42 16 “Metal Plate Wall Panels”.
4. Division 07, Section 07 62 00 “Sheet Metal Flashing and Trim”.
5. Division 07, Section 07 92 00 “Joint Sealants” for installation of joint sealants installed with glazed aluminum curtain walls and for sealants to the extent not specified in this Section.
6. Division 08, Section 08 40 00 “Exterior Enclosure System Requirements”.

7. Division 08, Section 08 88 36.16 “Electronically Controlled Switchable Glass” for curtain wall glazing.
8. Division 08 Section 08 41 13 “Aluminum-Framed Entrances and Storefronts”.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site. Review methods and procedures related to structural sealant glazed curtain wall systems including but not limited to the following:

1. Inspect and discuss condition of substrate, and other preparatory work performed by other trades.
2. Review structural loading limitations.
3. Review and finalize construction schedule and verify availability of materials, Installer’s personnel, equipment, and facilities needed to make progress and avoid delays.
4. Review required inspecting, testing, and certifying procedures.
5. Review weather and forecasted weather conditions and procedures for coping with unfavorable conditions.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Sustainable Design Submittals:

1. Building Product Disclosure and Optimization - Sourcing of Raw Materials:
    a. Leadership Extraction Practices
        1) Extended Producer Responsibility (EPR): Submit documentation indicating that manufacturers have a take back or recycling program for the product purchased.
        2) Recycled Content: For products having recycled content, indicate percentages by weight of post-consumer and pre-consumer recycled content.
            a) Include statement indicating costs for each product having recycled content.
    b. Sourcing of Raw Materials: For products that are required to comply with requirements for regional materials, indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material.
        1) Include statement indicating distance to Project, cost for each regional material and the fraction by weight that is considered regional.
2. Indoor Environmental Quality, Low Emitting Materials: Building Products must be tested and compliant with the California Department of Public-Health (CDPH) Standard Method v1.2-2017, using the applicable exposure scenario.
    a. For paints, and coatings, wet applied, include printed statement of VOC content, showing compliance with the applicable VOC limits of the California Air Resources Board (CARB) 2007, Suggested Control Measure for Architectural Coatings or the South Coast Air Quality Management District (SCAQMD) Rule 113-2011.

b. Adhesives and Sealants wet applied on site: Submit printed statement of showing compliance with the applicable chemical content requirements of SCAQMD Rule 1168-2005.
c. Alternative tests for VOC include ASTM D2369-10, ISO 11890, ASTM D6886-03; or ISO 11890-2.
d. Methylene Chloride and perchloroethylene may not be added to paints, coating, adhesive or sealants

3. Product Data: For sealants, indicating VOC content.

4. Laboratory Test Reports: For sealants, indicating compliance with requirements for low-emitting materials.

C. Shop Drawings: For glazed aluminum curtain walls, stamped by a professional engineer licensed to practice in the State of Texas who is responsible for their preparation and who has performed the structural analysis to show compliance with performance requirements. 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 type of 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.

3. Distinguish among factory-, shop-, and field-assembled work

4. Show connection to and continuity with adjacent thermal, weather, air, and vapor barriers.

D. Samples for Initial Selection: For units with factory-applied color finishes.

E. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes except as otherwise specified. Where finishes involve normal color and texture variations, include sample sets showing full range of variations expected.

1. Aluminum Extrusions: Minimum 4 feet length.

2. Aluminum Sheet: Minimum 5 feet length x 1 feet wide.

3. Submit metal finish samples as the same time as metal finish samples submitted for Sections:

a. 07 42 16 Metal Plate Wall Panels
b. 08 41 13 Aluminum-Framed Entrances and Storefronts.

4. Coil and extrusion material finished by different manufacturers shall match curtain wall framing color and gloss to the satisfaction of the Architect.

F. Fabrication Sample: Of each vertical-to-horizontal intersection of assemblies, made from 12-inch lengths of full-size components and showing details of the following:

1. Joining of metal panel and curtain wall.

2. Joinery, including concealed welds.

3. Anchorage.

4. Expansion provisions.

5. Glazing.

6. Flashing and drainage.

G. Fabrication Engineering and Design Submittal: For glazed aluminum curtain walls and metal panel system submit comprehensive engineering analysis signed and sealed by the qualified professional engineer responsible for their preparation, indicating compliance with performance requirements specified. Submission shall include:

1. Analysis for applicable loads on framing members

2. Analysis for applicable loads on anchors and support system for the project.

3. Structural calculations and details of anchoring system, including type, size, and spacing of fasteners.

1.5 INFORMATIONAL SUBMITTALS

A. Preconstruction Mockup Testing Submittals:

1. Testing Program: Developed specifically for Project.

2. Test Reports: Prepared by a qualified preconstruction testing agency for each mockup test.

3. Record Drawings: As-built drawings of preconstruction mockups showing changes made during preconstruction mockup testing.

B. Qualification Data:

1. For Installer and mockup testing agency and field-testing agency.

2. For professional engineer's experience with providing fabrication engineering and design services of the kind indicated, including documentation that engineer is licensed in the state of Texas.

C. Sustainable Design Submittals:

1. Building Product Disclosure and Optimization - Environmental Product Declarations

a. Submit product specific type III EPDs or Industry wide (generic) EPDs, USGBC approved program declaration or products with a publicly available, critically reviewed life-cycle assessment conforming to ISO 14044 that have at least a cradle to gate scope.

2. Building Product Disclosure and Optimization - Material Ingredients

a. Material Ingredient Reporting: Submit documentation confirming chemical inventory of products to at least 0.1 % (1000pm) with at least one of the following:

1) Submit published manufacturer inventory of ingredients identified by name and Chemical Abstract Service Registration Number (CASRN)
2) Submit documentation that product has been certified as Cradle-to-Cradle v3 at the Bronze Level or better
3) Submit Declare product label indicating that all ingredients have been disclosed down to 1000 ppm or designated as Red List Free or Declared
4) Living Product Challenge
5) Product Lens Certification
6) USGBC approved program.

b. Material Ingredient Optimization: Submit documentation confirming chemical inventory of products to at least 0.01 % (100pm) and/or that has a compliant material ingredient optimization report with at least one of the following:

1) Submit GreenScreen V1.2 Benchmark: Third party report prepared by a licensed GreenScreen List Translator, or a full GreenScreen Assessment.
2) Submit third-party verified documentation that product has been certified as Cradle-to-Cradle v3 at the Bronze Level or better
3) Submit third-party verified Cradle to Cradle v3 Material Health certificate at the Bronze Level or better
4) Submit third-party verified Declare product label indicating that all ingredients have been disclosed down to 100 ppm
5) Submit third-party verified documentation that product is Living Product Challenge certified with a Red List Free or LBC Red List Free Declare label.
6) Submit documentation that product has a manufacturer prepared action plan with material inventory to at least 1000 ppm.

