

SECTION 08 41 00 – ENTRANCES AND STOREFRONT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes furnishing and installing:
 - 1. Exterior and interior storefront system, including swing entrance doors.
 - 2. Glass and glazing in conjunction with the work of this Section and as specified in Section 08 81 00.
 - 3. Sealants, joint fillers, gaskets, blocking and related materials in conjunction with each of the above components and to all adjacent work.
 - 4. Anchors, inserts, reinforcements, support brackets, flashings, weeps, and similar elements in conjunction with each of the above components.
 - 5. Steel supports at entrance storefront.
 - 6. Cleaning work of this Section.

1.3 RELATED WORK

- A. Related Work of Other Sections:
 - 1. Section 05 50 00 – Metal Fabrications.
 - 2. Section 07 11 13 – Bituminous Dampproofing.
 - 3. Section 07 92 00 – Joint Sealants.
 - 4. Section 08 71 00 – Door Hardware.
 - 5. Section 08 81 00 – Glass and Glazing.
 - 6. Section 09 21 16 – Gypsum Board Assemblies.

1.4 REFERENCED STANDARDS

- A. Comply with applicable standards and specifications published by NAAMM, AAMA, and AA, including definitions of terms and designations not otherwise defined herein.
- B. Comply with applicable standards and recommendations by NAAMM, in "Metal Curtain Wall Specifications Manual," "Entrance Manual" and other published specifications and standards, except to the extent more stringent requirements are indicated.
- C. Comply with the "Glazing Manual" issued by the Glass Association of North America, latest editions.
- D. Aluminum Association (AA) "Standards for Anodically Coated Aluminum Alloys for Architectural Applications."
- E. Aluminum Association "Standards for Aluminum Mill Products."
- F. National Association of Architectural Metal Manufacturers (NAAMM) "Metal Finishes Manual."

1.5 DESIGN/PERFORMANCE REQUIREMENTS

- A. General: Provide aluminum-framed systems, including anchorage, capable of withstanding, without failure, the effects of the following:
1. Structural loads.
 2. Thermal movements.
 3. Movements of supporting structure indicated on Drawings including, but not limited to, story drift and deflection from uniformly distributed and concentrated live loads.
 4. Dimensional tolerances of building frame and other adjacent construction.
 5. Failure includes the following:
 - a. Deflection exceeding specified limits.
 - b. Thermal stresses transferred to building structure.
 - c. Framing members transferring stresses, including those caused by thermal and structural movements, to glazing.
 - d. Glazing-to-glazing contact.
 - e. Noise or vibration created by wind and thermal and structural movements.
 - f. Loosening or weakening of fasteners, attachments, and other components.
 - g. Sealant failure.
 - h. Failure of operating units to function properly.
- B. Structural Loads: Framing member sizes and wall thickness indicated are minimums and are for detailing only. Confirm framing member sizes, wall thicknesses, and need for internal reinforcements by analyzing Project loads and in-service conditions. Provide glazed wall system framing member sizes as indicated, but not less than size and strengths required to meet or exceed the following criteria:
1. Wind Loads: Provide entrance and storefront systems, including anchorage, capable of withstanding wind-load design pressures calculated according to requirements of authorities having jurisdiction or the American Society of Civil Engineers' ASCE 7, "Minimum Design Loads for Buildings and Other Structures," 6.4.2, "Analytical Procedure," whichever are more stringent.
 - a. Basic Wind Speed: 110 mph (49 m/sec).
 - b. Importance Factor: 1.0
 - c. Exposure Category: B.
 - d. Internal Pressure Coefficient: Indicate in the design calculations the internal pressure coefficient used in the design of exterior cladding and components.
 2. Deflection Normal to Wall Plane: Limited to 1/175 of clear span for spans up to 13 feet 6 inches (4.1 m) and to 1/240 of clear span plus 1/4 inch (6.35 mm) for spans greater than 13 feet 6 inches (4.1 m) or an amount that restricts edge deflection of individual glazing lites to 3/4 inch (19 mm), whichever is less.
- C. Structural-Test Performance: Provide aluminum-framed systems tested according to ASTM E 330 as follows:
1. When tested at positive and negative wind-load design pressures, systems do not evidence deflection exceeding specified limits.
 2. When tested at 150 percent of positive and negative wind-load design pressures, systems, including anchorage, do not evidence material failures, structural

