**section 08 41 13** – ALUMINUM FRAMED ENTRANCES AND STORE FRONTS

1. GENERAL
   * + 1. SUMMARY
          1. Furnish labour, materials, and other services to complete the fabrication and installation of:

Glazed aluminum exterior storefront glazing and window framing.

Exterior and interior manual swing glazed aluminum doors.

* + - * 1. Related Requirements:

Section 04 20 00 – Unit Masonry.

Section 07 21 13 – Board Insulation.

Section 07 21 16 – Blanket Insulation.

Section 07 24 00 – Exterior Insulation and Finish System (EIFS).

Section 07 27 39 – Vapour Permeable Air Barrier Membrane.

Section 07 84 00 – Firestopping and Smokeseals.

Section 07 92 00 – Joint Sealants.

Section 09 29 00 – Gypsum Wallboard.

Section 09 90 00 – Painting.

* + - 1. reference standards
         1. Aluminum Association (AA):

Aluminum Design Manual, Latest Edition.

* + - * 1. American Architectural Manufacturers Association (AAMA):

AAMA 501-05, Methods of Test for Exterior Walls.

AAMA 611-12, Voluntary Specification for Architectural Anodized Aluminum.

AAMA 1503-09, Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections.

AAMA 2603-13, Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels.

AAMA 2604-13, Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coating on Aluminum Extrusions and Panels.

AAMA 2605-13, Voluntary Specification, Performance Requirements and Test Procedures for Superior Performance Organic Coating on Aluminum Extrusions and Panels.

SFM-1-87, Aluminum Storefront and Entrance Manual.

* + - * 1. American National Standards Institute (ANSI):

ANSI H35.1-2006, Alloy and Temper Designation Systems for Aluminum.

ANSI/BHMA A156.1-2013, Butts and Hinges.

ANSI/BHMA A156.3-2001, Exit Devices.

ANSI/BHMA A156.4-2013, Door Controls - Closers.

ANSI/BHMA A156.5-2010, Cylinders and Input Devices for Locks.

ANSI/BHMA A156.6-2010, Architectural Door Trim.

ANSI/BHMA A156.8-2010, Door Controls - Overhead Stops and Holders.

ANSI/BHMA A156.16-2002, Auxiliary Hardware.

ANSI/BHMA A156.21-2009, Thresholds.

* + - * 1. American Society for Testing and Materials (ASTM):

ASTM A653/A653M-06, Standard Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc Iron Alloy Coated (Galvannealed) by the Hot Dip Process.

ASTM A167-99 (R2004), Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip.

ASTM B209/209M-04, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

ASTM B221/B221M-05, Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

ASTM B308/B308M-02, Standard Specification for Aluminum-Alloy 6061-T6 Standard Structural Profiles.

ASTM B429-02, Standard Specification for Aluminum-Alloy Extruded Structural Pipe and Tube.

ASTM E330-02, Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.

ASTM E331-00, Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.

ASTM E783-02(2010), Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors.

ASTM E1105-00(2008), Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform or Cyclic Static Air Pressure Difference.

* + - * 1. Canadian Standards Association (CSA):

CAN/CSA G40.20/G40.21-04, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steels.

CSA W47.1-09, Certification of Companies for Fusion Welding of Steel Structures.

CSA W47.2-11, Certification of Companies for Fusion Welding of Aluminum.

CSA W59-03(2008), Welded Steel Construction (Metal Arc Welding), Metric.

CSA W59.2-M1991(R2013), Welded Aluminum Construction

* + - * 1. Canadian Welding Bureau (CWB Group Industry Services):

CWB 112E, 93-1, Welding Symbols Study Guide.

CWB 113E, 94-1, Weld Quality and Examination Methods Study Guide.

* + - * 1. The Association for material Protection and Performance (AMPP) (formerly The Society for Protective Coatings (SSPC))/National Association of Corrosion Engineers (NACE International):

Surface Preparation Guidelines:

SSPC-SP COM Surface Preparation Commentary for Steel and Concrete Substrates.

SSPC-PS Guide 12.00, Guide to Zinc-Rich Coating Systems.