D. Seismic Qualification Certificates: For structural sealant glazed curtain walls, accessories, and components, from manufacturer.

1) Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.

E. Welding certificates.

F. 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.

G. Compatibility and Adhesion Test Reports: From sealant manufacturer, indicating the following:

1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.

2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.

H. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified preconstruction testing agency, for glazed aluminum curtain walls, for tests performed by a qualified testing agency, indicting compliance with performance requirements.

1. Provide lab testing data results (performed within 4 years prior to the date of submission) providing structural, air, and water penetrating testing data for each wall system specified.

I. Quality-Control Program: Developed specifically for Project, including fabrication and installation, in accordance with recommendations in ASTM C1401. Include periodic quality-control reports.

J. Source quality-control reports.

K. Field quality-control reports.

L. Sample Warranties: For special warranties.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For glazed aluminum curtain walls to include in maintenance manuals.

B. Maintenance Data for Structural Sealant: For structural-sealant-glazed curtain walls to include materials, equipment, procedures for cleaning and maintaining the work of this Section in maintenance manuals. Include ASTM C1401 recommendations for post-installation-phase quality-control program.

C. Warranties: Sample of special warranties.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer with 10 years successful experience on projects of comparable size and scope, with in house engineering capability to design, engineer, and fabricate curtain wall systems specified for this project to meet or exceed energy performance requirements specified, and of documenting this performance by certification, labeling, and inclusion in lists, who has the in hours capability to produce the necessary shop drawings, conduct thermal and energy modeling and provide a comprehensive engineering analysis.

B. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project. . Installers and supervisors shall be trained by the manufacturer.

C. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in the State of Texas and who is experienced in providing comprehensive engineering services to show that structural sealant glazed curtain walls designed for the project comply with performance requirements.

D. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, or in-service performance.

1. Do not change intended aesthetic effects, as judged solely by Architect, except with Architect's approval, and only to the extent needed to comply with performance requirements. If changes are proposed, submit comprehensive explanatory data to Architect for review.

E. Structural-Sealant Glazing: Comply with ASTM C1401 for design and installation of structural-sealant-glazed curtain wall assemblies.

F. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."

2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."

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

H. Provide NFRC-certified structural sealant glazed curtain walls with an attached label.

I. Mockups: Prior to installing exterior wall systems, construct structural sealant glazed curtain walls as part of composite testing mockup indicated on Mockup Elevation Sheets and specified in Division 08, Section 08 40 00 "Exterior Enclosure System Requirements".

1. Incorporate each type of exterior wall construction and finish to verify selections made under sample submittals and to demonstrate aesthetic effects as well as qualities of materials and execution. Coordinate with Exterior Wall Contractor and each of the contractors listed in Summary Paragraph of "Exterior Enclosure System Requirements". Provide materials in this section to create the composite mockup indicated
2. Provide materials in this section to create the composite mockup indicated
3. Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
4. Build mockup of typical wall area as shown on Drawings by full thickness, including supports, attachments, and accessories.
    a. Include four-way joint.
        1) Notify Architect 7 days in advance of the dates and times when mockups will be constructed.
        2) Demonstrate the proposed range of aesthetic effects and workmanship
        3) Obtain Architect's approval of mockups before start of Work
5. Testing shall be performed on mockups in accordance with requirements in "Field Quality Control" Article.
6. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
7. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

J. Comply with mockup requirements specified in Division 08, Section 08 40 00 "Exterior Enclosure System Requirements".

K. Preconstruction Adhesion and Compatibility Testing: Submit to structural glazing sealant manufacturer, for testing indicated below, samples of each glazing material type, tape sealant, gasket, glazing accessory, and glass-framing member that is near or is touching the structural or nonstructural sealants of a structural glazed system.

1. Compatibility: Test materials or components using ASTM C1087.
2. Adhesion: Test for adhesion or lack of adhesion of a structural sealant to the surface of another material or component using ASTM C1135.
3. Submit no fewer than eight pieces of each type of material, including joint substrates, shims, joint-sealant backings, secondary seals, and miscellaneous materials.
4. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
5. For materials failing tests, obtain sealant manufacturer's written instructions for corrective measures, including the use of specially formulated primers.
6. Testing will not be required if data based on previous testing of current sealant products match those submitted.

1.8 PROJECT CONDITIONS

A. Field Measurements: Verify dimensions by field measurements before fabrication and show recorded measurements on Shop Drawings. Provide actual locations of structural supports for structural sealant glazed curtain walls. Coordinate fabrication schedule with construction progress to avoid delaying the work.

1.9 DELIVERY, STORAGE AND HANDLING

A. Deliver curtain wall components, and other manufactured items so as not to be damaged or deformed. Package wall panels for protection during transportation and handling.

B. Unload, store, and erect curtain wall and metal panel system in a manner to prevent bending, warping, twisting, and surface damage.

C. Store wall panels vertically, covered with suitable weathertight and ventilated covering. Store wall panels to ensure dryness, with positive slope for drainage of water. Do not store wall panels in contact with other materials that might cause staining, denting, or other surface damage. Do not allow storage space to exceed 120 deg F.

D. Retain strippable protective covering for period of construction until final acceptance.

1.10 WARRANTY

A. Special Assembly Warranty Installer agrees to repair or replace components of glazed aluminum curtain wall that do not comply with requirements or that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

   a. Structural failures including, but not limited to, excessive deflection.
   b. Noise or vibration created by wind and thermal and structural movements.

      1) Thermal stresses transferred to building structure
      2) Framing members transferring stresses, including those caused by thermal and structural movements to glazing.
      3) Failure of system to meet performance requirements.

   c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
   d. Water penetration through fixed glazing and framing areas.
   e. Failure of operating components.

