SECTION 08 41 13 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes aluminum-framed entrances and storefronts. The aluminum-framed entrance and storefront work includes the following:

1. Aluminum trim, flashings, and similar items in conjunction with aluminum-framed entrance and storefronts.
2. Painting and coating in conjunction with the above aluminum items.
3. Internal steel and aluminum reinforcements for aluminum-framed entrances and storefronts.
4. Internal and perimeter sealing, joint fillers, weeps, vents and gasketing systems for aluminum-framed entrances and storefronts.
5. Anchors, shims, fasteners, inserts, expansion devices, accessories, support brackets and attachments for aluminum-framed entrances and storefronts.
6. Glass and glazing for aluminum-framed entrances and storefronts.

1.2 ACTION SUBMITTALS

A. Product Data: Submit manufacturer's specifications and installation instructions for each aluminum-framed entrance and storefront product specified.

B. Shop Drawings: Submit shop drawings showing scaled elevations, plans, and sections of the aluminum entrance and storefront work. Full-scale sections shall be prepared and submitted for details of the assemblies that cannot be shown in the elevations or sections. Include with shop drawings metal thickness of all metal components, glass thicknesses, metal finishes,, location and installation requirements of door hardware and reinforcements, and all other pertinent information as necessary or requested by the Architect to indicate compliance with the Contract Documents. Details of field connections, anchorage, and their relationship to the work of others shall be clearly indicated for the coordination of the work by other building trades. Details of fastening and sealing methods and product joinery shall be shown to ensure proper performance of the field installation. No work shall be fabricated until shop drawings for that work have been approved by Architect for fabrication.

C. Samples: Submit samples of the following before any work is fabricated:

1. 3 paired sets of samples for each exposed metal finish required. Sample finishes shall be on the specified alloy, temper, and thickness of metal required for the work. Where finishes involve color and texture variations, include sample sets showing the full range of variations expected. Furnish samples in either 12 inch lengths of patch fittings, rails, or 12 inch squares of sheet.

1.3 INFORMATIONAL SUBMITTALS

A. Structural Calculations: Submit, for information only, copies of structural calculations indicating complete compliance with the specified performance requirements. Calculations shall be prepared, signed and sealed by a Professional Engineer registered in the state wherein the work is to be erected.

B. Field Test Reports: Submit field testing reports.

C. Product Test Reports: Submit certified product test reports based on tests performed by an AAMA Accredited Laboratory clearly describing in written form, and in shop drawing form, compliance of each aluminum-framed entrance and storefront assembly (each swinging and sliding door) with requirements indicated based on comprehensive testing.

D. Pre-Construction Sealant Compatibility and Adhesion Testing: Submit test results.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Instructions: Submit copies of an assembled and bound maintenance manual, describing the devices and procedures to be followed in cleaning, adjusting, and maintaining the aluminum-framed entrance and storefront work. Include information for maintaining operable doors, operating hardware, and replacing weather stripping.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Subcontract the aluminum-framed entrance and storefront work to a firm which is specialized in the erection of entrances and storefronts and who has successfully installed work similar in design and extent to that required for the Project, in not less than three projects of similar scope to the satisfaction of the Architect, and whose work has resulted in construction with a record of successful in-service performance for a period of 10 years.

B. Testing laboratories shall be specifically qualified to conduct laboratory and field performance tests required by these specifications and acceptable to the Architect.

C. Pre-construction Sealant Compatibility and Adhesion Testing: Test results confirming compatibility and adhesion are mandatory for all concealed and exposed sealant materials in contact with exterior glazing, stone, precast, other sealants, flashings, metal framing, and shims prior to full size sample installation construction. Refer to Section 07 92 00 "Joint Sealants" for specific testing requirements, and anticipated lead time necessary to perform testing.

D. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Section 01 31 00 "Project Management and Coordination." Prior to the start of the aluminum-frame entrance and storefront work, and at the Contractor's direction, meet at the site and review the installation procedures and coordination with other work. Meeting shall include Contractor, Owner, aluminum-framed entrance and storefront installer, sealant installer, as well as any other subcontractors or material technical service representatives whose work, or products, must be coordinated with the aluminum-framed entrance and storefront work.

1.6 IDENTIFICATION, DELIVERY, STORAGE, AND HANDLING

A. General: Refer to Section 08 44 13 "Glazed Aluminum Curtain Walls."

B. General: Comply with the applicable provisions of AAMA "Curtain Wall Manual #10" for the care and handling of aluminum-framed entrance and storefront work from shop to site.

C. All components of the aluminum-framed entrance and storefront work shall be identified after fabrication by marks clearly indicating their location in the building. Packaging of components shall be so selected to protect the components from damage during shipping and handling.