* + - 1. WORK SUPPLIED BUT INSTALLED BY OTHER SECTIONS
         1. Supply inserts, anchors and other items to be built into work of other Sections and required for support of aluminum framed entrances and storefronts.
         2. Provide clear instructions and, if required setting templates to ensure accurate setting of components.
      2. QUALITY ASSURANCE
         1. System Manufacturer's Qualifications:

Minimum five (5) years continuous experience in successful production of work of type and quality specified. Submit proof of experience upon Consultant's request.

* + - * 1. Erector's Qualifications:

Manufacturer's forces or forces licensed by manufacturer. Work of this Section shall be performed by workers trained and experienced in the type of work specified. A manufacturer's representative shall be at the site during erection of system to direct the various stages of operations.

* + - 1. administrative requirements
         1. Pre-Construction Meeting: Conduct a pre-construction meeting in accordance with Section 01 31 19 – Project Meetings, on site to review methods and procedures related to aluminum framed entrances and storefronts including, but not limited to, the following:

Review and finalize construction schedule and verify availability of materials, installer's personnel, equipment, and facilities needed to make progress and avoid delays.

Review location and alignment of vertical and horizontal elements as they relate to the aesthetic criteria indicated on the Drawings, and the technical requirements indicated on the shop drawings.

* + - 1. DESIGN AND PERFORMANCE REQUIREMENTS
         1. Details and information indicated on drawings are schematic, showing general intent only and shall not be considered or construed to be the engineering design for the system or to be complete or adequate to meet the design criteria.
         2. Make thorough examination of drawings and details, check anchorage, structural deflections, shading factors, size and shape of glass, system of sealing, location of heating units, interfacing requirements with work of other Sections and other factors influencing design and performance of aluminum framed entrances and storefronts.
         3. Design, fabricate and erect aluminum framed entrances and storefront systems to meet or exceed the following minimum requirements:

Design system based on the rain screen, pressure equalization principle. The storefront system must form an air sealed envelope on the building. Ensure that all ties to other building envelope components are air sealed.

Design components to sizes and profiles indicated, reinforced if required, to limit deflection to L/200 maximum under positive and negative peak wind design gust pressures, in accordance with OBC Climatic Design Data (30-year probability), in accordance with ASTM E330-90.

Make provisions to accommodate thermal and structural movement, including building structural framing deflection and creep, in component parts of system and fastenings without joint seal failure, glass breakage and other detrimental effects.

Prevent water infiltration into building through system, when system is subjected to water spray at 5 gals/sf/hr maintained for 15 minutes with static pressure difference across system of 4 psf, in accordance with ASTM E331-86.

Limit air infiltration and exfiltration through system to maximum .02 cfm/sf when subjected to static pressure of 1.57 psf, in accordance with ASTM E283-84.

Provide effective vapour seal at inside face of system, designed to prevent detrimental condensation and ice build-up within system.

Prevent condensation and frosting on inside surfaces of system when subjected to outside temperature of -25 deg C and 15 mph wind and inside temperature of +20 deg C/25% R.H.

Limit temperature difference between central and edge portions of any pane of glass to less than the maximum permissible value stated by glass manufacturer.

Design thermal barrier connection to achieve complete metal-to-metal separation between main framing and glass retention members except for screw fasteners. Assembled frame section shall have a maximum "U" factor of .455 Btu/(sf/hr/deg F).

* + - 1. SUBMITTALS
         1. Submit submittals in accordance with Section 01 33 00 – Submittal Procedures.
         2. Shop Drawings:

Furnish complete shop and erection drawings required for the Work of this Section to the Consultant for review prior to fabrication. Shop drawings shall bear the seal and signature of a Professional Engineer registered to practise at the Place of Work.

Co-ordinate shop drawings for Work of this Section with those for other trades to ensure correct interface details required to provide watertight installation.

Shop drawings shall incorporate plans, elevations, sections and details for all work in this Section. The details shall show and specify all metal and glass thicknesses, types and finishes; areas to be sealed and sealant materials; gaskets; glazing methods; direction and magnitude of thermal expansion; type of construction including joinery, fasteners and welds; all anchorage assemblies and components; connections, fastenings, shapes and finishes; the fabrication and erection tolerances for the work in this Section and the adjoining related work of other Sections.

* + - * 1. Product Data:

Product Data: Submit product data including construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of product indicated.