- distress, and permanent deformation of main framing members exceeding 0.2 percent of span.
3. Test Durations: As required by design wind velocity but not less than 10 seconds.
- D. Thermal Movements: Provide aluminum-framed systems that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
- E. Air Infiltration: Provide aluminum-framed systems with maximum air leakage through fixed glazing and framing areas of 0.06 cfm/sq. ft. (0.03 L/s per sq. m) of fixed wall area when tested according to ASTM E 283 at a minimum static-air-pressure difference of 6.24 lbf/sq. ft. (300 Pa).
- F. Water Penetration Under Static Pressure: Provide aluminum-framed systems that do not evidence water penetration through fixed glazing and framing areas when tested according to ASTM E 331 at a minimum static-air-pressure difference of 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft. (300 Pa).
- G. Water Penetration Under Dynamic Pressure: Provide aluminum-framed systems that do not evidence water leakage through fixed glazing and framing areas when tested according to AAMA 501.1 under dynamic pressure equal to 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft. (300 Pa).
1. Maximum Water Leakage: According to AAMA 501.1. Water controlled by flashing and gutters that is drained to exterior and cannot damage adjacent materials or finishes is not considered water leakage.

1.6 SUBMITTALS

- A. Product Data for each product specified, including details of construction relative to materials, dimensions of individual components, profiles, and finishes.
- B. Shop Drawings showing fabrication and installation of entrance and storefront system including plans, elevations, sections, details of components, and attachments to other units of Work. Include metal and glass thickness, details of all field connections and anchorage, fastening and sealing methods, metal finishes, location of all joints, direction of expansion of wall and related components, exposed fasteners, work to be performed by other trades which adjoins and/or is secured to storefront system components, and all other pertinent information.
1. For installed products indicated to comply with certain design loadings, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation. Include certification signed and sealed by the qualified professional engineer responsible for the structural analysis preparation that the storefront system design complies with the Design/Performance Requirements specified. Submit engineering calculations and certification with first submittal of shop drawings.
 2. Show full and complete details of the entire system, related construction, general layout and elevations, glazing system, and setting blocks, connections, shims, glass types and sealant types.

3. Show sequence of erection. Accommodate deviation and qualification to the erection sequence by General Contractor without altering the design profiles.
 4. Do not change shop drawings and data bearing Architect's final review stamp, or deviate from construction operations, unless changes and deviations are coordinated with glass manufacturer and submitted to Architect for review.
 5. Begin fabrication only after receiving shop drawings bearing Architect's final review stamp.
- C. Samples for verification of each type of exposed finish required in manufacturer's standard sizes. Where finishes involve normal color and texture variations, include Sample sets showing the full range of variations expected.
- D. Product test reports from a qualified independent testing agency evidencing compliance of storefront system with requirements based on comprehensive testing of manufacturer's current system.
- E. Maintenance Manuals: Submit 3 copies each of detailed procedures for the periodic inspection, maintenance, and cleaning of all applicable storefront system elements, including glass and metal finishes.