      1) Loosening or weakening of fasteners, attachments, and other components
      2) Glazing Breakage.
      3) Sealant failure

2. Warranty Period: Twenty (20) years from date of Substantial Completion.

B. Special Finish Warranty, Factory-Applied Painted Finishes: Manufacturer's standard form in which manufacturer agrees to repair finishes or replace metal that shows evidence of deterioration of factory-applied finishes within specified warranty period.

1. Deterioration includes, but is not limited to, the following:

   a. Color fading more than 5 Delta E units when tested in accordance with ASTM D2244.
   b. Chalking in excess of a No. 8 rating when tested in accordance with ASTM D4214.
   c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Warranty Period: Minimum 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fabrication Engineering and Design: Engage a qualified professional engineer to provide fabrication engineering and design of glazed aluminum curtain walls, including metal panels, supports, air/water barrier, insulation to comply with performance requirements specified. Provide a comprehensive engineering analysis by a qualified professional engineer licensed to practice in the State of Texas and responsible for preparation of fabrication engineering, using performance requirements and criteria specified in Division 08, Section 08 40 00 "Exterior Enclosure System Requirements".

B. General Performance: Comply with performance requirements specified, as determined by testing of glazed aluminum curtain walls, metal panels 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, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.

2. Failure also includes the following:

a. Deflection exceeding specified limits.
b. Framing members transferring stresses, including those caused by thermal and structural movements to glazing and/or metal panels.
c. Thermal stresses transferring to building structure.
d. Glass breakage.
e. Glazing-to-glazing contact.
f. Noise or vibration created by wind and thermal and structural movements.
g. Loosening or weakening of fasteners, attachments, and other components.
h. Failure of operating units.

C. Structural Loads Air and Water Performance, Interstory Drift, Energy Performance Noise Reduction, Thermal Movements: specified in Division 08, Section 08 40 00 "Exterior Enclosure System Requirements".

1. Wind Load Criteria:

a. Basic Wind Speed (ASCE 7-10_: 150 mph (3 second gust).
b. Wind Exposure Category: C
c. Internal Pressure Coefficient: +0.18/-0.18
d. Wind Load Rating: Working level wind pressures as shown on the Drawings. Use minimum safety factor of 2,0 for design.
e. Jet Blast Pressure: 50 psf over area of 15 square feet
f. Hail Resistance Rating: Severe Hail
g. FM Global Wind Zone: Zone HM

2. Other Design Loads: As indicated on Drawings

D. 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 of up to 13 feet 6 inches and to 1/240 of clear span plus 1/4 inch for spans of greater than 13 feet 6 inches 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.

a. Operable Units: Provide a minimum 1/16-inch clearance between framing members and operable units.

3. Cantilever Deflection: Where framing members overhang an anchor point, as follows:

   a. Perpendicular to Plane of Wall: No greater than 1/240 of clear span plus 1/4-inch for spans of greater than 11 feet 8-1/4 inches or 1/175 times span, for spans of less than 11 feet 8-1/4 inches.

E. Structural: Test per Section 08 40 00 “Exterior Enclosure Systems Requirements”.

F. Water Penetration under Static Pressure: Test per Section 08 40 00 “Exterior Enclosure Systems Requirements”.

G. Interstory Drift: Test per Section 08 40 00 “Exterior Enclosure Systems Requirements”.

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

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 0.25 as determined according to NFRC 200.

3. 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. (300 Pa).

4. Condensation Resistance: Fixed glazing and framing areas shall have an NFRC- certified condensation resistance rating of no less than 45 as determined according to NFRC 500.

I. Sound Transmission: Provide glazed aluminum curtain walls with fixed glazing and framing areas complying with Section 08 40 00 “Exterior Enclosure System Requirements”.

J. Structural-Sealant Joints:

1. Designed to carry gravity loads of glazing.

2. Designed to produce tensile or shear stress of less than 20 psi.

K. Structural Sealant: ASTM C1184. Capable of withstanding tensile and shear stresses imposed by structural-sealant-glazed curtain walls without failing adhesively or cohesively. When tested for preconstruction adhesion and compatibility, cohesive failure of sealant shall occur before adhesive failure.

1. Adhesive failure occurs when sealant pulls away from substrate cleanly, leaving no sealant material behind.

2. Cohesive failure occurs when sealant breaks or tears within itself but does not separate from each substrate, because sealant-to-substrate bond strength exceeds sealant's internal strength.

L. Fire, Smoke and Draft Barrier: Provide a continuous fire/smoke/draft barrier as an integral component of the exterior wall systems to prevent the passage of air, flame and smoke from one floor to another, within the exterior wall work. Comply with the requirements of the local authorities having jurisdiction, including testing and certification requirements indicating compliance with requirements when tested in accordance with ASTM E2307

1. Design the barrier system to accept floor fire safing as an integral part of the system.

2. Design the barrier to sustain the impact from a fire hose stream in accordance with the requirements of the local authorities having jurisdiction.

M. Unacceptable Conditions: Vibration harmonics, wind whistles, noise or vibration created by thermal movement, structural movement, or wind; thermal movement transferred to building structure; loosening, weakening or failure of fasteners, attachments, or other components.

N. Low-Emitting Materials:

1. Architectural paints and coatings wet-applied inside the weather-proofing system must meet the VOC general emissions testing criteria of CDPH Standard Method v1.2.
2. All paints and coatings wet-applied inside the weather-proofing system must have VOC content in compliance with the applicable VOC limits (g/L) found in tables in Division 01 Section 01 81 13 "Sustainable Design Requirements - LEED v4 BD+C."
3. Adhesives and Sealants wet-applied inside the weather-proofing system must meet the VOC general emissions testing criteria of CDPH Standard Method v1.2.
4. All adhesives and sealants wet-applied inside the weather-proofing system must have VOC content in compliance with the applicable VOC limits (g/L) found in tables in Division 01 Section 01 81 13.14 "Sustainable Design Requirements - LEED v4 BD+C."