D. Storage on Site:

1. Store aluminum-framed entrance and storefront components in a location and in a manner to avoid damage to the components. Stacking shall be done in a way which will prevent bending, excessive pressure, abrasion or other permanent damage of the component and its finished surfaces.
2. Store aluminum-framed entrance and storefront components and materials in a clean, dry location, away from uncured concrete, masonry work, sprayed on fireproofing work, and other construction activities. Cover with non-staining waterproof paper, tarpaulin, or polyethylene sheeting in a manner that will permit circulation of air inside the covering.

E. Keep handling on site to a minimum. Exercise particular care to avoid damage to finishes of metals.

1.7 FIELD CONDITIONS

A. Field Measurements: Verify dimensions of supporting structure by field measurements before fabrication so that the entrance and storefront work will be accurately designed, fabricated and fitted to the structure. Indicate measurements on shop drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work. Use Contractor's lines and benchmarks as a basis for measurements.

1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating entrance and storefront work without field measurements. Coordinate supporting structure construction to ensure actual dimensions correspond to established dimensions.

B. Electrical System Roughing-in: Coordinate layout and installation of electrified door hardware with connections to, power supplies, fire alarm system and detection devices, access control system, security system, building control system.

1.8 WARRANTY

A. General: Refer to Section 08 44 13 "Glazed Aluminum Curtain Walls."

B. Special Warranty: Submit a 2 year written warranty, beginning from date of substantial completion, and executed by the Contractor, manufacturer and the aluminum-framed entrance and storefront installer agreeing to repair or replace components of entrance and storefront systems that develop defects in materials or workmanship within the specified warranty period. Defects include, structural failures, sealant failures, deterioration of metals, metal finishes, and other materials beyond normal weathering, failure of operating components to function properly, uncontrolled water leakage, uncontrolled air leakage, and any other evidence of failure or deterioration of the aluminum-framed entrance and storefront work to meet performance requirements.

C. Warranty; Anodized Coatings: Submit a warranty for a period of 3 years, warranting that the anodized aluminum will not develop excessive fading or excessive non-uniformity of color or shade, and will not crack, peel, pit, or corrode; all within the limits defined as follows:

1. "Excessive Fading" means a change in appearance which is perceptible and objectionable as determined by the Architect when viewed visually in comparison with the original color range samples.
2. "Excessive Non-Uniformity" means non-uniform fading during the period of the warranty to the extent that adjacent panels have a color difference greater than the original acceptable range of color.
3. "Will Not Pit or Otherwise Corrode" means there shall be no pitting or other type of corrosion discernable from a distance of 10 feet, resulting from the natural elements in the atmosphere at the Project site.

D. Warranty, High Performance Organic Coatings: Submit a warranty for a period of 20 years, warranting the integrity of film and permanence of color of the high performance organic coatings for the following:

1. Color fade not to exceed 5 delta E units (Hunter) as calculated in accordance with ASTM D 2244 on exposed surfaces cleaned with clean water and a soft cloth.
2. Degree of chalking not to exceed rating No. 8 when measured in accordance with ASTM D 4214 on exposed unwashed surfaces.
3. Will not crack, check or peel.

E. Warranty, Thermosetting Acrylic Enamel Coatings: Submit a warranty for a period of 5 years, warranting the integrity of film against cracking, chipping, flaking, peeling and blistering of the thermosetting acrylic enamel coatings.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturer Qualifications: The drawings and specifications are based on Kawneer North America; an Alcoa company's "TriFab VG 451T" systems. . Award the fabrication of aluminum framed entrances and storefront components to a single firm specializing in the fabrication of aluminum framed entrances and storefront components who has successfully produced work similar in design and extent to that required for the project, in not less than three projects of similar scope to the satisfaction of the Architect, and whose work has resulted in construction with a record of successful in-service performance for a period of 5 years. The fabricator shall have sufficient production capacity, have organized quality control and testing procedures, and published written and illustrated installation manuals, to produce and properly install the aluminum framed entrances and storefront assemblies required without causing delay in progress of the Work. Other manufacturers capable of producing aluminum framed entrances and storefront systems meeting the performance requirements include the following:

B. Source Limitations: Obtain aluminum framed entrances and storefronts from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. General: Refer to Section 08 44 13 "Glazed Aluminum Curtain Walls" for performance requirements, fabrication and erection standards; in addition provide the following:

1. Design and fabricate aluminum-framed entrances to withstand the operating loads which result from heavy traffic conditions using the specified hardware, without measurable permanent deflection. Limit elastic deflections so as to provide the normal degree of rigidity required to avoid glass breakage, air leaks and other objectionable results of excessive flexibility. Provide weatherstripping at stiles, sill and head rails of door leaves, to minimize air, water and sound leaks.

