

1 General

1.1 **SECTION INCLUDES**

- .1 Design, labour, Products, tool, equipment and services necessary for Aluminum Work in accordance with the Contract Documents.

1.2 **REFERENCES**

- .1 AAMA 611, Voluntary Standards for Anodized Architectural Aluminum.
- .2 AAMA CW-10, Care and Handling of Architectural Aluminum from Shop to Site.
- .3 AAMA CW I-9, Aluminum Curtain Wall Design Guide Manual.
- .4 ANSI H35.1M, Alloy and Temper Designation Systems for Aluminum (Metric).
- .5 ASTM A167, Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip.
- .6 ASTM B209M, Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
- .7 ASTM B221M, Specification for Aluminum-Alloy Extruded Bars, Rods, Wires, Profiles and Tubes.
- .8 ASTM C920, Specification for Elastomeric Joint Sealants.
- .9 ASTM E283, Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
- .10 ASTM E330, Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.
- .11 ASTM E331, Standard Test Method for Water Penetration of Exterior Windows, Curtain Walls and Doors by Uniform Static Air Pressure Difference.
- .12 ASTM F738M, Specification for Stainless Steel Metric Bolts, Screws, and Studs.
- .13 CAN/CGSB 1.108-M, Bituminous Solvent Type Paint.

1.3 **DEFINITION(S)**

- .1 Aluminum Work: Shall mean aluminum curtainwall, entrances, doors, and framing mentioned in Part 2 of this Specification Section.

1.4 DESIGN REQUIREMENTS

- .1 Design Aluminum Work in accordance with following Climatic Design Data for Toronto contained in the Ontario Building Code:
 - .1 Design temperature: January 1%, July 2 1/2%.
 - .2 Hourly wind pressures: 1 in 50 year occurrence.
- .2 Design Aluminum Work to accommodate following without producing detrimental effect:
 - .1 Cyclic 40°C daily thermal swing of components.
 - .2 Cyclic, dynamic loading and release of loads such as wind loads.
 - .3 13 mm vertical deflection in supporting structure and movement of supporting structure due to live, dead load, and creep or deflections, seismic load, sway displacement and similar items.
- .3 Design to prevent accumulation of condensate on interior side of Aluminum Work framing under the following service conditions:
 - .1 Interior summer temperature: 21°C.
 - .2 Interior winter temperature: 21°C.
 - .3 Exterior temperature: -20°C.
 - .4 Interior RH: 35%.
- .4 Restrict air infiltration/exfiltration, through Aluminum Work in accordance with ASTM E283 at pressure differential as indicated:
 - .1 Entrance assemblies: 0.0003 m³/s m² at differential of 300 Pa.
 - .2 Doors (per door): 2.78 m³/h m per linear metre of crack at differential of 75 Pa.
- .5 Design and detail controlled drainage path to actively discharge water, which enters into or forms within Aluminum Work, to exterior; prevent accumulation or storage of water within Aluminum Work. Prevent water from entering interior when tested in accordance with ASTM E331.
- .6 Design and detail air barrier, vapour retarder, and rainscreen products and assemblies into continuous and integrated Aluminum Work envelope. Optimize Aluminum Work design to align envelope layers and to minimize thermal bridges.
- .7 Prevent deflection and permanent or progressive glazing displacement. Restrict horizontal and vertical mullion deflection to less than L/175 and 19 mm maximum for heights under 4115 mm and L/240 and 25 mm maximum for heights over 4115 mm.
- .8 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 in accordance with ASTM E330.
- .9 Design anchorage inserts for installation as part of other Sections of Work. Design anchorage assemblies to accommodate construction and installation tolerances.

- .10 Provide all reinforcing within aluminum members as required by design and OBC to provide structurally sound assembly. In any case, mullion size shall not be increased due to provision of reinforcing.
- .11 Design Aluminum Work and connections to substrate where the bottom of the Aluminum Work extends to a point below 1070 mm above finished floor level and separates a floor level from an adjacent interconnected space to withstand the required guard and handrail loads in accordance with the OBC and applicable local regulations. When requested by Consultant, provide a letter signed and sealed by a Professional Engineer certifying that the Aluminum Work conforms to the OBC requirements.

