

SECTION 08411 — ALUMINUM ENTRANCES, STOREFRONT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Exterior and interior aluminum-framed storefronts. (center glazing plane applications)
 - 2. Pre-finished and closure insulated panels.
 - 3. Exterior and interior manual-swing aluminum doors.
 - a. Monumental door construction at exterior applications.
 - b. Standard door construction at interior applications.
- B. Related Sections include the following:
 - 1. Division 8 Section “PWCPS – HS Finish Hardware” for hardware not included herein.
 - 2. Division 8 Section “Glazing” for glazing materials and requirements not specified herein.

1.3 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. Dimensional tolerances of building frame and other adjacent construction.
 - 4. 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. Noise or vibration created by wind and thermal and structural movements.
 - e. Loosening or weakening of fasteners, attachments, and other components.
 - f. Sealant failure.
- B. Structural Loads:
 - 1. Wind Loads: As indicated on Structural Drawings.
 - 2. Seismic Loads: As indicated on Structural Drawings.
- C. Structural-Test Performance: Provide aluminum-framed systems tested per ASTM E 330 as follows:
 - 1. When tested at positive and negative wind-load design pressures, systems do not evidence deflection exceeding specified limits.

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PRINCE WILLIAM COUNTY

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. Deflection of Framing Members:
1. Deflection Normal to Wall Plane: Limited to 1/175 of clear span for spans up to 13 feet 6 inches, and to 1/240 of clear span plus 1/4 inch, for spans greater than 13 feet 6 inches or an amount that restricts edge deflection of individual glazing lites to 3/4 inch, whichever is less.
 2. Deflection Parallel to Glazing Plane: The smaller of 1/360 of clear span or 1/8 inch.
 - a. Operable Units: Minimum 1/16-inch clearance between framing members and operable units.
- E. 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, ambient; 180 deg F, material surfaces.
- F. Air Infiltration: Provide aluminum-framed systems with maximum air leakage through fixed glazing and framing areas of 0.06 cfm/sq. ft. of fixed wall area when tested according to ASTM E 283 at a minimum static-air-pressure difference of 6.24 lbf/sq. ft.
- G. Water Penetration Under Static Pressure: Provide aluminum-framed systems that do not evidence water penetration through fixed glazing and framing areas when tested **per** ASTM E 331 at a minimum static-air-pressure difference of 20 percent of positive wind-load design pressure, but minimum 6.24 lbf/sq. ft.
- H. Condensation Resistance: Provide aluminum-framed systems with fixed glazing and framing areas having condensation-resistance factor (CRF) of not less than 53 when tested according to AAMA 1503.
- I. Average Thermal Conductance: Provide aluminum-framed systems with fixed glazing and framing areas having average U-factor no more than 0.57 Btu/sq. ft. x h x deg F when tested according to AAMA 1503.
- 1.4 SUBMITTALS:
- A. Provide submittals for the following related sections concurrently.
 1. 08411 aluminum entrances, storefront and curtain wall
 2. 08710 finish hardware
 - B. Product Data: Submit manufacturer's product specifications, technical product data, standard details, and installation recommendations for types of aluminum entrance, storefront, operable sashes and curtain wall required. Include information on fabrication methods, finishing, door hardware, and accessories.
 1. Submit data for prefinished insulated panels.

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PRINCE WILLIAM COUNTY

- C. Shop Drawings: For aluminum-framed systems. Include plans, elevations, sections, details, and attachments to other work. Indicate anchorage of aluminum-framed systems to surrounding construction to transfer wind loading to structure.
 - 1. Include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 - 2. Include details of provisions for system expansion and contraction and for draining moisture occurring within the system to the exterior.
 - 3. For entrances, include hardware schedule and indicate operating hardware types, quantities, and locations. Coordinate with Division 8 Section “PWCPS – HS Finish Hardware.”
 - D. Samples for Selection: For insulated metal panel factory-applied color finishes.
 - E. Certification: Provide certified test results showing that systems have been tested by a recognized testing laboratory or agency and comply with performance characteristics.
- 1.5 QUALITY ASSURANCE:
- A. Source Limitations: Obtain aluminum entrances, storefront and curtain wall (08411) through one source from a single manufacturer.
 - B. Installer's Qualifications: Storefront, curtain wall, operable sashes and entrances shall be installed by a firm with not less than 5-years successful experience in the installation of systems similar to those required. Capable of assuming engineering responsibility and performing work of this Section and who is acceptable to manufacturer.
 - 1. Engineering Responsibility: Preparation of data for aluminum-framed systems including Shop Drawings based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project and submission of reports of tests performed on manufacturer's standard assemblies.
 - C. Manufacturer's Qualifications: Provide storefront, curtain wall, operable sashes and entrances produced by a single manufacturer with not less than 5 years successful experience in the fabrication of assemblies of the type and quality required.
 - D. Design Standard: Based on Efcocorp “403” storefront system, and Efcocorp 5600 (2.25-inch) curtain wall system, and Efcocorp D500 and D518 aluminum entrances,.” www.efcocorp.com
 - E. Welding Standards: Comply with applicable provisions of AWS D1.2, “Structural Welding Code--Aluminum.”
- 1.6 PROJECT CONDITIONS:
- A. Field Measurements: Check openings by field measurement before fabrication to ensure proper fitting of work; show field measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delay in the work. Coordinate fabrication tolerances to ensure proper fit. Coordinate and allow for sealant joints and steel lintels.
- 1.7 WARRANTY
- A. General Warranty: The special warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties under requirements of the Contract Documents.