B. General: Provide aluminum-framed entrance and storefront systems meeting or exceeding the following performance requirements:

1. Structural Properties:

a. Wind Loads: The aluminum-framed entrance and storefront work, including glass, shall be designed, fabricated and installed to withstand the maximum inward and outward wind pressures as indicated on Drawings.
b. Deflection Limitations:

1) Deflections: Base calculations for the following deflections upon the combination of maximum direct wind loads, building deflections, thermal stresses, and erection tolerances.

a) The deflection of any framing member in a direction normal to the plane of the wall when subjected to the full code required wind loads specified above shall not exceed 1/175 of the glass edge length or 3/4 inch whichever is less, except limit deflection of glass to 1 inchfor exterior walls 1/2 inch for interior walls.
b) Glass, sealants and interior finishes shall not be included to contribute to framing member strength, stiffness or lateral stability.

2) Do not permit any permanent deformation (set) in the metal framing work. Permanent deformation, fastener, weld, or gasket failure, component breakage or disengagement shall not occur under wind loading equal to 1.5 times the wind loads (positive or negative). Permanent deformation shall be taken as deflection without recovery exceeding 1/1000 times span.

c. Dead Loads:

1) Maximum full deadload deflections, parallel (in-plane) to wall plane, of framing members shall not reduce glass bite or glass coverage, to less than 75 percent of the design dimension, and shall not reduce edge clearance to less than 25 percent of design dimension or 1/8 inchwhichever is greater.
2) Limit deflections of metal members spanning door openings to 1/300. The clearance between the member and an operable door shall be no less than 1/16 inch .
3) Twisting (rotation) of the horizontals due to the weight of the glass shall not exceed 1 degree, measured between ends and center of each span.

C. Hurricane-Resistance Test Performance: Provide entrance and storefront systems that pass large and small missile-impact tests, as required by systems' location above grade, and cyclic pressure tests according to testing requirements of authorities having jurisdiction.

1. Windborne-Debris Resistance: Provide entrance and storefront assemblies capable of resisting impact from windborne large and small missile debris, based on the criteria as determined from testing entrance and storefront assemblies identical to those specified, according to Testing Application Standard (TAS) 201 'Impact Test Procedures' and requirements of authorities having jurisdiction.
2. Cyclic Load Testing: Provide entrance and storefront assemblies capable of resisting cyclic loading, based on the criteria as determined from testing entrance and storefront assemblies identical to those specified, according to Testing Application Standard (TAS) 203 'Criteria for Testing Products Subject to Cyclic Wind Pressure Loading' and requirements of authorities having jurisdiction.

D. Air Leakage:

1. Typical Conditions: Air leakage through each entrance and storefront assembly shall not have exceeded 0.06 cfm/sq. ft. of fixed wall area when tested in accordance with ASTM E 283 at a static-air-pressure difference of 6.24 lbf/sq. ft.

2. Swinging Doors: Air leakage through each swinging entrance door shall not have exceeded 1.0 cfm/sq. ft. of surface area when tested in accordance with ASTM E 283 at a static-air-pressure difference of 1.57 lbf/sq. ft. .

E. Water Penetration:

1. Water penetration in this specification is defined as the appearance of uncontrolled water, other than condensation, on any indoor face of any part of the wall.
2. Provision shall be made to drain to the exterior face of the wall any water entering the system.
3. No uncontrolled water penetration shall have occurred when each storefront assembly (each fixed storefront wall) was tested in accordance with the ASTM E 331 for one 15 minute cycle at a static pressure difference of 12 lbf/sq. ft. minimum.

F. Thermal Movements: Fabricate the entrance and storefront work to accommodate for such expansion and contraction of component materials, and supporting elements, as will be caused by surface temperatures ranging from -5 to +180 deg F, without causing buckling, glass breakage, failure of joint sealants, undue stress on metal members and fasteners, failure of doors or other operating units to function properly, reduction of performance, and other detrimental effects.

1. Dimensions shown on Drawings are based on an assumed design temperature of +70 deg F. Fabrication and erection procedures shall take into account the ambient temperature range at the time of the respective operations.

G. Building Frame Movement: Design, fabricate and install aluminum-framed entrances and storefronts to withstand building movements including thermal movements, loading deflections, shrinkage, creep and similar movements. Thermal movements shall be as specified above. Building frame deflections, shrinkage, creep and other movements are available from the structural engineer.

H. Condensation Resistance: Design, fabricate and install the aluminum framed entrance and storefront systems to prevent excessive condensation on the indoor exposure of the wall with the mechanical system functioning under [the following] [normal] operating conditions. A computer generated thermal analysis for each primary entrance and storefront system showing temperature gradients through each component of the glazed aluminum entrance and storefront and the location of the dewpoint shall be submitted with the shop drawing package. Excessive condensation is defined as the accumulation of uncontrolled condensate flowing from the entrance and storefront at any location, or visible ice, frost, or water on more than 5 percent of the area of any module of the exterior wall.