2.2 GLAZED ALUMINUM CURTAIN WALL SYSTEMS

A. Basis-of-Design Product: Subject to compliance with requirements, provide Kawneer Company, Inc. 1600 SS (for **EWS-01**) and Clearwall (for **EWS-02**) or a comparable product by one of the following:

1. Bruce Wall Systems
2. EFCO Corporation.
3. Oldcastle Building Envelope.
4. United Architectural Metals
5. Wausau Window and Wall Systems; Apogee Wausau Group, Inc.
6. YKK AP
7. Kawneer

B. Source Limitations: Obtain all components of curtain-wall system and storefront system, including framing spandrel panels, entrances, and accessories, from single manufacturer.

C. Curtain Wall and Spandrel Panel Wall System Types: Refer to Division 08, Section 08 40 00 "Exterior Enclosure System Requirements" for further details.

D. Glazed Aluminum Curtain Wall **EWS-01A / EWS-01B / EWS-01C / EWS-01D**:

1. Glazing Component: Provide (**GL-02**) per Section 088836.16 “Electronically Controlled Switchable Glass.”
2. Framing Members: Manufacturer's extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.
    a. Construction: Thermally broken.
    b. Glazing System: Retained mechanically with gaskets on horizontal sides and SSG vertical joints.
    c. Glazing Plane: Front.
    d. Finish: Fluoropolymer finish.
    e. Fabrication Method: Factory-fabricated unitized system.
    f. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.

g. Steel Reinforcement: As required by manufacturer.

3. Pressure Caps: Manufacturer's standard aluminum components that mechanically retain glazing.

   a. Include snap-on aluminum trim that conceals fasteners.

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

5. Aluminum Bent Plate Spandrel Panel Detail Components **MTP-05**:

   a. Aluminum plate panels with no deviations in plane exceeding 0.8 percent of panel dimension in width or length.

      1) Overall Spandrel Detail Thickness: Refer to Drawings.
      2) Exterior Skin: Aluminum with PVC block perimeter.
         a) Thickness: Minimum 1/8 inch.
         b) Finish: Match framing system. No Exposed fasteners permitted.
         c) Texture: Smooth.
      3) Interior Skin: Galvanized steel sheet, minimum gauge to meet perimeter firesafing design requirement for back pan, but not less than 20 gauge and with reinforcement stiffeners to maintain flat surface.
         a) Thickness: Manufacturer’s standard for finish and texture indicated.
         b) Finish: Matching framing system. No Exposed fasteners permitted.
         c) Texture: Smooth.
      4) Thermal Insulation Core: Manufacturer’s standard rock mineral insulation board. Refer to Drawings for thickness. Complying with ASTM C162 Type III or Type IVB, nominal density of 5.93 lb/ft^3.
      5) Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
         a) Flame-Spread Index: 25 or less.
         b) Smoke-Developed Index: 50 or less.

6. Glass Spandrel Detail Components**:**

   a. Aluminum plate panels with no deviation in plane exceeding 0.8 percent of panel dimension in width or length.

      1) Spandrel Detail Thickness: Refer to Drawings.
      2) External Skin: Glass **GL-03** in accordance with Section 08 80 00 “Glazing”.
      3) Interior Skin: Foil facing taped to back of curtain wall framing.
      4) Thermal Insulation Core: Manufacturer’s standard rock mineral insulation board. Refer to Drawings for thickness. Complying with ASTM C162 Type III or Type IVB, nominal density of 5.93 lb/ft^3.
      5) Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate marking of applicable testing agency.
         a) Flame Spread Index: 25 or less.
         b) Smoke-Developed Index: 50 or less.

E. Glazed Aluminum Curtain Wall **EWS-02A / EWS-02B**:

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

   a. Construction: High thermal performance.
   b. Glazing System: Retained with 4-sided toggle glazed system
   c. Glazing Plane: Front.
   d. Finish: Fluoropolymer finish.

e. Fabrication Method: Factory-fabricated ladder sections, field glazed system.
f. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
g. Steel Reinforcement: As required by manufacturer.

2. Pressure Caps: Manufacturer's standard aluminum components that mechanically retain glazing.

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

4. Aluminum Bent Plate Panel Detail Components **MTP-06**:

a. Aluminum plate panels with no deviations in plane exceeding 0.8 percent of panel dimension in width or length.

1) Overall Panel Thickness: Refer to Drawings.
2) Exterior Skin: Aluminum with PVC block perimeter.
a) Thickness: Minimum 1/8 inch.
b) Finish: Match framing system. No Exposed fasteners permitted.
c) Texture: Smooth.
3) Interior Skin: Galvanized steel sheet, minimum gauge to meet perimeter firesafing design requirement for back pan, but not less than 20 gauge and with reinforcement stiffeners to maintain flat surface.
a) Thickness: Manufacturer's standard for finish and texture indicated.
b) Finish: Matching framing system. No Exposed fasteners permitted.
c) Texture: Smooth.
4) Thermal Insulation Core: Manufacturer's standard rock mineral insulation board. Refer to Drawings for thickness. Complying with ASTM C162 Type III or Type IVB, nominal density of 5.93 lb/ft^3.
5) Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
a) Flame-Spread Index: 25 or less.
b) Smoke-Developed Index: 50 or less.

F. Existing Glazed Aluminum Curtain Wall **at "SKYLINK":**

1. Insulated Metal Spandrel Panels **MTP-08**:

a. Laminated, metal-faced flat panels with no deviations in plane exceeding 0.8 percent of panel dimension in width or length.

1) Overall Panel Thickness: Refer to Drawings.
2) Exterior Skin: Aluminum.
a) Thickness: Minimum 1/8 inch.
b) Finish: Match framing system. No Exposed fasteners permitted.
c) Texture: Smooth.
3) Interior Skin: Aluminum, minimum 20 gauge with reinforcement to maintain flat surface.
a) Thickness: Manufacturer's standard for finish and texture indicated.
b) Finish: Matching framing system. No Exposed fasteners permitted.
c) Texture: Smooth.
4) Thermal Insulation Core: Manufacturer's standard rock mineral insulation board, 3 inches thick.
5) Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

a) Flame-Spread Index: 25 or less.
b) Smoke-Developed Index: 50 or less.

2.3 MATERIALS, GENERAL

A. Recycled Content of Products:

1. Provide products with an average recycled content of aluminum products so postconsumer recycled content plus one-half of pre-consumer recycled content is not less than 12.5 percent.

