
Part 1 General

1.1 SUMMARY

- .1 Design and install new aluminium doors and frames compatible with existing door openings and wall construction.

1.2 RELATED REQUIREMENTS

- .1 Division 01 – General Requirements
- .2 Section 02 41 19 – Selective Structure Demolition
- .3 Section 07 21 20 – Low Expanding Foam Sealant
- .4 Section 07 27 13 – Modified Bituminous Sheet Air Barriers
- .5 Section 07 62 00 – Sheet Metal Flashing and Trim
- .6 Section 07 92 00 – Joint Sealants
- .7 Section 08 44 13 – Glazed Aluminum Curtain Walls
- .8 Section 08 51 13 – Aluminum Windows
- .9 Section 08 71 00 – Door Hardware
- .10 Section 08 80 00 - Glazing

1.3 REFERENCES

- .1 The Aluminum Association (AA):
 - .1 AA DAF-45-2003 (R2009), Designation System for Aluminum Finishes.
- .2 American Architectural Manufacturers Association (AAMA).
 - .1 AAMA 609 & 610-15, Cleaning and Maintenance Guide for Architectural Finished Aluminum.
- .3 American Society for Testing and Materials (ASTM International).
 - .1 ASTM E330/E330M-14, Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.
- .4 Canadian General Standards Board (CGSB).
 - .1 CAN/CGSB-12.8-97, Insulating Glass Units.
 - .2 CAN/CGSB-12.20-M89, Structural Design of Glass For Buildings.
 - .3 CAN/CGSB-19.13-M87, Sealing Compound, One-Component, Elastomeric Chemical Curing.
- .5 Canadian Standards Association (CSA International).
 - .1 CSA G40.20-13/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel, Includes Update No. 1 (2014).

- .2 CAN/CSA G164-M92 (R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.

1.4 SYSTEM DESCRIPTION

- .1 Design Criteria:
 - .1 Design doors in exterior walls to:
 - .1 Accommodate expansion and contraction within service temperature range of -35 to 35 degrees C.
 - .2 Limit deflection of mullions to maximum 1/175th of clear span when tested to ASTM E3300 under wind load of 1.2kPa.
 - .3 Movement within system.
 - .4 Movement between system and perimeter framing components or existing substrate.
 - .5 To suit existing openings in building.
 - .2 Size glass thickness and glass unit dimensions to limits in accordance with CAN/CGSB-12.20.

1.5 EXISTING CONDITIONS REVIEW

- .1 Pre-installation Meeting: In accordance with Section 01 14 10 – Scheduling and Management of Work.

1.6 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Product Data:
 - .1 Submit manufacturer's printed product literature, specifications and data sheets.
 - .2 Shop Drawings:
 - .1 Submit shop drawings.
 - .2 Indicate materials and profiles and provide full-size, scaled details of components for each type of door. Indicate:
 - .1 Interior trim and exterior junctions with adjacent construction.
 - .2 Junctions between combination units.
 - .3 Elevations of units.
 - .4 Core thicknesses of components.
 - .5 Type and location of exposed finishes, method of anchorage, number of anchors, supports, reinforcement, and accessories.
 - .6 Location of sealant.
 - .7 Each type of door including location.
 - .8 Arrangement of hardware and required clearances.
 - .3 Submit catalogue details for each type of door illustrating profiles, dimensions and methods of assembly.

1.7 QUALITY ASSURANCE

- .1 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.
- .2 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.8 DELIVERY, STORAGE AND HANDLING

- .1 Storage and Protection:
 - .1 Apply temporary protective coating to finished surfaces. Remove coating after erection. Do not use coatings that will become hard to remove or leave residue.
 - .2 Leave protective covering in place until final cleaning of building.

1.9 WASTE MANAGEMENT AND DISPOSAL

- .1 Waste management and disposal to be in accordance with Section 01 74 21 – Construction/Demolition Waste Management and Disposal.

1.10 WARRANTY

- .1 5-year warranty on assembled units.
- .2 10-year warranty on hermetically-sealed glazing units.

Part 2 Products

2.1 DESCRIPTION

- .1 Replacement of single and pair aluminum-framed swing doors with glass inserts and frames suitable for existing openings.