1. Outdoor: Ambient temperature of -5 deg F, 15 mph wind.
2. Indoor: Ambient temperature of +70 deg F, relative humidity of 30 percent.

I. Thermal Transmittance: Design, fabricate and install the aluminum framed entrance and storefront assemblies with the assembly U-factor maximum to comply with ASHRAE 90.1 and the IECC for the project specific geographic location of the building project when tested according to NFRC 100. A computer generated thermal analysis for each primary entrance and storefront system; showing temperature gradients through each component of the glazed aluminum entrance and storefront and the location of the dewpoint shall be submitted with the shop drawing package. Indoor humidity, and indoor and outdoor temperature parameters for the project are available from the mechanical engineer.

J. Solar Heat-Gain Coefficient: Unless otherwise indicated in the glass schedules, provide glass for aluminum framed entrance and storefront assemblies with a assembly SHGC maximum to comply with ASHRAE 90.1 and the IECC for the project specific geographic location of the building project as determined according to NFRC 200 procedures.

K. Glass Statistical Factor: Glass thicknesses when shown on the Drawings, or specified, are for convenience of detailing only and are to be confirmed by the Contractor and/or glass manufacturer. All glass for the size openings shown will be provided in thicknesses such that the probability of breakage at the design "Wind Load" will not exceed 8 lights per 1000 lights (S.F. 2.5) based on a 3 second gust wind load duration, and reflectance and shading indicated. The glass manufacturer shall provide, on request, substantiating glass breakage data if such data is not otherwise available as manufacturer's published data.

L. Design Modifications:

1. Submit design modifications necessary to meet the performance requirements and field coordination.
2. Variations in details or materials shall not adversely affect the appearance, durability or strength of components.
3. Maintain the general design concept without altering size of members, profiles and alignment.

2.3 MATERIALS

A. Aluminum: Refer to Section 08 44 13 "Glazed Aluminum Curtain Walls."

B. Aluminum: Conform to the requirements published in AA "Aluminum Standards and Data," referenced ASTM standards and the following. All aluminum extrusions shall be manufactured to dimensional tolerances so as to eliminate any edge projection or misalignment at joints. Unless otherwise specified, provide alloy and temper as required to suit performance requirements and finish(es) indicated. Provide concealed extruded bars, rods, shapes and tubes in alloys as recommended by the fabricator to join or reinforce assembly of exposed aluminum components.

1. Alloys:

a. Sheet and Plate: Alloy 5005 and ASTM B 209, 'Anodizing Quality.'

b. Extruded Bars, Rods, Shapes, and Tubes: Alloy 6063 and ASTM B 221, 'Anodizing Quality.'
c. Bars, Rods, and Wire: ASTM B 211.

2. Welding Rods and Bare Electrodes: AWS A5.10.

C. Carbon Steel: For carbon steel components required to join, reinforce or support the assembly of aluminum components provide carbon steel conforming to ASTM A 36/A 36M for structural shapes, plates, and bars; ASTM A 1008/A 1008M for cold-rolled sheet and strip; or ASTM A 1011/A 1011M for hot-rolled sheet and strip.

D. Glass and Glazing Materials: As specified in Section 08 80 00 "Glazing."

E. Anchors and Fasteners:

1. Material:

a. Wet Zones: Series 300 stainless steel.
b. Dry Zones: Carbon steel complying with either ASTM A325 or SAE Grade 5.

2. Anchor and Fastener Metal Alloy Types, Designations and Standards: Alloys as selected by fabricator to prevent corrosion resistance with the components fastened. Do not use self-drilling, self-tapping type fasteners.
3. Do not use exposed anchors and fasteners, except for hardware application. For hardware application, use countersunk Phillips flat-head machine screws finished to match framing members or hardware being fastened, unless otherwise indicated.
4. Where fasteners are subject to loosening or turn out from thermal and structural movements, wind loads, or vibration, use self-locking devices.

F. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A 123 or ASTM A 153 requirements.

G. Concealed Flashing: Dead-soft, 0.018 inch thick stainless steel, complying with ASTM A 666, Type 304.

H. Weather Stripping:

1. Compressible Weatherstripping: Compressible weatherstripping gaskets fabricated from extruded multi-fingered PVC, silicone or neoprene, replaceable, held in adjustable depth extruded metal strips to be mortised into edge of door panels for minimum exposure, metal finish to match finish of door.
2. Sliding Weather Stripping: Wool, polypropylene, or nylon woven pile with nylon-fabric or aluminum-strip backing complying with AAMA 701 requirements, replaceable, held in adjustable depth extruded metal strips to be mortised into edge of door panels for minimum exposure.