2. Provide products with an average recycled content of steel products so postconsumer recycled content plus one-half of pre-consumer recycled content is not less than 25 percent.

B. Regional Materials: Provide a minimum of 20 percent of building materials (by cost) that are regionally extracted, processed and manufactured materials within a radius of 100 miles.

2.4 MATERIALS

A. Aluminum: Minimum aluminum yield strength shall be as required to comply with performance requirements, but not less than 25,000 psi. Snap on elements or other aluminum extrusions that are not structurally connected to act as a single composite member shall not be considered in determining the structural capacity of the mullion.

B. Aluminum Alloy and temper recommended by manufacturer for type of use and finish indicated, complying with the requirements of standards indicated below.

1. Sheet and Plate: ASTM B209.

2. Extruded Bars, Rods, Profiles, and Tubes: ASTM B221.

3. Extruded Structural Pipe and Tubes: ASTM B429/B429M.

4. Structural Profiles: ASTM B308/B308M.

C. Steel Reinforcement: Minimum steel yield strength shall be 36,000 psi for steel bars used to reinforce vertical mullions of the curtain walls, if determined necessary by calculation. A dynamic enhancement factor of 1.2 may be applied to the yield stress for steel members, to account for strain rate effects.

1. Qualities:

a. Structural Shapes, Plates, and Bars: ASTM A36/A36M.
b. Cold-Rolled Sheet and Strip: ASTM A1008/A1008M.
c. Hot-Rolled Sheet and Strip: ASTM A1011/A1011M.

2. The reinforcing steel bars and the aluminum mullions shall be structurally connected to sufficiently transfer the applied loads across the interface between the members.

3. Composite section properties of mullion components may only be used if calculations demonstrate strain compatibility across the interface.

4. Combined section properties of mullion components may be used if calculations demonstrate deformation compatibility between the aluminum and steel components

D. Steel Reinforcement Primer: Manufacturer's standard zinc-rich, corrosion-resistant primer complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods in accordance with recommendations in SSPC-SP COM and prepare surfaces in accordance with applicable SSPC standard.

2.5 GLAZING

A. Glazing: Comply with Division 08, Section 08 80 00 "Glazing."

B. Glazing Gaskets: ASTM C509 or ASTM C864. Manufacturer's standard.

1. Color: Black.

C. Glazing Sealants: Comply with Division 08, Section 08 80 00 "Glazing."

1. Sealant shall have a VOC content of 250 g/L or less.

2. Sealant shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

D. Structural Glazing Sealants: ASTM C1184, chemically curing silicone formulation that is compatible with system components with which it comes into contact, specifically formulated and tested for use as structural sealant and approved by structural-sealant manufacturer for use in curtain-wall assembly indicated.

1. Color: Black.

E. Weather seal Sealants: ASTM C920 for Type S; Grade NS; Class 25; Uses NT, G, A, and O; chemically curing silicone formulation that is compatible with structural sealant and other system components with which it comes into contact; recommended by structural-sealant, weather seal-sealant, and structural-sealant-glazed curtain-wall manufacturers for this use.

1. Color: Match structural sealant.

2.6 ACCESSORIES

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

1. Use self-locking devices where fasteners including their accessory items (washers, nuts, etc.), are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration. Tighten torques as required to achieve maximum torque tension relationship required by fasteners

2. Reinforce the interior surface with aluminum or non-magnetic stainless steel as required to receive fastener threads or provide manufacturer's standard non-corrosive pressed-in splined grommet nuts to receive fastener threads. Drill screwed connections.

3. Use exposed fasteners with countersunk Phillips screw heads**,** finished to match framing system, fabricated from 300 series stainless steel.

B. Anchors: Three-way stainless steel adjustable anchors with minimum adjustment of 2inch that accommodate fabrication and installation tolerances in material and finish compatible with adjoining materials and recommended by manufacturer.

1. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A123/A123M or ASTM A153/A153M requirements.

2. Where anchors penetrate the air barrier, provide only stainless-steel inserts.

C. Anchors, Clips, and Accessories for Terrace Doors: Provide anchors, clips, and accessories of aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron complying with ASTM B456

or ASTM B633 for SC 3 severe service conditions; provide sufficient strength to withstand design pressure indicated

D. Concealed Flashing: Dead-soft, 0.018-inch- (0.457-mm-) thick stainless steel, ASTM A240/A240M of type recommended by manufacturer.

E. Bituminous Paint: Cold-applied asphalt-mastic paint containing no asbestos, formulated for 30-mil thickness per coat.

2.7 FABRICATION

A. General: Fabricate glazed aluminum curtain wall system according to final Shop Drawings and Mockup Testing recommendations. Fabricate and finish glazed aluminum curtain walls, metal panel systems and accessories at the factory to the greatest extent possible, my manufacturer's procedures and processes necessary to fulfill indicated performance requirements, and such that components that, when assembled, will have accurately fitted joints with ends coped or mitered to produce hairline joints free of burrs and distortion. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

B. Forming: Form or extrude aluminum shapes before finishing.

C. Welding: Weld components to comply with referenced standards and shop drawings unless otherwise indicated. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

D. Fabricate components that, when assembled, have the following characteristics:

1. Profiles that are sharp, straight, and free of defects or deformations.
2. Accurately fitted joints with ends coped or mitered.
3. Physical and thermal isolation of glazing from framing members.
4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
5. Provisions for field replacement of glazing from exterior. Include accommodations for using temporary support device (Dutchman) to retain glazing in place while sealant cures.
6. Provisions for safety railings mounted between mullions at interior.
7. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
8. Components curved to indicated radii.

E. Fabricate components to resist water penetration as follows:

1. Internal guttering system or other means to drain water passing joints, condensation occurring within framing members, and moisture migrating within glazed aluminum curtain wall to exterior.
2. Pressure-equalized system or double barrier design with primary air and vapor barrier at interior side of glazed aluminum curtain wall and secondary seal weeped and vented to exterior.