2.2 MATERIALS

- .1 Aluminum extrusions: Aluminum Association alloy AA 6063-T6 anodizing quality.
- .2 Sheet aluminum: Aluminum Association alloy AA5005-H32 anodizing quality.
- .3 Steel reinforcement: to CSA-G40.20/G40.21, grade 300 W.
- .4 Fasteners: stainless steel, finished to match adjacent material.
- .5 Door bumpers: neoprene.
- .6 Door bottom seal: adjustable door seal of anodized extruded aluminum frame and vinyl weather seal, recessed in door bottom, closed ends, automatic retract mechanism when door is open.

- .7 Isolation coating: bituminous paint.
- .8 Glazing materials: sealed insulating glass in accordance with Section 08 80 00 – Glazing.
- .9 Sealants: in accordance with Section 07 92 00 – Joint Sealants.
- .10 Air barrier: in accordance with Section 07 27 13 – Modified Bituminous Sheet Air Barriers.
- .11 Flashing: in accordance with Section 07 62 00 – Sheet Metal Flashing and Trim.
- .12 Accessories: as recommended by door manufacturer for complete installation.

2.3 ALUMINUM DOORS

- .1 Construct doors of porthole extrusions with minimum wall thickness of 3 mm.
- .2 Insulated aluminum door adapters.
- .3 Door stiles nominal 102 mm wide plus or minus 3 mm.
- .4 Top rail nominal 98 mm wide plus or minus 3 mm.
- .5 Bottom rail nominal 178 mm wide plus or minus 3 mm.
- .6 Center rail: 260 mm wide plus or minus 3 mm.
- .7 Reinforce mechanically-joined corners of doors to produce sturdy door unit.
- .8 Glazing stops: interlocking snap-in type for dry glazing. Exterior stops: tamperproof type.
- .9 Provide internal reinforcement plates to accommodate rim and surface vertical rod exit devices.
- .10 Hardware: in accordance with Section 08 71 00 – Door Hardware.

2.4 ALUMINUM FRAMES

- .1 Construct thermally broken and insulated frames of aluminum extrusions with minimum wall thickness of 4.8 mm.
- .2 Frame members: 50 X 115 mm nominal for flush glazing.
- .3 Provide internal reinforcement plates to accommodate rim and surface vertical rod exit devices.
- .4 Sidelites, with glazing, sized to suit existing opening.
- .5 Transom, with glazing, over doors, sized to suit existing openings.

2.5 ALUMINUM FINISHES

- .1 Provide finishes for aluminium components to match finishes on existing doors.
 - .1 Location: interior and exterior exposed aluminum surfaces.
- .2 Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.
- .3 Colour Anodic Finish: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm or thicker.
 - .1 Colour: to be selected by Departmental Representative from full range of industry colours and colour densities.
- .4 Black anodic finish: AA-M12C22A42, Class 1
- .5 High-Performance Organic Finish: Two-coat fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in colour coat. Prepare, pre-treat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - .1 Colour and Gloss: to be selected by Departmental Representative from manufacturer's full range.
- .6 Touch-up Primer for Galvanized Steel Surfaces: SSPC-Paint 20, Type II-Organic or MPI #19, organic, zinc-rich primer.
- .7 Concealed Steel Items: Hot-dip galvanized to appropriate grade for type and size of steel material indicated, coating thickness ASTM A123/A123M.
- .8 Concealed Steel Items: Primed with iron oxide paint.
- .9 Apply one (1) coat of bituminous paint to concealed aluminum surfaces in contact with cementitious or dissimilar materials.

2.6 STEEL FINISHES

- .1 Finish steel clips and reinforcing steel with zinc coating to CAN/CSA G164.
- .2 Apply 2 coats of bituminous paint to concealed steel surfaces in contact with cementitious or dissimilar materials.

2.7 FABRICATION

- .1 Doors and framing to be by same manufacturer.
- .2 Fabricate doors to profiles and maximum face sizes as shown. (Sizes of existing openings to be confirmed on site.) Provide minimum 22 mm bite for insulating glazed units.
- .3 Provide structural steel reinforcement as required.
- .4 Fit joints tightly and secure mechanically.