* + - * 1. Test Data:

If requested by Consultant, submit test data from a recognized independent testing agency, acceptable to Consultant, verifying that specified requirements are being met. Test results may be from a previous testing program conducted on a system similar to that specified herein.

* + - * 1. Samples:

Submit duplicate minimum 2" x 4" samples of each type of aluminum finish specified. Upon Consultant's request, furnish samples of glass types, gaskets, tapes, and sealants.

* + - * 1. Safety Data Sheets:

Submit WHMIS safety data sheets for inclusion with project record documents. Keep one copy of WHMIS safety data sheets on site for reference by workers.

* + - * 1. Maintenance and Glazing Instructions:

On completion of Work of this Section, supply maintenance and glazing instructions for insertion into the Operating and Maintenance Manual.

* + - 1. STORAGE, DELIVERY, HANDLING AND PROTECTION
         1. Co-ordinate deliveries to comply with construction schedule and arrange ahead for off the ground, under cover storage location.
         2. Assembled units and their component parts shall be transported, handled, and stored in a manner to preclude damage of any nature.
         3. Ship and store pre-glazed units in upright position only or use method which will positively prevent extrusion of sealants and shifting of glass within framing.
         4. Accessory materials required for erection at the site shall be delivered to the site in manufacturer's labelled containers.
         5. Remove all units or components which are cracked, bent, chipped, scratched or otherwise unsuitable for installation and replace with new.
      2. SITE CONDITIONS
         1. Provide safe and adequate equipment on the site to execute the Work of this Section, including scaffolding, staging, hoisting, safety protection equipment, tools, plant, and other equipment required for the completion of the Work of this Section.
         2. Site Measurements: Verify actual locations of structural supports for aluminum framed entrance and storefront systems by site measurements before fabrication and indicate measurements on Shop Drawings.
         3. Established Dimensions: Establish dimensions and proceed with fabricating aluminum framed entrance and storefront systems where site measurements cannot be made without delaying the Work; coordinate construction to ensure that actual dimensions correspond to established dimensions.
      3. WARRANTY
         1. Warrant Work of this Section against any defects in materials and workmanship in accordance with the General Conditions but for an extended period of ten (10) years and agree to promptly and without cost to Owner make good defects which become evident during warranty period. Without restricting the generality of the warranty, defects shall include leaking, deformation of members, breaking of glass due to thermal or structural movement, discoloration of finishes and failure of sealants.
         2. Warrant insulating glass units in accordance with General Conditions for a period of five (5) years. Warrant that units will be free from material obstruction of vision as a result of dust or film formation on internal glass surfaces by any cause other than extrinsic glass breakage.
         3. Warrant that any unit failing shall be removed and replaced without cost to the Owner.

1. PRODUCTS
   * + 1. Manufacturers
          1. Basis-of-Design products are named in this Section; additional manufacturers offering similar aluminum framed entrance and storefront systems may be incorporated into the work provided they meet the performance requirements established by the named products.
          2. Acceptable Materials Manufacturers: Subject to compliance with requirements specified in this Section and as established by the Basis-of-Design Materials, manufacturers offering products that may be incorporated into the Work include; but are not limited to, the following:

Alumicor Limited.

Oldcastle Building Envelope.

Kawneer Canada Ltd.

* + - 1. materials
         1. Aluminum:

Extrusions: AA6063-T5 alloy, anodizing quality, conforming to ASTM B221-92a.

Plate and Sheet: AA1100-H14 alloy, anodizing quality unless otherwise indicated minimum 0.125" thick, conforming to ASTM B209-92a.

Thresholds and Sills: AA6061-T6 alloy, anodizing quality, conforming to ASTM B221-92a.

Exposed surfaces of aluminum shall be free of die marks, scratches, blisters, "leave-off" marks, or other blemishes, whether left unfinished or finished.

Aluminum Welding Materials: Conforms to CSA W59.2.

* + - * 1. Structural Steel Sections and Steel Plate:

Conforms to CAN/CSA-G40.20/G40.21, Grade 300W. Hollow steel sections shall conform to CAN/CSA-G40.20/G40.21, Grade 350W, Class H.

Steel Welding Materials: Conforms to CSA W59.

* + - * 1. Galvanized Steel Sheet:

Commercial grade, stretcher levelled, or temper rolled conforming to ASTM A525-91b with galvanized zinc G90 (Z275) coating conforming to ASTM A526/A526M-90.