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PRINCE WILLIAM COUNTY

- B. Special Warranty: Submit a written warranty executed by the manufacturer agreeing to repair or replace components of entrance, curtain wall, and storefront systems that fail in materials or workmanship within warranty period. Failures include, but are not limited to, the following:
1. Structural failures including, but not limited to, excessive deflection.
 2. Failure of system to meet performance requirements.
 3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 4. Failure of operating components to function normally.
 5. Water leakage through fixed glazing and frame areas.
- C. Warranty Period
1. Entrance, Curtain Wall, and Storefront Systems: 2 years from date of Substantial Completion.
 2. Warranty Period on Finish System: 5 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work shall be one of the following:

	Storefront (2x4.5)	Std Entrance (interior)	H-D Entrance (exterior)
Vistawall Arch. Products.	3000	500	Rugged Entrance
EFCO Corporation.	S403	D500	D518
Kawneer Company, Inc.	451T	500	Tuffline 500
YKK	YES45TU	50D	40D
US Aluminum Corporation	IT451	550	850 Durafront

2.2 MATERIALS:

- A. Aluminum Members: Provide alloy and temper recommended by the manufacturer for strength, corrosion resistance, and application of required finish; meet ASTM B 221 for extrusions and ASTM B 209 for sheet or plate.
- B. Fasteners: Provide fasteners of aluminum, nonmagnetic stainless steel, or other materials warranted by manufacturer to be noncorrosive and compatible with aluminum components, hardware, anchors and other components.
1. Reinforcement: Where fasteners screw-anchor into aluminum less than 0.125" thick, reinforce the interior with aluminum or nonmagnetic stainless steel to receive screw threads, or provide standard noncorrosive pressed-in splined grommet nuts.
 2. Exposed Fasteners: Except where unavoidable for application for hardware, do not use exposed fasteners. For the application of hardware, provide fasteners that match the finish of member or hardware being fastened. Provide Phillips flat-head machine screws for exposed fasteners.
- C. Concealed Flashing: Provide 26 gage minimum dead-soft stainless steel, or 0.026" minimum extruded aluminum of alloy and type selected by manufacturer for compatibility with other components.

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PRINCE WILLIAM COUNTY

- D. Brackets and Reinforcements: Where feasible, provide high-strength aluminum brackets and reinforcements; otherwise provide nonmagnetic stainless steel or ASTM A 386 hot-dip galvanized steel.
- E. Masonry Inserts: Fabricated from cast-iron, malleable iron, or ASTM A 386 hot-dip galvanized steel.
- F. Glass and Glazing Materials: Comply with requirements of Section 08800.

2.3 COMPONENTS:

- A. Entrance Doors (interior): Provide manufacturer's standard 1-3/4-inch- thick glazed doors with minimum 0.125-inch- thick, extruded tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deep penetration and fillet welded or that incorporate concealed tie-rods. (Stile design and muntin note for monumental doors apply here as well.)
 - 1. Glazing Stops and Gaskets: Provide manufacturer's standard snap-on extruded-aluminum glazing stops and preformed gaskets. Provide stops at doors for 1/4-inch thick glass (interior) to match storefront and curtain wall glazing.
- B. Monumental Entrance Doors (exterior): Provide manufacturer's high-performance, heavy-extrusion, 2-inch-thick glazed aluminum doors with minimum 0.185-inch- (3/16") thick, extruded tubular rail and stile members. Include manufacturer's attendant matching heavy-extrusion aluminum door framing members as part of the entrance system. Door framing members shall be compatible with contiguous storefront system where indicated adjacent, including profile and glazing accommodations. Mechanically fasten corners with reinforcing brackets that are deep penetration and fillet welded or that incorporate concealed tie-rods.
 - 1. Glazing Stops and Gaskets: Provide manufacturer's standard snap-on extruded-aluminum glazing stops and preformed gaskets. Provide stops at doors for 1-inch thickness insulating glass (exterior) to match storefront and curtain wall glazing.
 - 2. Stile Design: Wide stile; 5-inch nominal width, with 8-inch top and 12-inch bottom rails indicated.
 - 3. Muntins: Provide muntins to maintain uniform site-line, and in pattern as indicated.
- C. Storefront Framing System: Provide center set, resilient flush-glazed storefront framing system with provisions for glass replacement. Shop-fabricate and preassemble frame components where possible. Provide for 1" thickness insulating glass (exterior) and 1/4" thick glass (interior), as indicated.
 - 1. Thermal-Break Construction: Fabricate with integrally concealed, low conductance thermal barrier, located between exterior materials and exposed interior members to eliminate direct metal-to-metal contact. Use manufacturer's standard construction.
 - a. Interior storefront framing applications may utilize non thermal-break construction in lieu of thermal-break construction of same 2-inch by 4.5-inch profile.
 - 2. Sills: Provide extruded aluminum sills of profile and dimension to suit substrate construction and direct water from widows; of profile and dimensions not less than 0.062-inch- thick extruded aluminum. Match window unit finish.

