SECTION  – glazed aluminum curtain walls

1. General
   1. summary
      1. This Section includes requirements for design, supply and installation of a low-rise, narrow sightline, four-sided capped glazed curtain wall system consisting of, but not limited to, the following:
         1. Fixed, low emissivity (Low E) sealed glass units.
         2. Connections to structural support systems, fasteners, and accessories required for a complete installation of the glazed aluminum curtain wall system.
      2. Work of this Section is intended to be designed and supplied by a single source curtain wall manufacturer and installed by a manufacturer trained and approved glazing installer; having experience designing and installing systems of similar complexity and scope to that described in this Section including glazing, and architectural structural steelwork required for complete installation.
      3. Related Requirements:
         1. Section 04 20 00 – Unit Masonry.
         2. Section 05 40 00 – Cold Formed Metal Framing.
         3. Section 05 50 00 – Metal Fabrications.
         4. Section 07 21 16 – Blanket Insulation.
         5. Section 07 92 00 – Joint Sealants.
         6. Section 08 71 13 – Automatic Door Operator.
         7. Section 08 42 29 – Automatic Entrance Sliding Doors.
         8. Section 08 80 00 – Glazing.
         9. Section 09 29 00 – Gypsum Board.
         10. Section 09 90 00 – Painting.
   2. reference standards
      1. American Society for Testing and Materials (ASTM):
         1. ASTM A653/A653M-17, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.
         2. ASTM B209-14, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
         3. ASTM B221-14, Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles and Tubes.
         4. ASTM C542-05(2017), Standard Specification for Lock-Strip Gaskets.
         5. ASTM E283-04(2012), Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
         6. ASTM E330/E330M-14, Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.
         7. ASTM E331-00(2016), Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors and Curtain Walls by Uniform Static Air Pressure Difference.
      2. Canadian General Standards Board (CGSB):
         1. CAN/CGSB-12.1-M90, Tempered or Laminated Safety Glass.
         2. CAN/CGSB-12.3-M91, Flat, Clear Float Glass.
         3. CAN/CGSB-12.8-97, Insulating Glass Units.
         4. CAN/CGSB-12.9-M91, Spandrel Glass.
         5. CGSB 12.20-M89, Structural Design of Glass for Buildings.
         6. CAN/CGSB-51.11-92, Mineral Fibre Thermal Insulation Blanket.
         7. CAN/CGSB-1.108-M89, Bituminous Solvent Type Paint.
         8. CAN/CGSB-1.181-99, Ready-Mixed Organic Zinc-Rich Coating.
      3. American Architectural Manufacturers Association (AAMA):
         1. AAMA 505-17, Dry Shrinkage and Composite Performance Thermal Cycling Test Procedure.
         2. AAMA 1503-09, Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections.
      4. Canadian Standards Association (CSA):
         1. CSA-G40.20-04/G40.21-04(R2009), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
         2. CAN/CSA-G164-M92(R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.
   3. 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 wall system.
      2. Provide clear instructions and, if required setting templates to ensure accurate setting of components.
   4. DESIGN AND PERFORMANCE REQUIREMENTS
      1. Within parameters specified assume complete design responsibility for entire curtain wall system.
      2. 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.
      3. 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 curtain wall system, and be fully cognizant of requirements.
      4. Design, fabricate and erect curtain wall system to meet or exceed the following minimum requirements:
         1. Design system based on the rain screen, pressure equalization principle. The curtain wall must form an air sealed envelope on the building. Ensure that all ties to other building envelope components are air sealed. The curtain wall system shall include metal soffits returns if indicated on drawings.
         2. 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 NBC Climatic Design Data (30 year probability), in accordance with ASTM E330.
         3. 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.
         4. 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.
         5. 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.
         6. Provide effective vapour seal at inside face of system, designed to prevent detrimental condensation and ice build-up within system.
         7. 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.
         8. Limit temperature difference between central and edge portions of any pane of glass to less than the maximum permissible value stated by glass manufacturer.
         9. 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).
      5. Louvers shall be capable of meeting the wind and earthquake loads specified in O.B.C. and shall resist a positive pressure of 1 KPA and a negative pressure of 0.8 KPA with not more than 1/180 of span deflection. The assembled louvers shall provide 40% free area minimum without admitting rain or snow.
   5. SUBMITTALS
      1. Submit submittals in accordance with Section 01 33 00 – Submittal Procedures.
      2. Shop Drawings:
         1. Furnish complete shop and erection drawings required for the Work of this Section to the Consultant for review prior to fabrication.
         2. Co-ordinate shop drawings for Work of this Section with those for other trades to ensure correct interface details required to provide watertight installation.