* + - * 1. Insulating Glass and Spandrel Panel: As indicated in Section 08 80 00 – Glazing.
        2. Glazing Materials: As indicated in Section 08 80 00 – Glazing.
        3. Insulation Materials: As indicated in Section 07 21 13 – Board Insulation and Section 07 21 16 – Blanket Insulation.
        4. Sealant Materials:

Perimeter Sealant: Multi-component, chemical curing epoxidized polyurethane type sealant conforming to ASTM C920, 'Dymeric 240' by Tremco (Canada) Ltd., or CWS/CCS by Dow Corning, or approved equal. Colour as selected later by Consultant.

Threshold Sealant: Oil based sealant conforming to CAN/CGSB-19.6.

Backer Rod: Round open cell foam, extruded polyethylene, Shore A hardness of 20, tensile strength 140 to 200 kPa, oversized 30-50%, compatible with sealant and primer, non-adhering to sealant, 'Ethafoam SB' by Dow Chemical Canada Inc., or 'Sof Rod' by Tremco (Canada) Ltd., or approved equal.

Joint Primers: As recommended by sealant manufacturer.

Solvents, Cleaning Agents and Other Accessory Materials: As recommended by sealant manufacturer in writing.

Bond Breakers: Where required, shall be polyethylene tape (or equal) as recommended by manufacturer of sealant in writing.

* + - * 1. Zinc Rich Paint:

Ready mixed, zinc rich primer conforming to CAN/CGSB-1.181, 'Sealtight Galvafroid Zinc-Rich Coating' by W.R. Meadows of Canada Limited, or 'Zinc Clad No.7 Organic Zinc Rich Primer' by Sherwin Williams Company of Canada Ltd.

* + - * 1. Bituminous Paint: Conforming to CAN/CGSB-1.108, Type 2.
        2. Fasteners: "400" Series stainless steel, or "300" Series stainless steel.
        3. Firestopping: Non-combustible, semi rigid, compressible, mineral wool insulation, with "Z" shaped galvanized sheet steel impale clips, ULC listed for required fire resistance rating, 'Fire-Bloc' by M.W. McGill and Associates Limited, or 'Fire Barrier' by A/D Fire Protection Systems Inc., or 'Paroc Safing Insulation' by Partek Insulations Ltd.
        4. Aluminum Flashings: As indicated in Section 07 62 00 – Sheet Metal Flashing and Trim.
        5. Aluminum Sills:

Extruded or formed type aluminum sills, minimum 3/32" thick, with three coat fluoropolymer thermal setting enamel finish to match aluminum caps.

* + - 1. entrance doors
         1. Manufacturer's extruded aluminum glazed doors for manual swing operation, reinforced as required to withstand traffic conditions.
         2. Exterior Door Type 1:

Construction: Medium stile, thermally broken frame sections.

Glazing Method: Square stops for sealed glazing, with non-removable glazing stops on outside of door.

Basis-of-Design Material: Alumicor Insuldoor Entrance Doors Series 400A, or Kawneer 360 Insulclad Thermal Entrances Series.

SPEC NOTE: Delete the following if there is no interior vestibule required on the project.

* + - * 1. Interior Door Type 1:

Construction: Medium stile, non-thermally broken frame sections.

Glazing Method: Square stops for single glazed doors, with non-removable glazing stops on outside of door.

Basis-of-Design Material: Alumicor Canadian Series Door 400A, or Kawneer 350 Medium Stile Entrances.

* + - 1. STOREFRONT FRAMES
         1. Manufacturer's standard extruded aluminum framing members of thickness required and reinforced as required to support imposed loads.
         2. Exterior Frame Type 1:

Construction: Thermally broken, pressure plate glazed.

Dimensions of Frame Profile: As indicated on Drawings; Glazing throat to accommodate glazing unit indicated in Section 08 80 00.

Cover: Matching width of frame profile, and supplied by aluminum framed entrance and storefront manufacturer to ensure compatibility.

Glazing Method: Glazed from exterior.

Installation Method: Single span, storefront.

Operable Units: None.

Basis-of-Design Material: Alumicor VersaWall 2500 Series or Kawneer 1600 Wall System 1.