2.4 FABRICATION:

- A. Prefabrication: Before shipment to the project site, complete fabrication, assembly, finishing, hardware application, and other work to the greatest extent possible. Disassemble components as necessary for shipment and installation.
 - 1. Perform fabrication operations, including cutting, fitting, drilling and grinding of metal work to prevent damage to exposed finish surfaces. Do not drill and tap for hardware items until time of installation at project site.
- B. Welding: Comply with AWS recommendations; grind exposed welds smooth and restore mechanical finish.
- C. Reinforcing: Install reinforcing as required for performance requirements, sag resistance and rigidity.
- D. Metal Protection: Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying manufacturer's recommended sealant or tape. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
- E. Framing: Fabricate framing in profiles indicated for flush glazing (without projecting stops). Provide subframes and reinforcing of types indicated or, if not indicated, as required for a complete system. Factory-assemble components to greatest extent possible. Disassemble components only as necessary for shipment and installation.
 - 1. Provide heavy-duty extrusion sections or steel-reinforced sections for project applications which exceed the structural capacity of standard framing member extrusions. Provide framing members sized to withstand windloads for applications indicated as substantiated by manufacturer's windload charts.
 - 2. Provide closed back (or flat filler) extruded jamb section for all door jamb installations to masonry. Open back sections are not acceptable for these applications. Provide concealed anchorage for jamb extrusions.
 - 3. Insulating glass is specified in Division 8 Section "Glazing."
 - 4. Subframes: Provide subframes with anchors for applications indicated, not less than 0.062-inch-thick extruded aluminum. Miter or cope corners, and weld and dress smooth with concealed mechanical joint fasteners. Match finish of primary framing members.
 - 5. Built-up Corner Closures and Sill Base: Provide aluminum closure pieces of profiles and dimensions indicated, finished to match other exposed components. Provide outside-corner profiles of not less than 0.062-inch- thick extruded aluminum and base sill closure pieces of not less than 0.080-inch- thick extruded or sheet aluminum.
 - 6. Sills: Provide extruded aluminum sills of profile and dimension to suit substrate construction and direct water from widows; of minimum 0.062-inch- thickness. Match storefront finish. Provide extruded aluminum sill members for exterior sills.
 - 7. Mullions: Provide mullion cover sections as indicated.
 - 8. Closure Panels: Provide .125 inch aluminum plate panels with continuous extruded aluminum perimeter mounting angle mounted to continuous storefront stiles.
- F. Entrances: Reinforce as required to support imposed loads. Factory-assemble door and frame units and factory install hardware to greatest extent possible. Reinforce doors and frames as

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PRINCE WILLIAM COUNTY

required for hardware indicated. Cut, drill, and tap for factory-installed hardware before finishing components.

1. Exterior Doors: Provide compression weather stripping at fixed stops. Elsewhere, provide sliding weather stripping retained in adjustable strip mortised into door edge.

G. Continuity: Maintain accurate relation of planes and angles, with hairline fit of contacting members.

H. Fasteners: Conceal fasteners.

2.5 FINISHES:

A. Class II, Clear Anodic Finish: AA-M12C22A31 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class II, clear coating 0.010 mm or thicker) complying with AAMA 611.

PART 3 - EXECUTION

3.1 INSTALLATION:

A. General: Comply with manufacturer's written instructions for protecting, handling, and installing curtain wall system. Do not install damaged components. Fit frame joints to produce hairline joints free of burrs and distortion. Rigidly secure non-movement joints. Seal joints watertight, unless otherwise indicated. Provide means to drain water to the exterior to produce a permanently weatherproof system.

B. 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.

C. 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. Include sill flashing element extending full width of frame with end dams.

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

E. 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.

3.2 ERECTION TOLERANCES

A. Install aluminum-framed systems to comply with the following maximum erection tolerances:

1. Location and Plane: Limit variation from true location and plane to 1/8 inch in 12 feet; 1/4 inch over total length.

2. Alignment:

a. Where surfaces abut in line, limit offset from true alignment to 1/16 inch.

b. Where surfaces meet at corners, limit offset from true alignment to 1/32 inch.

B. Diagonal Measurements: Limit difference between diagonal measurements to 1/8 inch.

CD HYLTON HIGH SCHOOL VESTIBULE AND POTOMAC HIGH SCHOOL FIRE DOORS –
PRINCE WILLIAM COUNTY

3.3 PROTECTION

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

END OF SECTION 08411