2.4 SEALING MATERIALS

A. Concealed Sealing Materials: All sealing materials concealed within the entrances and storefronts shall be silicone, compatible with and adherent to each material it will be in contact with, as recommended by the manufacturer to fulfill performance requirements.

B. Adhesives, adhesive bonding primers, adhesive primers, sealants, sealant primers and caulks shall comply with local or regional regulations as shown in CALgreen Section 5.504.4.1.

C. Aerosol adhesives, and smaller unit sizes of adhesives, and sealant or caulking compounds shall comply with regulations as shown in CALgreen Section 5.504.4.2.

D. Exposed Sealing Materials: All sealing materials exposed at entrance and storefront perimeter joints in contact with adjacent cladding materials: Silicone, refer to Section 07 92 00 "Joint Sealants."

2.5 FABRICATION

A. General: Fabricate the entrances and storefronts to the designs, shapes, and sizes shown using the materials specified and shown to produce assemblies that meet or exceed the performance requirements. [Fabricate from the same materials as required to meet the applicable provisions of acceptance indicated under the door manufacturer's Notice of Acceptance (NOA) or Florida Product Approval.] To the greatest extent possible, complete fabrication, assembly, finishing, hardware applications and other work before shipment to Project site.

1. Metal Wall Thickness: Provide shapes as shown and as required to suit the performance requirements but with wall thickness of not less than 1/8 inch.

B. Glazing Stops and Gaskets: Provide continuous interior glazing stops with concealed fasteners for all doors and frames. Provide stops with hairline joints at corners. Provide stops with beveled, not square, shouldered profile unless otherwise shown.

C. Glass Components: Provide holes and cutouts in glass to receive hardware and accessories before tempering glass. Drill, countersink, and chamfer holes using tooling, materials and methods which are selected and applied to prevent spalling of the cut glass surfaces at holes and cutouts. The internal surface of holes and cutouts shall be smooth with minimal roughness from drilling operations. Do not cut, drill, or make other alterations to glass after tempering.

1. Fully temper glass using horizontal (roller-hearth) process and fabricate so, when installed, roll-wave distortion is parallel with bottom edge of door or lite.
2. Heat Soaking: After tempering, expose 100% of all fabricated glass units to European Standard EN14179 heat soaking process to reduce the potential for inclusion related glass breakage.
3. Factory assemble components and factory install hardware to greatest extent possible.

D. Metal Components: Doors and frames shall be cut, reinforced, drilled and tapped in strict accordance with the printed door hardware manufacturer's templates and instructions. Provide solid stainless steel hardware reinforcements, securely fastened to doors and frames where door hardware is to be attached.

1. Security system components may be incorporated into the door and frame openings of all entrance doors and frames. Provide all cutouts required by the Owner's security system vendor and all prewiring for vendor provided security system devices. Wherever storefront and entrance framing components are to receive wiring provide unobstructed clear paths free of burrs and sharp objects with pull strings to facilitate wiring.

E. Joints in Metal Work: All exposed work shall be carefully fitted and matched to produce continuity of line and design, with all joints, being accurately fitted for hairline contact and rigidly secured. Where additional rigidity or strength is required to satisfy the performance requirements reinforce entrance components with aluminum or carbon steel shapes, bars, and plates.

F. Shop Assembly: As far as practicable, all fitting and assembly work shall be done in a fabrication shop.

1. For exterior entrances, provide weepholes and internal water passages in the glazing framing recesses as recommended by the respective glass and framing manufacturers to conduct infiltrating water to the exterior. Provide weep baffles secured to inside of frame behind weepholes.

G. Exposed Fasteners: Not permitted.

H. Protection of Metals: Wherever dissimilar metals are in contact, except in the case of aluminum in contact with galvanized steel, zinc, separate such surfaces with a coating of zinc rich primer, bituminous paint, or separation gaskets as the condition requires. Wherever aluminum comes in contact with concrete surfaces separate such surfaces with a coating of zinc rich primer, bituminous paint, or separation gaskets as the condition requires.

2.6 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 Application:

1. Apply high performance organic coatings to all exposed exterior surfaces of storefront and entrance components. Apply thermosetting acrylic enamel coatings to all exposed interior surfaces of storefront and entrance components.
2. Apply anodized coatings to all exposed surfaces of storefront and entrance components.
3. Extent of Coating Types:

a. Anodic Coatings: Except for exposed surfaces of exterior (weathering side) snap on exterior caps, metal panels, column covers, and the exposed interior surfaces of the main entry lobby ground floor storefront, apply anodized coatings to all exposed interior surfaces of storefront and entrance components.
b. High Performance Organic Coating: Apply high performance organic coatings to all exposed surfaces of exterior (weathering side) snap on exterior caps, metal panels, column covers, and the exposed interior surfaces of the main entry lobby ground floor storefront.