SPEC NOTE: Delete the following if there is no interior vestibule required on the project

* + - * 1. Interior Frame Type 1:

Construction: Non-thermally broken.

Dimensions: Nominal 1-3/4" face x 4-1/2" deep back frame profile with glazing throat to accommodate 1/4" glazing unit.

Glazing Method: Flush glazed.

Operable Units: None.

Basis-of-Design Material: Alumicor FlushGlaze 800 Series or Kawneer Trifab 400.

SPEC NOTE: Door hardware should be provided by the manufacturer of the aluminum doors and frames. door hardware schedules prepared by hardware consultants should not indicate hardware for aluminum doors, but should reference "supplied by others".

* + - 1. door hardware
         1. Manufacturer's heavy duty hardware units in sizes and types as required to meet entrance use as indicated on Drawings, with the following opening force limitations:

Pushes: 'Style "Classic CP-II" Push' with clear anodized finish by Kawneer Company of Canada Limited or approved equal.

Pulls: 'Style "Classic CO-9" Pull' with clear anodized finish by Kawneer Company of Canada Limited or approved equal.

Egress Doors: Maximum 135 N to set door in motion and not more than 70 N to open door to minimum required width.

Accessible Interior Doors: Maximum 20 N to operate door through entire range of movement.

Delayed Egress Locks: Lock releases within 15 seconds after applying a force of not more than 70 N for not more than 3 seconds.

Latches and Exit Devices: Not more than 70 N required to release latch.

* + - * 1. Provide door hardware in accordance with the requirements of this Section; using products that are recommended and supplied by entrance system manufacturer; in accordance with referenced standards, meeting requirements for description, quality, type, and function listed in hardware schedule.
        2. Hinges:

Pivot Hinges: In accordance with BHMA A156.4, Grade 1, with 3 offset pivots located at top, intermediate and bottom of each door leaf.

Ball Bearing Butts: In accordance with BHMA A156.1, Grade 1, radius corner; manufactured with non-removable pins from nonferrous metal, with 4 hinges for each door leaf.

Continuous Geared Hinges: Roton continuous geared hinges incorporating lubricated bearings between the knuckles, #780-112HD by Kawneer.

SPEC NOTE: Deadbolt provides sufficient security for doors that open once in the morning and close at night operations; typical uses are for warehouses. Dead latches provide similar security as deadbolts, but allow for personnel to exit the locked door by use of thumb turn or paddle to retract the latch, latch is fully retracted by key for normal operation; typical uses are for offices or buildings where multiple tenants exit locked premises after close of business. Deadbolt/Latch is a high security lock typically used for banks or retail establishments with staff exiting requirements.

* + - * 1. Locking Devices: Manufacturer's standard locking mechanism that do not require use of key, tool, or special knowledge for operation, and as follows:

Mortise Auxiliary Locks: Lock body manufactured in accordance with BHMA A156.5, Grade 1, fabricated from corrosion resistant steel to fit into door stile specified and as follows:

Bolt Action: [Deadbolt] [Dead Latch] [Deadbolt/Latch]

1. Deadbolt: Maximum security deadbolts with cam and mortise with strike trim, 1850 Series by Adams-Rite Manufacturing Co. Locks shall be in one leaf of each pair of doors. Double doors shall be key operated on exterior side and thumb turn on the interior side (one leaf of each pair). Face of rails not having cylinders, shall not be drilled.

Function: [Single Action Bolting, locked in security and unlocked for two way traffic] [Single Action Latching, latch retracted to allow for two way traffic by key, and manually retracting for security and exiting] [Triple Action, deadbolt and latch fully retracted for two way traffic by key; manually retracting latch secure for exiting only with deadbolt retracted; hook type deadbolt engaged for security].

Faceplate Shape: To match profile of leading entrance stile.

Finish: To match adjacent entrance stiles.

Door Operation: [Single] [Paired] swinging door operation.

Mortise Cylinders and Turns: [As specified in Section 08 70 00] [In accordance with BHMA A156.5, Grade 1, [paddle operated] [handle operated] [thumb turn operated] [keyed] from interior to match lock body, provided by Section 08 70 00.

Manual Flush Bolts: In accordance with BHMA A156.16, Grade 1.