1.7 QUALITY ASSURANCE

- A. Testing Agency Qualifications: To qualify for approval, an independent testing agency must demonstrate to Architect's satisfaction, based on evaluation of agency-submitted criteria conforming to ASTM E 699, that it has the experience and capability to satisfactorily conduct the testing indicated without delaying the Work.
- B. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in the jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of storefront systems that are similar to those indicated for this Project in material, design, and extent.
- C. Installer Qualifications: Engage an experienced installer to assume engineering responsibility and perform work of this Section who has specialized in installing storefront systems similar to those required for this Project and who is acceptable to manufacturer.
1. Engineering Responsibility: Engage a qualified professional engineer to prepare or supervise the preparation of data for storefront systems, including drawings, testing program development, test-result interpretation, and comprehensive engineering analysis that shows systems' compliance with specified requirements.
 2. Examine and study the Drawings and Specifications to insure the work as described is complete and submit written notification to the General Contractor of all discrepancies. Direct requests for clarification of conditions to the General Contractor.
 3. Examine and study the Drawings and Specifications with regard to the surfaces and structural framing to which all applicable work in this Section is attached and anchored. Submit written notification to the General Contractor of all deficiencies and detrimental factors that would affect proper and timely installation of the work of this Section.
 4. Furnish and install supplementary parts to comply with design/performance requirements and complete the work indicated. Design and size framing sections and components to meet the design/performance requirements. Furnish and install clips and bracing for secure anchorage of the storefront system elements to the structure.

5. Coordinate and verify, by measurement at the Project Site, all dimensions affecting work of this Section. Bring field dimensions that are at variance with those on the approved shop drawings to the attention of the General Contractor. Obtain decisions regarding corrective measures from the General Contractor before the start of installation of affected items. Assure compatibility of adjacent items in relationship to work of this Section.
 6. Cooperate with the General Contractor in the coordination and scheduling of the work of this Section with the work of other Sections so as not to delay Job progress.
 7. Maintain design concept as shown (member sizes, basic profiles, and component alignment). Modify only as necessary to meet performance requirements.
- D. Source Limitations: Obtain each type of storefront system from one source and by a single manufacturer.
- E. Product Options: Drawings indicate size, profiles, and dimensional requirements of entrance and storefront systems and are based on the specific system indicated. Other manufacturers' systems with equal performance characteristics may be considered. Refer to Division 01 Section "Product Requirements" for substitution procedures.
1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval and only to the extent needed to comply with performance requirements. Where modifications are proposed, submit comprehensive explanatory data to Architect for review.

1.8 DELIVERY AND STORAGE OF MATERIALS

- A. Store materials delivered to the Site in space(s) provided by the General Contractor on each floor of the building to permit easy access to and handling of the materials. Store materials neatly, properly stacked on dunnage, and protected from warping and damage. The Contractor shall not be required to move them except for installation.
1. Transport, handle, and store materials and components in a manner to preclude damage.
 2. Deliver accessory materials in manufacturer's labeled containers.
 3. Exercise care in handling and protect all materials and finishes during fabrication, shipment, storage, and erection as necessary to prevent damage to the finished surfaces.
 4. Remove all units and components that are cracked, bent, chipped, scratched, or otherwise unsuitable for installation and replace with new, approved items.

1.9 PROJECT CONDITIONS

- A. Field Measurements: Verify dimensions by field measurements before fabrication and show recorded measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
1. Where field measurements cannot be made without delaying the Work, guarantee dimensions and proceed with fabrication without field measurements. Coordinate construction to ensure that actual dimensions correspond to guaranteed dimensions.

1.10 WARRANTY

- A. Provide special project warranty as specified, agreeing to remove and replace entrance and storefront system work, including but not limited to, aluminum entrance units, storefront framing systems, and glass and glazing work which becomes unserviceable

or objectionable in appearance due to failure in materials or workmanship. Warranty includes removal and replacement of related work that must be removed to properly repair or replace storefront system work.

1. Failure of materials and workmanship includes, but is not limited to, excessive leakage or air infiltration, excessive deflections, deterioration of finish of metal in excess of normal weathering, and defects in hardware and accessories, weatherstripping, sealants, deterioration of glass coating, glass breakage resulting from thermal conditions, deterioration of insulating glass unit edge seal and other components of the work. Failure of materials or workmanship of entrance units includes failures in operation of doors and hardware.
2. Warranty period shall be 5-years for storefront system work from the Date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PRODUCT AND MANUFACTURER