F. Curtain-Wall Framing: Fabricate components for assembly using manufacturer's standard assembly method.

G. Factory-Assembled Frame Units:

1. Rigidly secure nonmovement joints.
2. Prepare surfaces that are in contact with structural sealant in accordance with sealant manufacturer's written instructions, to ensure compatibility and adhesion. Preparation includes, but is not limited to, cleaning and priming surfaces.
3. Seal joints watertight unless otherwise indicated.
4. Install glazing to comply with requirements in Division 08, Section 08 80 00 "Glazing."
5. Install structural glazing.
    a. Set glazing into framing in accordance with sealant manufacturer and framing manufacturer's written instructions and standard practice. Use a spacer or backer as recommended by manufacturer.
    b. Set glazing with proper orientation so that coatings face exterior or interior as specified.
    c. Apply structural silicone sealant to completely fill cavity, in accordance with sealant manufacturers written instructions with the framing and glazing in a fully supported position.
    d. Brace or stiffen framing and glazing in such a manner to prevent undue stresses on the glass edge seal and structural joints or movement of the glazing, until sealant is fully cured in accordance with manufacturer's recommendations.
    e. After structural sealant has completely cured, insert backer rod between lites of glass as recommended by sealant manufacturer.
    f. Install weather seal sealant to completely fill cavity, in accordance with sealant manufacturer's written instructions, to produce weatherproof joints.
    g. Clean and protect glass as indicated in Division 08, Section 08 80 00 "Glazing."
    h. Retain bracing or stiffening until erected to prevent racking of units during transportation and erection.

H. After fabrication, clearly mark components to identify their locations in Project in accordance with Shop Drawings.

2.8 FABRICATION, SPECIFIC

A. Metal Panels: Provide where shown, exposed aluminum panels fabricated and coordinated to install within the exterior wall construction in profiles, face dimensions and patterns as shown complete with matching reveals.

1. Fabricate panels of minimum 3/16 in. thick aluminum plate rigidized with welded concealed aluminum stiffeners as required to prevent oil-canning or other visible distress.
2. Finish panels to match finish of exterior exposed aluminum mullions unless otherwise shown or specified.
3. Metal Panel Tolerances: Fabricate panels with panel stiffeners as required to comply with deflection limits. Weld and grind panel corners smooth. Fabricate panels to the following dimensional tolerances:
    a. Length and Width: Plus, or minus 0.032 inch up to 48 inches; 0.064 inch more than 48 inches.
    b. Diagonal: Plus, or minus 0.1875 inch.
    c. Panel Bow: Not more than 0.2 percent of panel width or length up to 0.1875 inch maximum.
    d. Thickness: Plus, or minus 0.008 inch.
    e. Squareness: 0.1875-inch difference between diagonal measurements.
    f. Camber: 0.032 inch.

B. Glass Spandrel Panels: Provide insulated glass panels at spandrels of type shown and specified in Section "Glazing". Provide mineral wool insulation specified in Section "Thermal insulation" in the cavity behind insulated spandrel panels. Provide concealed back panels fabricated from 22 gage galvanized steel sheet. Seal back pans to aluminum framing

C. Brackets and Reinforcement: Provide manufacturer's standard high strength aluminum brackets and reinforcements. Provide non-staining, nonferrous shims for aligning system components.

D. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

E. Accessories: Provide components required for a complete assembly including trim, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, stiffeners and similar items.

2.9 OPERABLE UNITS

A. Entrance Door Systems: Comply with Division 08, Section 08 41 13 "Aluminum-Framed Entrances and Storefronts".

2.10 ALUMINUM FINISHES

A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations relative to applying and designating finishes.

B. Finish designations prefixed by AA conform to the system established by the Aluminum Association for designating aluminum finishes.

C. Finishes Application: Apply high performance organic coatings to exposed exterior surfaces of exterior enclosure system components. Apply thermosetting acrylic enamel coatings to exposed and concealed interior surfaces of exterior enclosure system components.

1. During production, maintain large size color range samples for use in comparing against production material.
2. Adhesion and Compatibility Testing: Test samples of high-performance coatings on aluminum shall be provided for compatibility and adhesion testing of joint sealants proposed for use on exterior enclosure system components prior to installations. Refer to Section Division 07, Section 07 92 00 "Joint Sealants.'

D. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

E. High-Performance Finish:

1. Three-coat fluoropolymer finish system consisting of corrosion inhibitive primer and fluoropolymer color coat complying with AAMA 2604, with suspended mica flakes for mica colors, containing not less than 50 percent PVDF resin by weight in color coat in not less than 1.2 mils dry thickness. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
2. Color and Gloss:

a. **EWS-01A, EWS-01B, EWS-01C, EWS-1D**: Provide **PT-41**: Permadize Sterling Gray by Kawneer Company
b. **EWS-02A, EWS-02B**:
    1) Exterior Exposed Aluminum:
        a) (**PT-42**): White to match existing Terminal A to be later selected by Architect from standard manufacturer colors.
        b) (**PT-43**): Bronze/beige to match existing Terminal A to be later selected by Architect from standard manufacturer colors.
    2) Interior Exposed Aluminum: #UC43350 Bone White by PPG Duranar.
c. **MTP-05**: To match (**PT-41**).
d. **MTP-06**: To match **(PT-42).**

3. **MTP-08**: To match existing C2 Package curtain wall framing, (**PT-44**).

2.11 SOURCE QUALITY CONTROL

A. Structural Sealant: Perform quality-control procedures complying with ASTM C1401 recommendations, including, but not limited to, assembly material qualification procedures, sealant testing, and assembly fabrication reviews and checks.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for components and systems penetrating metal wall panels to verify actual locations of penetrations relative to seam locations of panels before panel installation.

C. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare surfaces that will contact structural sealant according to sealant manufacturer's written instructions to ensure compatibility and adhesion. Preparation includes, but is not limited to, cleaning and priming surfaces.

3.3 INSTALLATION, GENERAL

A. General:
    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 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. 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 with 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.

E. Install insulation solid in voids between and within curtain members, behind solid panels, where curtain wall abuts adjacent construction, in shim spaces and where shown on the Drawings. Compress insulation to 50 percent of less of original thickness.