Flushbolts: Top and bottom of one leaf of each pair of doors. Door manufacturer's standard. Provide at exterior doors not having exit devices.

Automatic and Self Latching Flush Bolts: In accordance with BHMA A156.3, Grade 1.

Panic Exit Devices: In accordance with BHMA A156.3, Grade 1, listed and labelled by a testing and inspecting agency acceptable to Authorities Having Jurisdiction for panic protection.

1690 Concealed Rod Exit Device by Dor-O-Matic or approved equal. Outside rim cylinder to retract latches for entry and interior cylinder to exit device for push/pull operation. Finish to match doors.

Trims:

Strikes: Provide strike with black plastic dust box for each latch or lock bolt; fabricated for aluminum framing.

Closers: In accordance with BHMA A156.4, Grade 1, sized as required by door size, exposure to weather, and anticipated frequency of use; adjustable to meet site conditions and requirements for opening force; having accessories required for complete installation.

.1 Heavy-duty, concealed mounted, top jamb overhead type withhold-open feature, conforming to CAN/CGSB-69.20-M, 2030 Series by LCN Closers, or approved equal by Norton Door Controls.

Concealed Overhead Holders: In accordance with BHMA A156.8, Grade 1.

Surface Mounted Holders: In accordance with BHMA A156.16, Grade 1.

Doorstops: In accordance with BHMA A156.16, Grade 1, floor or wall mounted as appropriate for door location indicated with integral rubber bumper.

.1 GJ-100 Series by Glynn-Johnson, to suit condition.

Silencers: In accordance with BHMA A156.16, Grade 1.

Thresholds: Raised thresholds bevelled with a slope of not more than 1:2, with maximum height of 1/2"; in accordance with BHMA A156.21.

.1 Thresholds by K.N. Crowder Mfg. Inc., or approved equal, to suit condition.

* + - 1. FABRICATION
         1. Aluminum components shall be extruded sections and shapes, unless otherwise specified or shown.
         2. Components required, for which extruded sections are not available shall be accurately formed to profiles indicated. Use minimum 14 gauge sheet aluminum unless otherwise indicated.
         3. All fastenings and connections shall be concealed unless approved by Consultant.
         4. Joints between horizontal and vertical mullions shall be accurately cut and fitted. Horizontal and vertical mullions shall be in true plane with interior and exterior faces in line.
         5. Mechanically joined sections shall have hairline joints.
         6. Reinforce members as required to withstand loads and to maintain deflection within allowable limits.
         7. Internally reinforce framing members where work of other trades is to be fastened thereto.
         8. Install air cut-offs in continuous vertical members to prevent stack effect of enclosed air columns.
         9. Framing members shall have internally formed keyed slots to receive and retain preformed gaskets, seals and thermal separators.
         10. Pressure plates shall be designed with integrally formed keyed slots to receive seals and of thickness necessary to provide permanent, uniform, sealing pressures for glazing units, without deformation.
         11. Fabricate system to accommodate and interface with work of other Sections by means of rabbets, interlocks, miscellaneous angles, trim and filler sections as required.
         12. Prepare aluminum storefront framing and aluminum doors for installation of finish door hardware including but not limited to; deadlocks and other door finish hardware as specified in Section 08 71 00 and the Hardware Schedule.
         13. Do not expose welds. Burn, discolour, distortion, impairment, deterioration or delamination of finish surfaces will be rejected.
         14. Form covers, closures, mouldings and trim integral with or immediately adjacent to Work of this Section to profiles indicated, of minimum 14 gauge sheet aluminum.
         15. Fabricate extruded or formed aluminum sills to profiles indicated to suit wall conditions and minimum 3/32" thick. Provide drip deflectors at sill ends and at abutting vertical surfaces. Open ends of sills shall be fitted with neatly applied closure plates. Anchors shall be designed not to work loose after installation. Unless otherwise detailed, provide "flush" slip joint at intermediate sill joints.
      2. FINISHES
         1. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
         2. Protect finish with strippable protective film.
         3. As Fabricated Finish (Mill Finish): AA-M10, as fabricated mechanical finish.

SPEC NOTE: Select Class 1 finish for highly corrosive exterior environments (sea salt). Select Class 2 finish for standard exposure.