         3. 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, the fabrication and erection tolerances for the work in this Section and the adjoining related work of other Sections.
         4. Upon Consultant's request furnish complete design calculations for the curtain wall bearing seal of the professional engineer responsible for their preparation and all pertinent information affecting the design, including wind reactions, shading effects and the failure probability for the thermal glazing units as evidence of compliance with the design criteria.
      3. Test Data:
         1. 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.
      4. Samples:
         1. Submit duplicate minimum 2" x 4" samples of each type of aluminum finish specified.
         2. Upon Consultant's request furnish samples of glass types, gaskets, tapes and sealants.
      5. Maintenance and Glazing Instructions:
         1. On completion of Work of this Section, supply maintenance and glazing instructions for insertion into the Operating and Maintenance Manual.
   6. QUALITY ASSURANCE
      1. System Manufacturer's Qualifications:
         1. Minimum five (5) years continuous experience in successful production of work of type and quality specified. Submit proof of experience upon Consultant's request.
      2. Erector's Qualifications:
         1. Manufacturer's forces or forces licensed by manufacturer. Work of this Section shall be performed by workers especially trained and experienced in this type of work. A senior, qualified manufacturer's representative shall be at the site during erection of system to direct the various stages of operations.
   7. 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. Do not load any area beyond the design limits.
      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.
   8. 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. Coordinate and verify, by measurement at the job site, all dimensions affecting the Work of this Section. Submit written notifications to the Consultant any field dimensions and conditions which are at variance with those on the reviewed shop drawings. The decision regarding corrective measures shall be obtained from the Consultant prior to the fabrication of the item affected.
   9. WARRANTY
      1. Warrant Work of this Section against any defects in materials and workmanship in accordance with the General Conditions, but for a period of two (2) years and agree to promptly and without cost to Owner and Tenant 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, discolouration 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 and Tenant.
2. Products
   1. manufacturers
      1. Basis-of-Design products are named in this Section; additional manufacturers offering similar glazed aluminum curtain wall systems may be incorporated into the work provided they meet the performance requirements established by the named products.
         1. 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:
            1. VersaWall 2500 by Alumicor Limited.
            2. 1600 Wall System 1 by Kawneer Canada Ltd.
            3. 5400 Series Curtain Wall by Windspec Inc.
   2. DESCRIPTION OF WORK
      1. Responsibility: Professional Engineer is responsible for designing glazed aluminum curtain wall system based on design loads and reactions provided by the Consultant and verifying that safety factor is appropriate for intended installation and meets requirements of the Authority Having Jurisdiction.
      2. Design Requirements: Design and size system components in accordance with CGSB 12.20 and ASTM E330; free from defects impairing strength, durability and appearance including anchorage capable of withstanding specified loading without failure, and as follows:
         1. Exposed Fasteners: Fabricated from same materials design to prevent high stress concentration at glass connection points, colour and finish as material as that to which they are applied and having exposed surfaces with same inherent texture and colour for similar locations throughout system.
         2. Wind (Horizontal) and Structural (Vertical) Loads: Design and fabricate assemblies and systems to resist loads required by Building Code.
         3. Engineering Design: Use Professional Engineer, registered in the province of the Work, and that has experience in the work required by this Section to prepare structural calculations and design details.
      3. Design Loads and Performance Criteria: Design curtain wall framing system capable of withstanding design loads within limits and under design loads indicated in this Section, and as follows:
         1. Structural Deflection and Movement: Allow for movement and deflection of structural support framing; design tension framing system connections to accommodate structural deflections such that loading is not transferred to glass curtain wall system:
            1. Building Movement: Design for movements of supporting structure including twist, column shortening, long term creep, and deflection from uniformly distributed and concentrated live loads and storey drift under combined wind and gravity loads in accordance with the Building Code.
            2. Lateral Loads: Design for q50 wind loads using low importance factors listed in the Building Code for deflection and strength, modified by the appropriate exposure, gust and pressure (internal and external) factors in accordance with Building Code structural commentaries.
            3. Periodic Maintenance Equipment Loads: Account for loads arising from window cleaning or other maintenance equipment.
            4. Deflection of Framing Members: Limit deflection to the following requirements with full recovery of glazing materials:

Deflection Normal to Wall Plane: Limited to L/175 of clear span for spans up to 14', and to L/240 of clear span plus 1/4" for spans greater than 14' or an amount that restricts edge deflection of individual glazing lites to 19mm, whichever is less.

Deflection Parallel to Glazing Plane: Limited to amount not exceeding an amount that reduces glazing bite to less than 75% of design dimension and that reduces edge clearance between framing members and glazing or other fixed components to less than 1/8".

Limit length of cantilever deflection to 2/175 length of the cantilevered member where framing members overhang an anchor point.

* + - 1. Thermal Loads and Movement: Allow for glass movement arising from thermal changes as follows, accounting for surface temperatures of materials due to both solar heat gain and night-time sky heat loss:
         1. Normal Ambient Temperature Range: 40 deg C based on 16 deg C ambient winter and 24 deg C ambient summer; adjust calculations to account for colour treatments or coatings on curtain wall framing members and glass
         2. Structural Movement: Allow for thermal movement with no buckling of structural components, stress on glass, glazing edge seal failure, sealant failure, excess stress on curtain wall framing, anchors and fasteners, or reduction of performance in accordance with AAMA 505.
      2. Building Envelope Performance Criteria: Design glass and glazing systems to allow for the following:
         1. Air Infiltration: Design system for maximum air leakage of 0.03 L/m2 of fixed wall area when tested in accordance with ASTM E283 at a minimum static air pressure differential of 300 Pa
         2. Water Penetration Under Static Pressure: Design system for zero water penetration when tested in accordance with ASTM E331 at a minimum differential static pressure of 20% of positive design wind load, but not less than 475 Pa
         3. Average Thermal Conductance: Design system having average insulation factor of not more than 2.6 W/m2\_K when tested in accordance with AAMA 1503
  1. MATERIALS
     1. Aluminum:
        1. Extrusions: AA6063-T5 alloy, anodizing quality, conforming to ASTM B221-12.
        2. Plate and Sheet: AA1100-H14 alloy, anodizing quality unless otherwise indicated minimum 0.125" thick, conforming to ASTM B209-10, with special hardness for flat aluminum spandrel panels.
        3. Exposed surfaces of aluminum shall be free of die marks, scratches, blisters, "leave-off" marks, or other blemishes, whether left unfinished or finished.
     2. Structural Steel Sections and Steel Plate:
        1. CSA-G40.20/G40.21, Grade 260W.
     3. Galvanized Steel Sheet:
        1. Commercial grade, stretcher levelled or temper rolled, with galvanized zinc G90 (Z275) coating conforming to ASTM A653/A653M.
     4. Glass:
        1. Types and Composition: As indicated in Section 08 80 00.
        2. Glazing Materials:
           1. Glass Retaining Member Seals: PVC or neoprene conforming to ASTM C542-90, 75 to 85 Durometer A hardness, teflon coated, compressible, with corner joints under compression to ensure vertical to horizontal neoprene pressure contact.
           2. Glazing Tape: Extruded high-grade macro-polyisobutylene tape with continuous integral synthetic rubber spacer having a 50 shore A hardness.
           3. Setting Blocks: Neoprene conforming to ASTM C542, with 75 to 85 Durometer A hardness.
        3. Insulation Materials:
           1. Packing Insulation: Loose glass fibre, or mineral fibre insulation, Type II, as indicated in Section 07 21 16 – Blanket Insulation.
           2. Spandrel Panel Insulation and Fasteners: As indicated in Section 08 80 00 – Glazing.
        4. Perimeter Sealant Materials:
           1. Sealant: Multi-component, chemical curing type sealant conforming to ASTM C920.
           2. Provide cleaners, primers and bond breakers as recommended by the sealant manufacturer.
           3. Basis of Design Materials:

DYmeric 240 by Tremco (Canada) Ltd.

Sonolastic NP2 by Sonneborn Building Products, division of ChemRex Inc.,

CWS/CCS by Dow Corning or approved equal.

* + - * 1. Joint Back-Up: Round, closed cell extruded polyethylene non-outgassing foam, Shore A hardness of 20, tensile strength 140 to 200 KPa, oversized 30-50%, compatible with sealant and primer, non-adhering to sealant.
      1. Zinc Rich Paint:
         1. 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.
      2. Bituminous Paint:
         1. Conforms to CAN/CGSB-1.108, Type 2.
      3. Fasteners: '400' Series stainless steel, or '300' Series stainless steel.
      4. Flexible Flashings: Flexible EPDM rubber sheet, minimum .060" (60 mils) thick, by Lexcan Limited, or by Dunlop Construction Products Inc., or by Firestone Building Products Company, or approved equal.
      5. Provide door adapters and other components as required to complete the Work of this Section.

SPEC NOTE: Must use a 2-1/2" sightline curtain wall to use sun-shades. modify the basis of design products to suit this application if required on the project. get details from design team before making selections below. delete if not required.