3.4 INSTALLATION OF GLAZING

A. Install glazing as specified in Division 08, Section 08 80 00 "Glazing."

3.5 INSTALLATION OF ALUMINUM PLATE SPANDREL PANELS AT EXISTING CURTAIN WALL

A. [_____]

3.6 INSTALLATION OF STRUCTURAL GLAZING

A. Prepare surfaces that will contact structural sealant in accordance with sealant manufacturer's written instructions, to ensure compatibility and adhesion. Preparation includes, but is not limited to, cleaning and priming surfaces.

B. Set glazing into framing in accordance with sealant manufacturer's and framing manufacturer's written instructions and standard practice. Use a spacer or backer as recommended by manufacturer.

C. Set glazing with proper orientation, so that coatings face exterior, or interior as specified.

D. Hold glazing in place using temporary retainers of type and spacing recommended by manufacturer, until structural sealant joint has cured.

E. Apply structural sealant to completely fill cavity, in accordance with sealant manufacturer's and framing manufacturer's written instructions and in compliance with local codes.

F. Apply structural sealant at temperatures indicated by sealant manufacturer for type of sealant.

G. Allow structural sealant to cure in accordance with manufacturers recommendations.

H. Clean and protect glass as indicated in Division 08, Section 08 80 00 "Glazing."

3.7 INSTALLATION OF WEATHERSEAL SEALANT

A. After structural sealant has completely cured, remove temporary retainers, and insert backer rod between lites of glass, as recommended by sealant manufacturer.

B. Install weather seal sealant to completely fill cavity, in accordance with sealant manufacturer's written instructions, to produce weatherproof joints. Install joint filler behind sealant as recommended by sealant manufacturer.

3.8 INSTALLATION OF INSULATION AND FIRE SAFING

A. Installation curtain wall insulation and fire safing complying with requirements specified in Section 07 21 00 "Thermal Insulation" and the following:

1. Clean debris from behind exterior wall during erection and provide temporary closures to prevent accumulation of debris.

2. Install firestopping/safing and smoke seal to comply with local authorities having jurisdictions.

   a. Install firestopping/safing with securely anchored metal flanges or make equivalent provisions to prevent dislocation.
   b. Install fire rated silicone smoke seal system over safing insulation to provide a complete smoke seal. Comply with Division 07, Section 07 84 46 “Fire Resistive Joint Firestopping”, appropriate UL listing and local authorities having jurisdiction.

3. Install curtain wall insulation in accordance with manufacturer's written instruction utilizing materials and methods to comply with tested rated assembly if required.

   a. Retain insulation in place by metal clips and straps or integral pockets within frames, spaced at intervals recommended by insulation manufacturer to hold insulation securely in place.
   b. Brace insulation where it contacts safing insulation to prevent insulation from bowing under pressure from safing insulation.

4. Internal guttering systems or other means to drain water passing joints, condensation occurring within framing members, and moisture migrating within structural-sealant-glazed curtain wall to exterior.

3.9 INSTALLATION OF FACADE MAINTENANCE COMPONENTS

A. The installation of intermittent stabilization anchors shall conform with ASME A39.1.

3.10 INSTALLATION OF METAL PANELS, FLASHINGS AND ACCESSORIES

A. Metal Panels: Install metal wall panels according to manufacturer's written instructions in orientation, sizes, and locations indicated on Drawings. Install panels perpendicular to supports unless otherwise indicated. Anchor panels and other components of the Work securely in place, with provisions for thermal and structural movement.

1. Commence metal wall panel installation and install minimum of 300 sq. ft. in presence of factory-authorized representative.

2. Shim or otherwise plumb substrates receiving metal wall panels.

3. Flash and seal metal wall panels at perimeter of all openings. Do not begin installation until fluid applied air barrier, insulation and flashings that will be concealed by panels are installed.

4. Install flashing and trim as metal wall panel work proceeds.

5. Apply elastomeric sealant continuously between metal base channel (sill angle) and concrete, and elsewhere as indicated or, if not indicated, as necessary for waterproofing.

6. Provide weathertight escutcheons for pipe and conduit penetrating exterior walls.

7. Attach metal wall panels to supports at locations, spacings, and with fasteners recommended by manufacturer to achieve performance requirements specified.

8. Wet Seal Systems: Seal horizontal and vertical joints between adjacent metal wall panels with sealant backing and sealant. Install sealant backing and sealant according to requirements specified in Section 07 92 00 "Joint Sealants."

9. Rainscreen-Principle Installation: Install using manufacturer's standard assembly with vertical channel that provides support and secondary drainage assembly, draining at base of wall. Notch vertical channel to receive support pins. Install vertical channels supported by channel brackets or adjuster angles and at locations, spacings, and with fasteners recommended by manufacturer. Attach metal wall panels by inserting horizontal support pins into notches in vertical channels and into flanges of panels. Leave horizontal and vertical joints with open reveal.

10. Install wall panels to allow individual panels to be installed and removed without disturbing adjacent panels. Coordinate installation with installation of glazed aluminum curtainwalls and seal joints between systems so entire enclosure is water and weatherproof.

11. Do not apply sealants to joints unless otherwise indicated.

B. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, SMACNA's "Architectural Sheet Metal Manual", and Division 07 Section 07 62 00 "Sheet Metal Flashing and Trim". Provide concealed fasteners where possible and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

1. Install exposed flashing and trim that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance.

2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

C. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete metal panel wall panel assembly including trim, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.

3.11 ERECTION TOLERANCES

A. 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.

3.12 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Contractor's Responsibility: Furnish the testing Agency with access to the Work, materials and facilities as required by the Agency.

1. Provide adequate notice of construction activities to allow timely inspections and observation of testing.
2. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect and test completed structural sealant glazed curtain walls, metal panel installation, including accessories.
3. Notify the Owner, the Construction Manager, the Architect, the Manufacturer's field Representative so that each entity may have adequate representation at the testing.
4. Test and inspect representative areas of structural sealant glazed curtain walls as the work proceeds to determine compliance of installed assemblies with specified requirements.
5. The testing and inspection activities do not relieve the Contractor of responsibilities under the Contract.

C. Manufacturer's Field Service: Engage a factory-authorized service representative for the Exterior Enclosure System to inspect completed installation of its specific Components, including accessories and connection to adjacent assemblies. Report results in writing.

D. Test Area: Perform tests on one bay at least 30 feet, by one story

E. Testing Services: Testing and inspecting of representative areas of structural sealant glazed curtain walls shall take place as installation proceeds to determine compliance of installed assemblies with specified requirements.