C. Appearance of Finished Work: During production, maintain large size color range samples for use in comparing against production material. Variations in appearance of abutting or adjacent pieces are acceptable if they are within the range of approved samples. Noticeable variations in the same piece are not acceptable.

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

E. Class II, Clear Anodic Finish: Complying with AA-M10C22A31 for an Architectural Class II finish and the following:

1. Metal Preparation and Pretreatment: Remove die markings prior to finishing operations. Perform this work in addition to the finish specified. Scratches, abrasions, dents and similar defects are unacceptable.
2. Thickness: Minimum 0.4 mil, weighing not less than 15.5 mg per sq. in., minimum apparent density of 38 g per cubic in.
3. Performance Criteria: Meets or exceeding AAMA 611.
4. Color: Medium matte finished, clear natural anodized.
5. Post Anodizing Finish (Sealing): Anodized finishes shall be fully sealed by the manufacturer or processor according to procedures recommended by the licensor of the process. Maximum weight loss shall be 2.6 mg/ sq. in.

F. Class I, Clear Anodic Finish: Complying with AA-M10C22A41 for an Architectural Class I finish and the following:

1. Metal Preparation and Pretreatment: Remove die markings prior to finishing operations. Perform this work in addition to the finish specified. Scratches, abrasions, dents and similar defects are unacceptable.
2. Thickness: Minimum 0.7 mil, weighing not less than 27.0 mg per sq. in., minimum apparent density of 38 g per cubic in.
3. Performance Criteria: Meets or exceeding AAMA 611.
4. Color: Medium matte finished, clear natural anodized.
5. Post Anodizing Finish (Sealing): Anodized finishes shall be fully sealed by the manufacturer or processor according to procedures recommended by the licensor of the process. Maximum weight loss shall be 2.6 mg/ sq. in.

G. Class II, Color Anodic Finish: Complying with AA-M12C22A32/A34 for an Architectural Class II finish and the following:

1. Metal Preparation and Pretreatment: Remove die markings prior to finishing operations. Perform this work in addition to the finish specified. Scratches, abrasions, dents and similar defects are unacceptable.
2. Thickness: Minimum 0.4 mil, weighing not less than 15.5 mg per sq. in., minimum apparent density of 38 g per cubic in.
3. Performance Criteria: Meets or exceeding AAMA 611.
4. Color: Medium matte finished, integrally colored or electrolytically deposited color anodized.
5. Post Anodizing Finish (Sealing): Anodized finishes shall be fully sealed by the manufacturer or processor according to procedures recommended by the licensor of the process. Maximum weight loss shall be 2.6 mg/sq. in.

H. Class I, Color Anodic Finish: Complying with AA-M12C22A42/A44 for an Architectural Class I finish and the following:

1. Metal Preparation and Pretreatment: Remove die markings prior to finishing operations. Perform this work in addition to the finish specified. Scratches, abrasions, dents and similar defects are unacceptable.
2. Thickness: Minimum 0.7 mil, weighing not less than 27.0 mg per sq. in., minimum apparent density of 38 g per cubic in.
3. Performance Criteria: Meets or exceeding AAMA 611.
4. Color: Medium matte finished, integrally colored or electrolytically deposited color anodized.
5. Post Anodizing Finish (Sealing): Anodized finishes shall be fully sealed by the manufacturer or processor according to procedures recommended by the licensor of the process. Maximum weight loss shall be 2.6 mg/sq. in.

I. High-Performance Organic Coating Finish: AA-C12C42R1x and the following:

1. Polyvinylidene fluoride finish coating containing not less than 70 percent of "Kynar 500" or "Hylar 5000" fluorocarbon resin specially formulated for spray application to extrusions and preformed aluminum metal shapes. Remove die markings, scratches, abrasions, dents and other blemishes before applying finish. Coating films shall be uniform and visibly free from flow lines, streaks, blisters, sags or other surface imperfections in the dry-film state on all surfaces.

    a. Metal Preparation and Pretreatment: Pretreatment of aluminum surface and application of the finish shall be performed under specifications issued by the licensed formulator to approved applicator and the following as a minimum:

        1) The products used to form the chemical conversion coating on aluminum extrusions shall conform to ASTM D1730, Type B, Method 5 (Amorphous Chromium Phosphate Treatment) or Method 7 (Amorphous Chromate Treatment), or Trivalent Chrome Treatment..
        2) The coating weight of the chemical conversion coating shall be a minimum of 40 mg. per sq. ft. on exposed surfaces as specified in ASTM B449, Section 6, Class I. Processing shall conform to that specified in ASTM B449, Section 5.