* + - * 1. Clear Anodized Finish:

Class I Finish: Architectural Class I, clear coating 0.018 mm or thicker in accordance with AAMA 611.

Class II Finish: Architectural Class II, clear coating 0.010 mm or thicker in accordance with AAMA 611.

* + - * 1. **[Light Bronze] [Medium Bronze] [Dark Bronze] [Black]** Coloured Anodized Finish:

Class II Finish: Architectural Class II, integrally coloured or electrolytically deposited colour coating 0.010 mm or thicker in accordance with AAMA 611.

SPEC NOTE: Select 2 coat for standard exterior projects; 3 coat for high end finish, corrosive exterior environments; acrylic enamel for interior projects.

* + - * 1. High Performance Organic Finish:

Two (2) Coat PVDF or FEVE Coating:

Manufacturer's standard 2 coat, thermo-cured system consisting of specially formulated inhibitive primer and colour topcoat, and apply coating to exposed metal surfaces in accordance with AAMA 2605 and with coating and resin manufacturers' written instructions.

Colour: **[As indicated in Section 09 06 05 "Product and Finish Schedule."][As selected by Consultant from manufacturer's full product range.]**

Basis of Design Materials: PPG Duranar.

Three (3) Coat Fluoropolymer Thermo-setting Enamel:

All aluminum entrance and storefront framing exposed in the finished work shall have three coat fluoropolymer thermo-setting enamel conforming to AAMA 605.2-90, minimum 1.6 mils dry film thickness.

Pre-treat aluminum after fabrication and apply primer and finish coats in strict accordance with manufacturer's written instructions.

Colour: [As indicated in Section 09 06 05 "Product and Finish Schedule."][As selected by Consultant from manufacturer's full product range.]

Basis of Design Materials: PPG 'Duranar XL.

* + - * 1. Acrylic Enamel Finish:

One (1) Coat Acrylic Extrusion Coating:

AA C12 Chemical Finish, cleaned with inhibited chemicals; C40 Chemical Finish, conversion coating; Rx Acrylic Coating, manufacturer's standard single coat factory spray applied acrylic coating; prepare, pre treat and apply coating to exposed metal surfaces to 0.020 mm or thicker in accordance with AAMA 2603 and with coating manufacturer's written instructions.

Colour: **[As indicated in Section 09 06 05 "Product and Finish Schedule."][As selected by Consultant from manufacturer's full product range.]**

Basis of Design Materials: PPG Duracron.

* + - * 1. Steel (Concealed):

Hot-dip galvanized in accordance with CAN/CSA-G164, with minimum coating of 2 oz./sq.ft., or zinc rich paint.

* + - * 1. Isolate where necessary to prevent electrolysis due to dissimilar metal-to-metal contact or metal-to-masonry and concrete contact. Use bituminous paint, butyl tape or other approved divorcing material.

1. EXECUTION
   * + 1. INSTALLATION
          1. Check structural elements and adjoining work of other Sections on which Work of this Section is dependent, verify governing dimensions, floor elevations, floor to floor heights, minimum clearances between framing system and structure. Confirm that conditions are satisfactory before proceeding. Commencement of Work of this Section indicates acceptance of surfaces and conditions.
       2. installation
          1. General:

Erect storefront framing curtain wall systems plumb, level and square, in correct relation to work of other Sections, within a maximum non-cumulative deviation of 1/8" per 12' length of member, and with members accurately fitted and aligned at joints and intersections.

Anchor system to building structure, adjusting as required to meet erection tolerances and secure to prevent movement other than that which is expected due to structural deflection and creep and thermal expansion and contraction.

Provide all devices and components required for erection of system.

Use concealed fastenings only.

Touch up steel anchoring components, after installation, with zinc rich paint.

Provide aluminum flashings, fillers, covers and sealants indicated and as required to render system weather tight and to meet specified performance criteria. Ensure effective seal at laps, end joints and changes of direction.

Provide aluminum sills, complete with chairs, anchors, expansion plates, drip deflectors as detailed at windows. Provide sills in longest practicable lengths. Provide flush slip joints at maximum 10' O.C.

Provide continuity of thermal and air seal/vapour barriers with adjacent thermal and air seal/vapour barrier systems. Pack spaces between frames and adjacent building elements and where shown with fibrous insulation.