1.5 SUBMITTALS

- .1 Shop drawings:
 - .1 Submit shop drawings in accordance with Section 01 10 10 indicating:
 - .1 Plans, sections, details, type of extrusions, profiles, finishes, panels, operating components, doors, related flashings, closures, fillers, and end caps, and sealants.
 - .2 Products and glazing types.
 - .3 Anchorage inserts, system installation tolerances.
 - .4 Section and hardware reinforcement, anchorage, assembly fixings.
 - .5 Detailing, locations, and allowances for movement, expansion, contraction
 - .6 Path of cavity drainage and air pressure equalization.
- .2 Samples:
 - .1 Submit two samples of following in accordance with Section 01 10 10.
 - .1 250 mm long samples of each type of extrusion and finish.
 - .2 250 x 200 mm samples of insulating glass unit.
 - .3 One complete corner detail of door frame, glazing, and finish for each door type.
 - .4 Each door hardware item for Consultant's approval.
 - .5 250 x 200 mm sample of aluminum panel.
- .3 Reports:
 - .1 Submit substantiating engineering data, and independent test results of pre-tested, Aluminum Work to substantiate compliance with the design criteria including air leakage and water penetration conforming to ASTM E283 and ASTM E331.
 - .2 Submit documentation to substantiate ten years of experience in Aluminum Work manufacture and installation.
- .4 Close-out submittals: Submit Aluminum Work data for incorporation into the Operations and Maintenance Manual as part of Section 01 10 10.

1.6 QUALITY ASSURANCE

- .1 Retain a Professional Engineer, licensed in Province of Ontario, with experience in Aluminum Work of comparable complexity and scope to perform the following services as part of the Work of this Section:
 - .1 Design of Aluminum Work.
 - .2 Review, stamp, and sign shop drawings.
 - .3 Conduct on-Site inspections and prepare and submit inspection reports.
- .2 Mock-up:
 - .1 Fabricate, deliver, and erect one, full scale mock-up of each type of Aluminum Work, in location acceptable to Consultant.
 - .2 Demonstrate full range of Products, finishes, textures, quality of fabrication, and workmanship.
 - .3 Mock-up may form part of final Work, if acceptable to Consultant. Remove and dispose of mock-ups which do not form part of Work.

1.7 DELIVERY, STORAGE, AND HANDLING

- .1 Handle Aluminum Work in accordance with AAMA CW-10.
- .2 Protect aluminum surfaces with strippable coating. Do not use adhesive papers or sprayed coatings which bond when exposed to sunlight or weather. Do not remove before final cleaning of building.

1.8 EXTENDED WARRANTY

- .1 Submit a extended warranty for Aluminum Work in accordance with General Conditions, except that warranty period is extended to 5 years.
 - .1 Warrant against failure to meet the design criteria and requirements such as interior leakage, insulating glass unit failure, finish degradation, frame condensation.
 - .2 Coverage: Complete replacement including affected adjacent Work.

2 Products

2.1 ACCEPTABLE MANUFACTURER(S) AND SYSTEM(S)

- .1 Curtain Wall: (CW1) 'Clearwall Curtainwall Series' by Kawneer Company Canada Limited or approved alternative.
- .2 Aluminum doors: '260 Insulclad Doors' by Kawneer Company Canada Limited or approved alternative.

2.2 MATERIALS

- .1 All materials under Work of this Section, including but not limited to, sealants are to have low VOC content limits.