1. Testing of structural sealant glazed curtain walls is specified in Division 08, Section 08 40 00 "Exterior Enclosure System Requirements". Coordinate with, provide systems specified in this section that are part of the composite mock-up testing specified in Section 08 40 00 "Exterior Enclosure System Requirements".
2. Field Water Spray Test: As specified in Division 08, Section 08 40 00 "Exterior Enclosure System Requirements".
3. Air Infiltration, Water Penetration, and Field Water Spray Testing is specified in Division 08, Section 08 40 00 "Exterior Enclosure Systems Requirements".

F. Field Quality-Control Testing: Perform the following test on representative areas of glazed aluminum curtain walls.

1. Water-Spray Test: Before installation of interior finishes has begun, areas designated by Architect shall be tested in accordance with AAMA 501.2 and shall not evidence water penetration.

   a. Perform a minimum of three tests in areas as directed by Architect.
   b. Perform tests in each test area as directed by Architect. Perform at least three tests, prior to 10, 35, and 70 percent completion.

2. Air Leakage: ASTM E783 at 1.5 times the rate specified for laboratory testing in "Performance Requirements" Article but not more than 0.09 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft.

   a. Perform a minimum of three tests in areas as directed by Architect.
   b. Perform tests in each test area as directed by Architect. Perform at least three tests, prior to 10, 35, and 70 percent completion.

3. Water Penetration: ASTM E1105 at a minimum uniform and cyclic static-air-pressure differential of 0.67 times the static-air-pressure differential specified for laboratory testing in "Performance Requirements" Article, but not less than 6.24 lbf/sq. ft. and shall not evidence water penetration.

G. Conduct tests in the presence of the Architect's representative who will determine the period of water flow exposure based on any evidence of leakage or infiltration, with input from the Commissioning Agent. Contact the Architect and Commissioning Agent, not less than 72 hours before requiring his attendance for testing.

H. There shall be no water penetration to any indoor surface of the structural sealant glazed curtain wall system or any other adjoining surface of the construction or building. Repair leaks and other defects and retest as directed by the Architect. Repair or replace other work damaged by such leaks at no additional cost to the Owner.

I. Structural-Sealant Adhesion: Test structural sealant in accordance with recommendations in ASTM C1401, Destructive Test Method A, "Hand Pull Tab (Destructive)," Appendix X2.

1. Test a minimum of six areas on each building facade.

2. Repair installation areas damaged by testing.

J. The Owner's Inspection Agency shall inspect structural sealant glazed curtain walls in accordance with Texas State Building Code and the IBC, to verify that:

1. Building Superstructure: Examination of surveys of the superstructure substrates and supports to receive the exterior wall and applicable corrective work performed. Supporting structure is properly aligned and within the designed tolerances and without missing or mislocated inserts.

2. Exterior Wall Framing Components: Framing components are properly sized and aligned, are without missing or mislocated anchoring provisions and are without structural defects. Primed and painted components are provided with the specified materials.

3. Connections and Anchors: Anchors are properly placed, welded, or bolted. Correct anchoring and/or materials are used in lieu of others where there are field changes. Inspection of welding and bolting where connections are stressed to 50% or more of allowable values. Calibration of wrenches, review of bolting procedures and inspection of joint surfaces has been performed prior to bolting for bolted connections related to the exterior wall. Welder's license, qualifications and welding procedures for welds related to the exterior wall has been obtained. Proper welding or bolting of reset connections has been inspected.

4. Joints and Sealants: Horizontal and vertical movement joints have been provided, and joints are free from obstructions. Accepted sealant materials are provided. Sealant joints are properly sealed, materials are of sufficient elongation for movement anticipated. Unanticipated movement or displacement beyond performance criteria has been recorded and addressed.

5. Glass and Glazing: Vision glass are not defective; coatings and decorative ceramic frit are on the correct surface of insulating glass units and glazing gaskets and silicone sealants meet specifications. Edge deletions of coatings on insulating glass units have been performed correctly and seals (both primary and secondary) are correctly situated. The location and size of setting and edge blocks are suitable and meet specifications.

6. Continuity of Fire Safing Installation: Fire safing is properly sealed at joints and penetrations to maintain the continuity of the fire barrier at the exterior wall.

7. Exterior Wall Insulation: Insulation is continuous and properly sealed at joints and penetrations to maintain the continuity of the vapor barrier.

8. Flashings and Drainage: Flashings are materials specified, properly installed with end dams sealed. Weeps and tubes are installed and functional.

K. Contractor’s Site Testing: The Contractor shall perform the following site testing of the exterior wall at times appropriate to the construction schedule and in compliance with direction of the Architect and the Owner's independent testing agency:

1. **Embedded Anchor** Testing: Verify the adequacy of the embedded anchorage by means of pull out testing on in situ anchors. Loading for the testing shall be 150% of design load. Number of tests shall be as determined by the Architect due to the complexity of the embedded anchor design but shall not be less than 5% of the total. Location of embed to be tested shall be as selected by Architect. Failure of embed shall require further testing to ascertain the extent of the problem. Amount of additional testing shall be as determined by the Architect.

L. Glazed aluminum curtain walls will be considered defective if they do not pass tests and inspections. Following remedy of failed areas, retesting according to the same protocols shall take place, until construction passes testing requirements. Fabrication and installation of new areas may not proceed until tested areas have passed tests.

M. Prepare test and inspection reports.

3.13 PROTECTION

A. Remove temporary protective coverings and strippable films, if any, as assemblies are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of Exterior Enclosure System installation, clean finished surfaces as recommended by each assembly manufacturer. Maintain in a clean condition during construction.

1. Debris caused by, or incidental to, the erection of the assemblies shall be removed from the site and disposed of legally.

B. After Exterior Enclosure System installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.

C. Replace components of the Exterior Enclosure System that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures before the date of Substantial Completion.

D. Institute protective measures required throughout the remainder of the construction period to ensure that the Exterior Enclosure System work will be without damage or deterioration, other than normal weathering, at time of acceptance.

E. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, which ensure structural sealant glazed curtain wall system is without damage or deterioration at the time of Substantial Completion.

END OF SECTION