b. Thickness:

1) Fluoropolymer 2-Coat Coating System: Minimum 1.2 mil total dry film thickness (0.25 mil primer +/- 0.05 mil and 1.0 mil topcoat).
2) Fluoropolymer 3-Coat Coating System: Minimum 1.6 mil total dry film thickness (0.25 mil primer +/- 0.05 mil and 1.35 mil topcoat).

c. Coating Performance Criteria: Meets or exceeding AAMA 2605.
d. Color: One custom color to be determined by Architect.
e. Manufacturer, Coating System:

1) Two Coat, Opaque System; one of the following:

a) PPG Paints; Duranar.
b) Valspar, Inc.; Fluropon Standard.

2) Two Coat, Mica Flake System; one of the following:

a) PPG Paints; Duranar Sunstorm.
b) Valspar, Inc.; Fluropon Classic II.

3) Three Coat, Opaque System; one of the following:

a) PPG Paints; Duranar XL.
b) Valspar, Inc.; Fluropon Classic.

4) Three Coat, Metal Flake System; one of the following:

a) PPG Paints; Duranar XL.
b) Valspar, Inc.; Fluropon Classic.

J. Thermosetting Acrylic Enamel Coating: Complying with AAC12R1X and the following:

1. Thermosetting acrylic enamel finish coating containing either an acrylic based resin, polyester based resin, or not less than 50 percent of "Kynar 500" or "Hylar 5000" fluorocarbon resin specially formulated for spray application to extrusions and preformed aluminum metal shapes. Pretreatment of aluminum surface and application of the finish shall be performed under specifications issued by the licensed formulator to approved applicator. Remove die markings, scratches, abrasions, dents and other blemishes before applying finish. Coating films shall be uniform and free from flow lines, streaks, blisters, sags or other surface imperfections in the dry-film state on all surfaces.
2. Thickness: Minimum 1.0 mil total dry film thickness (+/- 0.2 mil).
3. Coating Performance Criteria: Acrylic based resin shall meet or exceed AAMA 2603, 50% kynar based resin shall meet or exceed AAMA 2604.
4. Color: One custom color to be determined by the Architect.
5. Manufacturer, Coating System: one of the following:

a. PPG Paints; Duracron Thermosetting Acrylic and Polycron Thermosetting Acrylic resin or Acrynar 50% pvdf.
b. Valspar, Inc.; Acroflur.

2.7 COATINGS FOR CONCEALED METAL SURFACES

A. General: The following protective coatings shall be applied to surfaces of metals which are to be concealed in the construction:

1. Coating for Carbon Steel: Hot dip galvanized, complying with ASTM A 123.
2. Coating for Aluminum, Carbon Steel, and Bronze: Where aluminum or carbon steel surfaces are to be in contact with each other or in contact with dissimilar materials such as masonry or concrete, and where hot dip galvanizing of carbon steel is incompatible with component parts because of galvanic action or component fabrication tolerances provide one of the following:

a. Bituminous Paint: Cold-applied, non-sagging, bituminous paint complying with ASTM D1187. Apply in two coats for an overall minimum dry film thickness of 25 mils.
b. Zinc Rich Primer: Organic zinc-rich primer, complying with SSPC-Paint 20.

PART 3 - EXECUTION

3.1 PREPARATION

A. Coordinate entrance and storefront work with the work of other Sections and provide items to be placed during the installation of other work at the proper time to avoid delays in the work.

B. Templates and Diagrams: Furnish templates, diagrams, and other data to fabricators and installers of related work, as necessary for coordinating entrance and storefront installation.

C. Place such items, including concealed overhead framing, accurately in relation to the final location of entrance and storefront components.

3.2 EXAMINATION

A. Examine the substrates, adjoining construction, and conditions under which the Work is to be installed. Proceed with installation only after unsatisfactory conditions have been corrected.

1. Before beginning installation of the entrance and storefront work examine all parts of the existing building structural frame and the existing building cladding indicated to support the entrance and storefront work. Ensure that the existing swing door thresholds, existing swing doors, swing door framing and subframes have been completely removed with all projecting anchors cut off flush. Notify Contractor in writing, of any dimensions, or conditions, found which will prevent the proper execution of the entrance and storefront work, including specified tolerances. Use Contractor's offset lines and bench marks as basis of measurements.

3.3 INSTALLATION

A. General: Comply with manufacturer's written instructions for protecting, handling, and installing entrance and storefront systems. Do not install damaged components. Fit frame joints to produce hairline joints free of burrs and distortion. Rigidly secure nonmovement joints. Seal joints watertight. Clean excess joint sealants from finished surfaces.