- .2 Aluminum extrusions and channels: ASTM B221 and ANSI H35.1 AA6063 alloy, T6 temper.
 - .1 Profile and dimensions: To be determined by Engineer.
 - .2 Thermal breaks in frame members: Vertically aligned with glazing.
- .3 Aluminum sheet: ASTM B209 and ANSI H35.1 AA1100 aluminum alloy, H14 temper, minimum 1.29 mm for sheets less than 610 mm wide and minimum 2.05 mm for sheets of a greater dimension.
- .4 Reinforcements and anchors: ASTM A167, Type 304 to AISI No. 2B finish. Size as shown.
- .5 Glass and glazing materials: As specified in Section 08 80 00.
- .6 Airseal and Aluminum Work sealant: ASTM C920, Type S, Grade NS, Class 100/50; One-part, low-modulus, moisture-curing, silicone. 'Dow Corning 790' by Dow Corning; 'Spectrem 1' by Tremco. Verify compatibility with insulating glass unit manufacturer's secondary sealant. Colour as selected by Consultant. Primer as recommended by manufacturer.
- .7 Frame sealant: Type as recommended by the Aluminum Work manufacturer.
- .8 Joint backing: Closed cell foam polyethylene rod, outsized minimum 30-50% larger than joint width and compatible with joint sealant. Product as recommended by sealant manufacturer.
- .9 Airseal transition membrane: 'Soprseal Stick 1100' by Soprema Inc., 'Exoair 110' by Tremco or 'Air-Shield' by W.R. Meadows. Membrane to come complete with applicable primer.
- .10 Anchors, clips, and angles: Extruded aluminum or stainless steel.
- .11 Shims and blocking for frame: Rigid plastic, wood is not permitted.
- .12 Flashings, closures and trim: 1.5 mm minimum aluminum sheet, finish to match curtain wall extrusion finish.
- .13 Screws, bolts and other fasteners: ASTM F738M; Stainless Steel Type 304.
- .14 Isolation coating: CAN/CGSB-1.108-M; Bitumastic coating, acid and alkali resistant material.
- .15 Spray Foam Insulation: CFC free, polyurethane foam in place, closed cell low expansion, one component, high density 15 kg/m³.
 - .1 'ENERFOAM' by Dow Chemical Canada.
 - .2 'IPF All Weather Pro' by Rivenco Industries.
- .16 Door hardware: Supplied by finish hardware supplier under Section 08 70 00 for installation by door manufacturer.

- .17 Weatherstripping: Durable, non-absorbing material resistant to deterioration by aging and weathering.

2.3 FABRICATION

- .1 Fabricate sections true to detail, free from defects impairing appearance, strength and durability. Fabricate extrusions with sharp, well defined corners.
- .2 Fabricate Aluminum Work in accordance with reviewed shop drawings and manufacturer's written instructions.
- .3 Fabricate, fit, and secure framing joints and corners accurately, with flush surfaces, and hairline joints. Apply frame sealant at joints for weatherproof seams.
- .4 Conceal anchors, reinforcement and attachments from view. Fabricate reinforcement in accordance with design requirements.
- .5 Do not expose manufacturer's identification labels on aluminum assemblies.
- .6 Fabricate continuous sill flashings with intermediate anchor clips, and joint reinforcing, form to profile shown. Fabricate filler and closure pieces as necessary for a complete and weather tight installation.
- .7 Fabricate doors and frames complete with internal reinforcements, cut-outs, and recesses to accommodate finish hardware. Reinforce cut-outs to assure adequate strength.
- .8 Fabricate Aluminum Work closures and trim from aluminum sheet. Form to profile shown. Make weathertight.
- .9 Double weatherstrip doors. Install weatherstripping in specially extruded ports and secure to prevent shrinkage or movement.
- .10 Fabricate glazing recess with drainage to exterior.

2.4 ALUMINUM DOORS

- .1 Fabricate doors of welded construction.
- .2 Glazing stop: Aluminum, square, snap-on type, designed for glazing system.

2.5 FINISH

- .1 Extrusion finish: Clear anodized to AAMA 611 per Aluminum Association Designation System for Aluminum Finishes AA-M12C22A31.
- .2 Doors: Clear anodized to AAMA 611 per Aluminum Association Designation System for Aluminum Finishes AA-M12C22A31.
- .3 Panel and sheet finish: As indicated on drawings to match adjacent extrusion finish.