- A. Product and Manufacturer: Subject to compliance with Design/Performance Requirements, provide the following produced by Oldcastle Building Envelope. Equivalent systems produced by Traco or Wausau Metal will be acceptable if approved by Architect.
1. Glazed Storefront System: Provide 4-1/2" x 2" tube type system complying with Design/Performance Requirements, and with continuous sill pan with end dams below all sills; Oldcastle Building Envelope, Terrell, TX, "Series 3000 Thermal Multipane Screw Spline Series Framing System," or equivalent produced by Traco or Wausau Metal, as approved.
 2. Wide Stile Entrance Doors: Oldcastle Building Envelope, Terrell, TX, "Series WS-500 Wide Stile Doors for 1/4-inch glazing," or equivalent produced by Traco or Wausau Metal, as approved. Provide complete with removable mullions at pair of doors, aluminum threshold, pile weather strip and door bottom seal. See Section 08 71 00 Door hardware for balance of door hardware.
 - a. Stiles: 5-inch wide.
 - b. Top and Bottom Rails: 6-3/4-inch, minimum.

2.2 MATERIALS

- A. Aluminum:
1. Sheet and Plate: ASTM B 209 (ASTM B 209M). Provide alloy and temper recommended by manufacturer for strength, application of required finish, but not less than 22,000-psi ultimate tensile strength.
 2. Extruded Bars, Rods, Shapes and Tubes: ASTM B 221 (ASTM B 221M). Provide alloy and temper recommended by manufacturer for strength, application of required finish, but not less than 22,000-psi ultimate tensile strength.
 3. Welding Rods and Bare Electrodes: AWS A 5.10.
- B. Steel Materials, General: Fabricate steel reinforcements and supports as follows:
1. Structural Steel Plates, Shapes, and Bars: ASTM A 36 (ASTM A 36M), pickled when exposed to view.
 2. Hot-Rolled Steel Sheet and Strip: ASTM A 570 (ASTM A 570M).
 3. Cold-Rolled Steel Sheet and Strip: ASTM A 611.

4. Stainless Steel Flashing: ASTM A 666, dead-soft, 0.018-inch- (0.047-mm-) thick stainless steel of type selected by manufacturer for compatibility with system.
- C. Glazing as specified in Section 08 81 00 – Glass and Glazing.
- D. Glazing Gaskets: Manufacturer's standard sealed-corner pressure-glazing system of black, resilient elastomeric glazing gaskets, setting blocks, and shims or spacers; in hardness recommended by manufacturer.
- E. Framing system gaskets and joint fillers as recommended by manufacturer for joint type.
- F. Sealants: Provide structural and weatherseal sealants recommended by the manufacturer of the structural sealant storefront system.
 1. Glazing sealants and fillers as specified in Section 08800 – Glass and Glazing.
 2. Structural silicone sealant shall be specifically designed and tested for use as structural sealant.
 3. Secondary seal or weatherseal silicone sealants shall be compatible with the structural silicone sealant. Weatherseal shall accommodate a 50 percent increase or decrease of joint width as measured
- G. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements, except containing no asbestos, formulated for 30-mil (0.762-mm) thickness per coat.

2.3 COMPONENTS

- A. Inserts, Brackets and Reinforcements: Provide manufacturers standard high strength aluminum brackets and reinforcements where possible. Where steel units are required for inserts, higher strength or other reason, hot-dip galvanize the units after fabrication, with 2.0 oz. zinc coating, complying with ASTM A 123.
- B. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials. Finish exposed portions to match glazed aluminum curtain wall.
 1. Provide fasteners and accessories complying with the "Design/Performance Requirements." Provide self-locking fasteners and nuts with nylon inserts or patches as manufactured by USM Corporation, Nylok Fastener Division, or equivalent approved by Architect.
 2. At movement joints, use slip-joint linings, spacers, and sleeves of material and type recommended by manufacturer.
 3. Where fasteners anchor into aluminum less than 0.125-inch (3.2 mm) thick, provide reinforcement to receive fastener threads.
 4. Use exposed fasteners with countersunk Phillips screw heads finished to match framing members, unless otherwise indicated.
- C. Anchors: 3-way adjustable anchors that accommodate fabrication and installation tolerances in material and finish compatible with adjoining materials and recommended by manufacturer. Provide hot-dip galvanized steel expansion anchors inserts complying with ASTM A 123 or ASTM A 153 requirements.