* + 1. Sun-Shades
       1. Grade 6063 T6 extruded aluminum sun shade components using stainless steel fasteners, cantilevered support arms with finished end cap system, painted fluoropolymer Duranar 2-coat finish to match curtain wall framing.
          1. Outrigger projection: Maximum 30"
          2. Outrigger: [Straight-square] [Straight-rounded] [Cured] [Wedge]
          3. Louvre: [Arched] [Planar] [Circular] [Airfoil] [Square]
          4. Fascia: [Rectangular] [Bullnose] [Angular] [Circular]; thickness as indicated on Drawings.
          5. Basis-of-Design Materials:

SunShade by Kawneer Canada Ltd.

McGill Sun Controls - Installed with Alumicor Curtain Wall System.

* 1. ALUMINUM ENTRANCE SWING DOORS
     1. Manufacturers extruded aluminum glazed doors for manual swing operation, reinforced as required to withstand traffic conditions.

SPEC NOTE - Only use the EXTERIOR DOOR TYPE when the glass inside the door is listed as insulated glass on the Drawings. Use the INTERIOR DOOR TYPE on all interior applications as well as on exterior applications that indicate 1/4" (6 mm) thick glazing.

* + 1. Exterior Door Type - Heavy stile, thermally broken frame sections:
       1. Glazing Method: Square stops for sealed glazing, with non-removable glazing stops on outside of door.
       2. Sizes:
          1. Stiles: 127mm (5").
          2. Top Rail: 140mm (5-1/2").
          3. Center Rail: 203mm (8").
          4. Bottom Rail: 304mm (12").
       3. Basis-of-Design Material:
          1. Insuldoor Entrance Doors Series 500A by Alumicor Limited.
          2. 560 Insulclad Thermal Entrances Series by Kawneer Canada Ltd.
          3. 500HTP Wide Style Series Door by Windspec Inc.
    2. Exterior Door Type - Medium stile, thermally broken frame sections:
       1. Glazing Method: Square stops for sealed glazing, with non-removable glazing stops on outside of door.
       2. Sizes:
          1. Stiles: 100mm (4").
          2. Top Rail: 98mm (3-7/8").
          3. Center Rail: 100mm (4").
          4. Bottom Rail: 178mm (7").
       3. Basis-of-Design Material:
          1. Insuldoor Entrance Doors Series 400A by Alumicor Limited.
          2. 360 Insulclad Thermal Entrances Series by Kawneer Canada Ltd.
          3. 350HTP Wide Style Series Door by Windspec Inc.
    3. Interior Door Type - Medium stile, non-thermally broken frame sections:
       1. Glazing Method: Square stops for single glazed doors, with non-removable glazing stops on outside of door.
       2. Basis-of-Design Material:
          1. Canadian Series Door 400A by Alumicor Limited.
          2. 350 Medium Stile Entrances by Kawneer Canada Ltd.
          3. 350 Medium Style Door by Windspec Inc.
  1. FABRICATION
     1. Fit and assemble component parts in shop as far as practicable. Work that cannot be permanently shop assembled shall be fitted, assembled, marked, and disassembled to assure proper fitting in field. Identify shop assembled components on shop drawings for location and erection at Site.
     2. Aluminum components shall be extruded sections and shapes, unless otherwise specified or shown.
     3. 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.
     4. All fastenings and connections shall be concealed unless approved by Consultant.
     5. 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.
     6. Mechanically joined sections shall have "hairline" joints.
     7. Reinforce members as required to withstand loads and to maintain deflection within allowable limits.
     8. Internally reinforce framing members where work of other trades is to be fastened thereto.
     9. Fabricate expansion joints between mullion sections with formed extruded aluminum internal sleeve sections, secure to permit joint function and maintain true alignment of sections.
     10. Install air cut-offs in continuous vertical members to prevent stack effect of enclosed air columns.
     11. Framing members shall have internally formed keyed slots to receive and retain preformed gaskets, seals and thermal separators.
     12. 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.
     13. Provide inconspicuous, baffled weep holes to properly drain curtain wall cavities to exterior.
     14. Fabricate system to accommodate and interface with work of other Sections by means of rabbets, interlocks, miscellaneous angles, trim and filler sections as required.
     15. Factory glaze system modules as far as practicable. Effect glazing seal in accordance with wall system and glass manufacturer's recommendations and so as to meet specified design and performance requirements.
     16. Fabricate extruded or formed aluminum sills to profiles indicated to suit wall condition 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.
     17. Prepare aluminum curtain wall framing for installation of doors, finish door hardware including, but not limited to; deadlocks, handicap power door operators and other door finish hardware as specified within these documents.
     18. Install all door hardware on doors. Test all doors on completion of installation and adjust as required for smooth and efficient operation.