3 Execution

3.1 **EXAMINATION**

- .1 Verify condition and dimensions of previously installed Work upon which this Section depends. Report defects to Consultant. Commencement of Work means acceptance of existing conditions.

3.2 **INSTALLATION**

- .1 Install Aluminum Work in accordance with reviewed shop drawings, manufacturer's written instructions.
- .2 Install Work of this Section securely, in correct location, level, square, plumb, at proper elevations, free of warp or twist.
- .3 Apply isolation coating at 0.8 mm dry film thickness to prevent corrosive or electrolytic action between dissimilar materials such as aluminum to concrete, masonry, galvanized steel and similar conditions.
- .4 Install flashings, closures, and trim pieces.
- .5 Fill voids between aluminum framing and adjacent construction with foam insulation.
- .6 Install sills in maximum lengths possible. For sills over 1200 mm in length, maintain 3 mm to 6 mm space at each end.
- .7 Refer to Contract Drawings for glazing type locations. Install glazing in accordance with Section 08 80 00.
- .8 Automatic door operators to be supplied and installed by Section 08 71 13. Install doors and hardware to manufacturers' written instructions. Clean and adjust hardware for correct performance.
- .9 Install aluminum door manufacturer's standard weatherstripping at door frame perimeter. Install weatherstripping throughout entire length and width of doors at jambs and heads.
- .10 Install doors and hardware to manufacturers' written instructions. Clean and adjust hardware for correct performance.
- .11 Adjust operable parts for correct function.
- .12 Remove damaged or unacceptable Products and assemblies from Site and replace to Consultant's acceptance.
- .13 Install glass presence markers, in two cross stripes extending from diagonal corners. Maintain markers until final clean-up.

3.3 ERECTION TOLERANCES

- .1 Tolerances: Non-cumulative.
 - .1 Maximum variation from plumb: 1.5 mm/3 m non-cumulative or 12 mm/30 m, whichever is less.
 - .2 Maximum misalignment of two adjoining members abutting in plane: 0.8 mm.
 - .3 Vertical and horizontal positions: +/- 3 mm.
 - .4 Racking of face: 6 mm, nil in elevation.
 - .5 Operable components: Consistent with smooth operation and weatherproof performance.
 - .6 Maximum perimeter sealant joint between Aluminum Work and adjacent construction: 13 mm.

3.4 GLAZING PERIMETER AIRSEAL

- .1 Install glazing perimeter airseal at entire perimeter of each insulating glass unit to achieve an airseal from insulating glass unit to curtain wall frame. Do not obstruct path of cavity drainage and air pressure equalization.
- .2 Perform sealant work in accordance with manufacturer's written requirements.

3.5 AIRSEAL TRANSITION MEMBRANE

- .1 Install primer and airseal transition membrane in accordance with manufacturer's instructions. Install airseal transition membrane into extrusion reglet as indicated on drawings. If there is no extrusion reglet, mechanically fasten airseal transition membrane to frame with batten bar fastened at 150 mm o.c.
- .2 Overlap airseal transition membrane 75 mm minimum and lap in direction of waterflow.
- .3 Coordinate airseal transition to adjacent parts of Work.

3.6 JOINT BACKING AND ALUMINUM WORK SEALANT

- .1 Prepare substrate surface and mask as recommended by sealant manufacturer.
- .2 Install joint backing and sealant at Aluminum Work and perimeter joints for weather tight installation in accordance with sealant manufacturer's instructions. Tool sealant. Remove excess sealant.

3.7 CLEANING

- .1 Maintain Aluminum Work, inside and outside, in clean condition throughout construction period.
- .2 Remove labels, protective material, and glass presence markers from prefinished surfaces.
- .3 Remove certification labelling when directed by Consultant, in writing.

- .4 Wash Aluminum Work with solution of mild detergent in warm water, with particular attention to recesses and corners. Wipe surfaces clean and dry.

END OF SECTION