- D. Concealed Fasteners: Provide aluminum, 300 Series stainless steel or other non-corrosive metal fasteners of types proven to be compatible with the materials and items being fastened and required to
- E. Exposed Fasteners: Provide Phillips countersunk flat-head screws where exposed, unless otherwise approved or required. Finish exposed fasteners to match finish of exposed aluminum in which they occur.
- F. Shims: Provide galvanized steel (ASTM A 36 or A 283) and 300 Series stainless steel as approved by the Architect. Use aluminum or plastic shims only as approved by the Architect.
- G. Thermal Break: Provide rigid polyvinyl chloride (PVC) extrusions as required to conform to the structural performance requirements as indicated on the Drawings and specified in the "Design/Performance" paragraph.

2.4 FABRICATION

- A. General: Fabricate storefront system according to Shop Drawings. Fabricate 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 shapes with sharp profiles, straight and free of defects or deformations, before finishing.
- C. Prepare components to receive concealed fasteners and anchor and connection devices.
- D. Fabricate components to drain water passing joints, condensation occurring in glazing channels, condensation occurring within framing members, and moisture migrating within the system to the exterior.
- E. Welding: Weld components to comply with referenced standard and Shop Drawings, unless otherwise indicated. Weld before finishing components. 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.
- F. Glazing Pockets: Provide minimum clearances for thickness and type of glass indicated according to GANA's "Glazing Manual."
- G. Metal Protection: Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

2.5 ALUMINUM FINISH

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

- B. 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.
- C. Finish designations prefixed by AA conform to the system established by the Aluminum Association for designating aluminum finishes.
- D. Class I, Clear Anodic Finish: AA-M12C22A41 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 607.1.

2.6 METAL PRIMING

- A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations relative to applying primer.
- B. Surface Preparation: Perform manufacturer's standard cleaning operations to remove dirt, oil, grease, or other contaminants that could impair paint bond. Remove mill scale and rust, if present, from uncoated steel.
- C. Priming: Apply manufacturer's standard corrosion-resistant primer immediately after surface preparation and pretreatment.
 - 1. Paint for Carbon Steel:
 - a. Concealed Parts: One shop coat of rust inhibitive primer or zinc chromate primer; FS TT-P-645.
 - b. Exposed Parts: One shop coat of zinc rich paint; MIL-P-2103S and MIL-P-38336.
 - 2. Galvanizing of Carbon Steel:
 - a. Steel Sheets: FA QQ-S-775c.
 - b. Hot-dipped for Shapes, Plates, Bars, and Strip: ASTM A 123.
 - 3. Aluminum (Concealed Parts): One shop coat of zinc chromate primer; FS TT-P-645.
 - 4. Dielectric Paint Between Dissimilar Metals: One coat of bituminous paint; FS TT-C-494 or MIL-P-6883A.

2.7 SEALANTS

- A. One-Part Non-Acid Curing Silicone Sealant: ASTM C 920, Type S, Grade NS, Class 25, and Uses NT, M, G, A, and, as applicable to joint substrates indicated, O; medium modulus with a tensile strength between 45-psi and 75-psi at 100% elongation when tested after 14 days at 77°F (25° C.) and 50% relative humidity per ASTM D 412.
 - 1. Products: Subject to compliance with requirements, provide either General Electric "Silpruf 2000" or Dow Corning "795 Building Construction Sealant."
 - 2. Locations: All metal-to-metal and metal to glass dynamically moving joint locations not otherwise noted or specified, including interior sealant joints on

interior side of components subject to thermal movement from exterior heat sources.