Seal joints between storefront framing system and adjacent building elements, and between frames, sills and other materials. Caulk inside and outside, with sealant as specified herein.

Install all door hardware on doors. Test all doors on completion of installation and adjust as required for smooth and efficient operation.

Completed installation shall be of adequate strength to support operating entrance doors, and wind loading as specified without glass shaking or vibrating when entrance doors are in use.

Leave final installation water and weathertight.

* + - * 1. Glazing:

Install glass types as indicated in Section 08 80 00.

Size glass units to accurately fit openings with appropriate clearance all around.

Identify glazed openings, mark each light of glass. Indicate presence of glass.

Replace all damaged or broken glass at no expense to Owner, prior to completion of work. Remove all broken glass from premises.

Locate and install setting blocks and spacers according to glass manufacturer's directions. Centre and space each piece of glass on premoulded neoprene rubber spacers. Provide minimum of two spacers on each edge of each piece of glass and four where dimension exceeds 48". Use spacers of size to accurately fit each thickness of glass.

Clean glass and metal surfaces to present clean, dry, grease and oil free surfaces to receive glazing tapes, gaskets or seals.

Glazing to be undertaken at temperatures recommended by manufacturer of glazing materials.

Provide sealed double glazed units at all locations.

* + - * 1. Sealants:

Apply sealants in strict conformance with manufacturer's written directions.

Gun apply 3 continuous beads of threshold sealant under extruded aluminum thresholds. Bead diameter shall be sufficient to ensure full width seal. Remove excess sealant by approved methods.

Apply sealant under pressure with hand or power actuated gun or other appropriate means. Gun shall have nozzle of proper size and provide sufficient pressure to completely fill joints as designed. All joint surfaces shall be tooled to provide the contour as indicated on drawings. For application of sealant when air temperature is below 40 deg F (4 deg C) consult sealant manufacturer for recommendations.

Thoroughly clean all joints, removing all foreign matter such as dust, oil, grease, water, surface dirt, frost and old caulking materials. Sealant must be applied to the base surface. Previously applied paint or primer must be entirely removed.

Non-porous surfaces shall be cleaned either mechanically or chemically. Protective coating on metallic surfaces shall be removed by a solvent that leaves no residue. Solvent shall be used with clean cloths or with lintless paper towels. Do not allow solvent to air dry without wiping. Wipe dry with clean, dry cloth or lintless paper towels.

All joints to receive sealant shall be as indicated on shop drawings. Do not seal joints until they are in compliance with drawings, or meet with the approval of the Consultant.

Joints to receive sealant shall be a minimum of 1/4" wide by 1/4" deep, unless otherwise approved.

For joints in metal, glass and other non-porous surfaces, sealant depth shall be a minimum of half the applied sealant width, and shall in no case exceed the applied sealant width.

Install backer rod or joint filler, of type and size specified, at proper depth in joint to provide sealant dimensions as detailed. Backer rod shall be of suitable size and shape, compressed 25-50% to fit joints as required. Sealant shall not be applied without back-up material and/or bond breaker strip. When using backer rod stock, avoid lengthwise stretching and do not twist or braid it.

Apply masking tape, where required, in continuous strip in alignment with joint edge.

Prime surfaces where required with primer as recommended by sealant manufacturer.

Sealants applied both in factory and at the job site shall be used in strict accordance with specific recommendations supplied by sealant manufacturer.

All hidden joints, or joints to be concealed by metal covers, shall be cleaned, sealed and tooled, inspected and approved prior to replacing metal covers.

Apply, tool and finish sealant as required. When tooling sealants, use tooling solution recommended by sealant manufacturer. Remove masking tape immediately after joints have been tooled.

Clean adjacent surfaces free of sealant as work progresses. Use solvent or cleaning agent as recommended by sealant manufacturer. All finished work shall be left in a neat clean condition.

* + - 1. FINAL CLEANING
         1. At completion of Work of this Section, remove all labels from glass and clean inner and outer faces of glass and all exposed metal surfaces at interior and exterior. Remove all protective metal coatings, stains, and foreign matter, and leave in uniform colour and in first-class condition, to Consultant's satisfaction.
         2. Replace scratched or broken glass and make good any damaged materials, all in accordance with Section 01 77 19 – Closeout Requirements.

END OF SECTION