1. Cut and trim component parts of the entrance and storefront work during erection only with the approval of the manufacturer or fabricator, and in accordance with his recommendations. Restore finish completely to protect material and remove all evidence of cutting and trimming. Remove and replace members where cutting and trimming has impaired strength or appearance, as directed by Architect.
2. Set components within the erection tolerances with uniform joints. Place components on shims and fasten to supporting substrates using bolts and similar fasteners. Use stainless steel shims at structural connections only. U shaped shims at structural connections are not permitted. Use aluminum, stainless steel, or high impact polystyrene shims at other connections.
3. Do not erect components that are warped, deformed, bowed, dented, defaced or otherwise damaged as to impair its strength or appearance. Remove and replace members damaged in the process of erection.
4. Coat concealed surfaces of dissimilar materials, and any ferrous metal components, with a heavy coating of bituminous paint, zinc rich primer or other separation in accordance with manufacturer's recommendations. Where aluminum components will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
5. No holes or slots shall be burned, cut into, or field drilled in any building framing member without the written acceptance of the structural engineer.
6. Install subsills in single piece lengths. Joints, where required, shall be placed at the maximum spacing allowed by the system manufacturer and sealed to result in a splice joint that is compliant with the manufacturers subsill splicing details. Fill anchor leg receptors at the splice joints as required by the system manufacturer. Spot heads of all fasteners with sealant.
7. Attach and seal end dams at the ends of all subsills.

B. Install glazing to comply with requirements of Section 08 80 00 "Glazing," unless otherwise indicated.

C. Install perimeter sealant to comply with requirements of Section 07 92 00 "Joint Sealants," unless otherwise indicated.

D. Concealed Sealing Components: Apply sealant and gasket components that are integral to the entrance and storefront systems in strict accordance with the each component manufacturer's printed instructions. Before applying components remove all mortar, dust, dirt, moisture, and other foreign matter that will be deleterious to the intended performance of the component. Mask adjoining exposed surfaces to avoid spilling, dripping, dropping or other unintended contact of the sealing components onto adjacent exposed surfaces.

3.4 ERECTION TOLERANCES

A. The entrance and storefront systems shall be fabricated and erected to accommodate the dimensional tolerances of the structural frame and surrounding cladding while providing the following as installed tolerances.

1. Variation from theoretical calculated position as located in plan or elevation in relation to established floors lines, column lines and other fixed elements of the structure, including variations from plumb, level, straight and member size: +/- 1/4 inch max in any 20'-0" run, column-to-column bay, or floor-to-floor height.
2. Alignment: Where surfaces abut in line, and where they meet at corners, limit offset from true alignment to 1/32 inch.
3. Variation from angle, or plumb, shown: +/- 1/8 inch max in any 10'-0" run or story height, non-cumulative.
4. Variation from slope, or level, shown: +/- 1/8 inch max in any 20'-0" run or column-to-column bay, non-cumulative.

3.5 ANCHORAGE

A. Anchorage of the entrance and storefront work to the structure and surrounding cladding shall be in accordance with the accepted shop drawings.

3.6 WELDING

A. Weld with electrodes and by methods recommended by manufacturer of material being welded, and in accordance with AWS D1.1 for concealed steel members.

B. Welds and adjacent metal areas shall be thoroughly cleaned and coated with a single coat of bituminous paint.

3.7 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified independent testing agency to perform field quality-control testing indicated. Conduct tests of each specified sample installation under the direction of the testing agency in the presence of the Owner, Architect, the Contractor, various component manufacturers and fabricators and the Installer for each system incorporated in the sample installation.

B. Water Spray Without Air Pressure Difference Test: After completing the installation of test areas indicated, but before the installation of interior finishes has begun, test fixed portions of the storefront system for water penetration according to AAMA 501.2 requirements.

C. Repair or remove and replace Work that does not meet requirements or that is damaged by testing; replace to conform to specified requirements.

3.8 REMOVAL OF DEBRIS

A. All debris caused by, or incidental to, the erection of the entrance and storefront work shall be removed from the site and disposed of legally.

3.9 CLEANING

A. Clean metal surfaces promptly after installation, exercising care to avoid damage to factory finished exposed surfaces.

B. Wash glass on both faces not more than 4 days prior to date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended by glass manufacturer. Remove excess glazing and sealant compounds, dirt, and other substances.

C. Immediately remove any deleterious material from surfaces of aluminum.

3.10 PROTECTION

A. Institute protective measures required throughout the remainder of the construction period to ensure that entrance and storefront work will be without damage or deterioration, other than normal weathering, at time of acceptance.

END OF SECTION 08 41 13