3. Colors: As selected by Architect from manufacturer's standard colors.
- B. Narrow joint sealant conforming to AAMA Standard 803.3.
1. Tremco "Curtain Wall Sealant" conforming to AAMA Standard 809.2.
- C. Bond Breaker Tape: Polyethylene tape or other plastic tape as recommended by the sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.
- D. Joint Sealant Backing:
1. Closed-cell polyethylene foam rod, non-gassing.
 2. Expanding foam sealant; Polytite B by Polytite Manufacturing Corp. or Polyseal by Sandell Mfg. Co.

2.8 MISCELLANEOUS MATERIALS

- A. Self-Adhesive Elastic Flashing: Protecto Wrap Co. "Ice & Water Guard" flashing tape, W. R. Grace "Perm-A-Barrier," Polyguard Products "Polyguard 650," Henry "Blueskin WP 200," or equivalent 40 mil thick rubberized asphalt self-adhesive tape. Include recommended primers.

2.9 FABRICATION

- A. General: Complete the cutting, fitting, forming, drilling, and grinding of all metal work prior to cleaning, finishing, treatment, and application of coatings. Conceal fasteners wherever possible. Fabricate and assemble components in accordance with approved shop drawings. Deviations of any nature will not be permitted without prior approval of the Architect. Minor adjustments for weather integrity or strength may be suggested for Architect's approval. In the event of controversies over design or details, the decision of the Architect will take precedence.
- B. Carefully fabricate components and assemble with proper and approved provision for thermal expansion and contraction, material and fabrication and installation tolerances, and adjoining building component tolerances and design criteria.
- C. Weld aluminum by methods and with materials recommended by the aluminum manufacturer and AWS to avoid distortion and discoloration at welds. Grind exposed welds smooth and restore mechanical finish. Remove arises from cut edges and ease edges and corners to a radius of approximately 1/64-inch.
1. Where weld metal must be exposed before anodizing, select filler alloys to closely match the composition of the base metal. Follow parent metal manufacturer's recommendations for such filler alloys.
 2. Where concealed weldments are to be made on materials that have been previously anodized or paint coated, remove anodizing or paint film in the area of fusion prior to welding. Mask parts at weld areas during anodizing or sand clean prior to welding. Crazeing or discoloring of the anodizing or paint coating on the exposed areas will not be acceptable.

- D. Fit and assemble the work at the shop to the greatest extent possible. Disassemble only as required for shipment and erection. Maintain true continuity of line and accurate relation of planes and angles. Provide secure attachment and support at mechanical joints, with hairline fit of contacting members.
- E. Where 2 or more sections of metal are used in building up members, bring contact surfaces to a smooth, true, and even surface and secured together so that the joints will be weathertight without the use of pointing material. Exposed sealants, except where shown, will not be permitted. Tolerance extrusions to eliminate edge projection and misalignment at joints.
- F. Fasteners: Provide stainless steel fasteners with self-locking devices, unless otherwise noted, and of sufficient size and strength to withstand the applicable design wind load and dead load forces with safety allowance factors as required for the specific materials.
 - 1. Space fasteners to develop the maximum strength of the members they secure or support.
 - 2. Provide washers and other accessory items of the same material as the fastener.
 - 3. Torque-tighten all assembly fasteners (except as may be required at expansion joints) to achieve the maximum torque-tension relationship in the fastener.
 - 4. At expansion joints, torque-tighten fasteners so as to provide proper support of the expansion joint connection elements and free noiseless movement at the connection without rattling.
- G. Conceal fasteners unless otherwise shown or approved. Where exposed fasteners are required, provide countersunk Phillips oval head type, unless otherwise indicated. Finish exposed fasteners to match surrounding metal finish.
- H. Provide extruded aluminum removable members, such as glass stops, securely engaged into adjacent components as indicated.
- I. Exposed Cladding, Trim, Panels, and Similar Components:
 - 1. Fabricate cladding elements with fabricated edge flanges as indicated and conforming to the flatness requirements specified. Provide backside stiffener members to maintain required flatness and structural performance.
 - 2. Do not exceed the following surface slope at any point, when measured at room temperature, measured from the nominal plane of the surface in its final installed position:
 - a. 1.0 deg. for surfaces having a finish of high reflectivity.
 - b. 1.25 deg. for surfaces having a finish of medium reflectivity.
 - c. 1.5 deg. for surfaces having a finish of low reflectivity.
- J. Use certified welders and make structural steel welds to conform to the requirements of the American Welding Society Specifications D1.1 "Structural Welding Code - Steel."
 - 1. Remove dirt, grease, lubricant, and organic materials by vapor or solvent degreasing.
 - 2. Repair joints rejected because of welding defects only by re-welding. Remove defective welds by chipping or machining. Do not flame cut welds.
 - 3. Where welding is done in proximity to glass or finished surfaces, protect glass and finished surfaces from damage due to weld sparks, spatter, or tramp metal.
 - 4. Touch up paint welds in galvanized metal with zinc rich paint.