     19. Form covers, closures, mouldings, and trim integral with, or immediately adjacent to Work of this Section to profiles indicated on drawings, and as required for a complete installation.
  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. Concealed Aluminum: As Fabricated Finish (Mill Finish); AA-M10 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:
       1. Class I Finish: Architectural Class I, clear coating 0.018 mm or thicker in accordance with AAMA 611.
       2. Class II Finish: Architectural Class II, clear coating 0.010 mm or thicker in accordance with AAMA 611.
    2. **[Light Bronze] [Medium Bronze] [Dark Bronze] [Black]** Coloured Anodized Finish:
       1. 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:
       1. Two (2) Coat PVDF or FEVE Coating:
          1. 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.
          2. Colour: **[As indicated in Section 09 06 05 – Product and Finish Schedule."][As selected by Consultant from manufacturer's full product range.]**
          3. Basis of Design Materials: PPG Duranar.
       2. Three (3) Coat Fluoropolymer Thermo-setting Enamel:
          1. 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.
          2. Pre-treat aluminum after fabrication and apply primer and finish coats in strict accordance with manufacturer's written instructions.
          3. Colour: [**As indicated in Section 09 06 05 – Product and Finish Schedule.”] [As selected by Consultant from manufacturer's full product range.]**
          4. Basis of Design Materials: PPG 'Duranar XL.
    2. Acrylic Enamel Finish:
       1. One (1) Coat Acrylic Extrusion Coating:
          1. 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.
          2. Colour: **[As indicated in Section 09 06 05 – Product and Finish Schedule.”] [As selected by Consultant from manufacturer's full product range.]**
          3. Basis of Design Materials: PPG Duracron.
    3. Steel (Concealed):
       1. Hot-dip galvanized in accordance with CAN/CSA-G164, with minimum coating of 2 oz./sq.ft., or zinc rich paint.
    4. 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. examination
      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 curtain wall and structural frame. Confirm that conditions are satisfactory before proceeding. Commencement of Work of this Section indicates acceptance of surfaces and conditions.
   2. ERECTION
      1. Erect curtain wall system 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.
      2. 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.
      3. Provide all devices and components required for erection of system.
      4. Provide flashings, fillers, covers and sealants indicated and as required to render system weathertight and to meet specified performance criteria. Ensure effective seal at laps, end joints and changes of direction.
      5. 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.
      6. Seal joints between wall system and adjacent building elements with sealant in strict accordance with requirements of Section 07 92 00 – Joint Sealants.
      7. Use concealed fastenings only.
      8. Touch up steel anchoring components, after installation, with zinc rich paint.
      9. Erection Tolerances: Install glazed aluminum curtain wall systems to the following maximum tolerances:
         1. Plumb: 3mm in 3048mm (1/8" in 10') with aggregate total not exceeding 6mm in 12192mm (1/4" in 40').
         2. Level: 3mm in 6069mm (1/8" in 20') with aggregate total not exceeding 6mm in 12192mm (1/4" in 40').
         3. Alignment: Limit misalignment of two adjoining glass panes abutting in the same plane as follows:
            1. Limit offset from true alignment to 1.6mm (1/16") where surfaces meet in-line or are separated by reveal or protruding element up to 13mm (1/2") wide.
            2. Limit offset from true alignment to 3mm (1/8") where surfaces are separated by reveal or protruding element from 13mm to 25mm (1/2" to 1") wide.
            3. Limit offset from true alignment to 6mm where surfaces are separated by reveal or protruding element of 25mm (1") or wider.
         4. Joint Width: Maintain sealant space between glass and adjacent construction to an average of 16mm (5/8"), with a variation of no more than +3mm (1/8") and -6mm (1/4").
         5. Location: Limit variation from plane to 3mm in 3658mm (1/8" in 12') with aggregate total not exceeding 13mm (1/2") over total length.
   3. FINAL CLEANING
      1. Remove protective coatings and coverings from prefinished components; clean structural components and fittings; remove excess sealants and other substances that detract from finished appearance after completion of installation.
      2. 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. Replace scratched or broken glass and make good any damaged materials, all in accordance with Section 01 77 19 – Closeout Requirements.
      3. Coordinate protective measures required to prevent damage or deterioration of structural glass system from subsequent construction activities.

END OF SECTION