5. Fill pinholes in welds and surface damage on all exposed surfaces of work visible under finished lighting condition when viewed from a distance of 6', with 2 component automotive body filler compatible with primer paint. Match adjacent metal surface finish unless otherwise indicated.

2.10 SHOP PAINTING WALL SYSTEM SUPPORT FRAMING

- A. Remove scale, rust, and other deleterious materials before the shop coat of paint is applied. Clean off heavy rust and loose mill scale in accordance with SSPC SP-2 "Hand Tool Cleaning." Remove oil, grease and similar contaminants in accordance with SSPC SP-1 "Solvent Cleaning."
- B. Apply 1 shop coat of primer paint to fabricated support framing, except apply 2 coats of paint to surfaces that are inaccessible after assembly or erection. Change color of second coat.
- C. Brush or spray on metal primer paint, at a rate to produce a uniform dry film thickness of 2.0-mils for each coat. Provide full coverage of joints, corners, edges, and all exposed surfaces.

2.11 FABRICATION QUALITY CONTROL

- A. Provide full access to Architect, Owner, General Contractor, and their authorized representatives to plants, shops, and assembly points to view and inspect the processes and methods employed in the fabrication, finishing, pre-assembling, and glazing (as applicable) of the storefront system components for this Project.
- B. Provide work true to detail with sharp, clean profiles straight and free from defects, dents, marks, indentations, waves, or flaws of any nature impairing strength or appearance, fitted with proper joints and intersections and with specified finishes.
- C. All items the Architect's, Owner's, or General Contractor's authorized representative notes to have any deficiency shall:
 1. Be removed from production lines.
 2. Not be loaded and shipped.
 3. Not be installed or assembled on the Project Site until repairs or replacement parts are approved by authorized representative.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. After lines and grades have been established by the General Contractor, but before beginning installation in any area, examine the supporting structure in the vicinity of storefront system work and report all conditions in writing to the General Contractor which would prevent the proper execution of the storefront system work or endanger its permanency.
- B. Do not proceed with installation in the affected area until unacceptable conditions have been corrected.

3.2 INSTALLATION

- A. General: Comply with manufacturer's written instructions for protecting, handling, and installing storefront system. Do not install damaged components. Fit joints to produce hairline joints free of burrs and distortion. Rigidly secure nonmovement joints. Seal joints watertight, unless otherwise indicated. Provide means to drain water to the exterior to produce a permanently weatherproof system.
- B. Do not cut, trim weld, or braze component parts during erection, in any manner that would damage the finish, decrease the strength, or result in visual imperfection or failure in performance of the construction.
- C. Metal Protection: Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
- D. Install components to drain water passing joints, condensation occurring in glazing channels, condensation occurring within framing members, and moisture migrating within the system to the exterior.
- E. Install framing members plumb and true in alignment with established lines and grades.
- F. Install factory-assembled frame units plumb and true in alignment with established lines and grades.
- G. Anchorage: After system components are positioned, fix connections to building structure as indicated on Shop Drawings.
 - 1. Provide separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
- H. Welding: Weld components to comply with referenced standard and Shop Drawings, unless otherwise indicated. Weld in concealed locations to minimize distortion or discoloration of finish. Protect glazing surfaces from welding.
- I. Install glazing according to Shop Drawings. Comply with requirements of Section 08 81 00 – Glass and Glazing, unless otherwise indicated.
- J. Sealants and Related Materials: Use sealing materials in strict accordance with sealant manufacturer's printed instructions. Apply sealants only by mechanics specially trained or experienced in their use. Ensure that sealants, tapes, gaskets, separators, joint fillers, and back-up materials are physically and chemically compatible with each other and with adjacent materials. Before applying sealant, completely remove all mortar, dirt, dust, moisture, and other foreign matter from sealant bond surfaces. Clean metal surfaces with oil free solvent, such as Toluene or Xylene. Wash one small area at a time and then dry with a clean white cloth before solvent evaporates. Do not apply sealant to damp surfaces. Apply primers as required by manufacturer. Apply primer to stone bond surfaces to prevent staining. Mask adjoining surfaces when required to maintain a clean and neat appearance. Tool sealing compounds to fill the joint and provide a smooth finished surface.

1. Thoroughly seal all metal-to-metal joints between elements of storefront system work by buttering joints with sealant immediately prior to the final assembly of abutting sections. Clean all excess sealant from exposed surfaces.
 2. Install sleeves, lugs, and related items in a full bed of sealant and seal perimeter when component is in final installed position as indicated or required by specified "Performance Requirements." Clean all excess sealant from exposed surfaces.
- K. Install component parts level, plumb, true to line, and with uniform joints and reveals. Secure to structure with non-staining and non-corrosive shims, anchors, fasteners, spacers, and fillers. Use erection equipment that will not mar or stain finished surfaces in any way.
- L. Clean debris, dust, and other substances from behind and adjacent to the storefront system work as it is erected, and provide temporary closures to prevent the accumulation of such substances in the void spaces behind the glazed window wall system.
- M. Assembly and Anchorage:
1. Anchor component parts securely in place, by bolting, welding, or other permanent mechanical attachment system, which will comply with performance requirements and expected movements of adjacent parts.
 2. Apply a bituminous coating of approximately 30-mil dry film thickness, or other suitable permanent separator, on concealed contact surfaces of dissimilar materials, before assembly or installation.
 3. Set sill members and other members with joint fillers and elastomeric sealant to provide weathertight construction.
- N. Flashing: Provide flashings of the material and profiles indicated. Provide continuous flashings in longest lengths possible. Lap joints 12" minimum and seal concealed area of entire lap with curtain wall sealant. Provide mechanical fasteners to maintain contact of overlapping elements.

3.3 ERECTION TOLERANCES

- A. Provide installed storefront system components conforming with to following erection tolerances:
1. Maximum Deviation for Vertical Member: 1/8-inch maximum in story height of 13-feet and 1/4-inch maximum.
 2. Maximum Deviation for Horizontal Members: 1/8-inch maximum in a 30-foot run.
 3. Maximum offset from true alignment between two abutting members shall be 1/32-inch. No edge projection or misalignment will be permitted.
 4. Maximum joint gap or opening between removable glazing stop and adjacent member shall be 1/32-inch and/or a maximum 1/32-inch cumulative opening at both ends of removable member (1/64-inch each end).

3.4 CLEANING

- A. Clean completed system, inside and out, promptly after erection and installation of glass and sealants (allow for nominal cure of liquid sealants). Contractor shall advise General Contractor of proper and adequate protection and cleaning procedures during remainder of construction period, so that the system will be without damage and deterioration at time of acceptance.

1. Just prior to Date of Substantial Completion, clean storefront system thoroughly and polish glass. Demonstrate proper cleaning methods and materials to Owner's maintenance personnel.
2. Submit a "Cleaning and Maintenance Manual" listing the types of cleaning compounds, cleaning methods, and the types of sealant and glazing materials to be used for cleaning, repair, and maintenance of the work, as specified.

3.5 PROTECTION

- A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer that ensure storefront system is without damage or deterioration at the time of Substantial Completion.

END OF SECTION 08 41 00