- .5 Conceal fastenings.
- .6 Mortise, reinforce, drill and tap doors and reinforcements to receive hardware using templates provided under Section 08 71 00 – Door Hardware.

Part 3 Execution

3.1 EXAMINATION

- .1 Compliance: comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

3.2 INSTALLATION

- .1 Install doors and hardware in accordance with hardware templates and manufacturer's instructions.
- .2 Adjust operable parts for correct function.
- .3 Make allowances for deflection of structure to ensure that structural loads are not transmitted to frames.

3.3 GLAZING

- .1 Glaze aluminum doors in accordance with Section 08 80 00 - Glazing.

3.4 CAULKING

- .1 Seal joints to provide weathertight seal at exterior and air vapour seal at interior.
- .2 Apply sealant in accordance with sealant manufacturer's recommendations and instructions.

3.5 DOOR HARDWARE

- .1 Hardware to be installed in accordance with Part 3 – Execution in Section 08 71 00 – Door Hardware.

3.6 FOAM SEALANT

- .1 Provide low expanding, single component polyurethane foam sealant installed at head and jamb of window for sealing to building air/vapour retarder and door frame. Foam sealant width to be adequate to provide required air tightness and vapour diffusion control to building interior. Refer to Section 07 21 20 – Low Expanding Foam Sealant.

3.7 FIELD QUALITY CONTROL

- .1 Have manufacturer of products supplied under this Section review Work involved in handling, installation/application, protection and cleaning of its products, and submit written reports in acceptable format to verify compliance of Work with Contract.
- .2 Manufacturer's field services: provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
- .3 Schedule site visits to review Work at stages listed:
 - .1 After delivery and storage of products, and when preparatory Work on which Work of this Section depends is complete, but before installation begins.
 - .2 Twice during progress of Work at 25% and 60% complete.
 - .3 Upon completion of Work, after cleaning is carried out.
- .4 Obtain reports within three days of review and submit.

3.8 CLEANING

- .1 Perform cleaning of aluminum components in accordance with AAMA 609 & 6110.
- .2 Perform cleaning as soon as possible after installation to remove construction and accumulated environmental dirt.
- .3 Clean aluminum with damp rag and approved non-abrasive cleaner.
- .4 Remove traces of primer, caulking, epoxy and filler materials; clean doors and frames.
- .5 Clean glass and glazing materials with approved non-abrasive cleaner.
- .6 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

3.9 SCHEDULE

- .1 Refer to drawings.

END OF SECTION

Part 1 General

1.1 RELATED SECTION

- .1 Division 01 – General Requirements.
- .2 Section 02 41 19 – Selective Structure Demolition.
- .3 Section 07 21 20 – Low Expanding Foam Sealant.
- .4 Section 07 27 13 – Modified Bituminous Sheet Air Barriers.
- .5 Section 07 62 00 – Sheet Metal Flashing and Trim.
- .6 Section 07 92 00 – Joint Sealants.
- .7 Section 08 11 16 – Aluminum Doors and Frames.
- .8 Section 08 44 13 – Glazed Aluminum Curtain Walls.
- .9 Section 08 80 00 – Glazing.

1.2 SUMMARY

- .1 Design and install curtain wall systems to function as windows in existing buildings. Windows to be compatible with existing window openings and wall construction.

1.3 REFERENCES

- .1 Canadian Standards Association
 - .1 CSA W59.2-1991 (Reaffirmation Notice, 2013), Welded Aluminum Construction.

1.4 PERFORMANCE REQUIREMENTS

- .1 General Performance: Comply with performance requirements specified, as determined by testing of manufacturer's standard glazed aluminium curtain walls representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.
 - .1 Thermally broken glazed aluminum curtain walls shall withstand movements of supporting structure including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
 - .2 Failure includes the following:
 - .1 Thermal stresses transferring to building structure.
 - .2 Glass breakage.
 - .3 Noise or vibration created by wind and thermal and structural movements.

- .4 Loosening or weakening of fasteners, attachments, and other components.
 - .5 Failure of operating units.
 - .2 Delegated Design: Design glazed aluminium curtain walls to AAMA CW-DG-1, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
 - .3 Structural Loads:
 - .1 Wind loads: Provide Curtain Wall system; include anchorage, capable of withstanding wind load design pressures based on the National Building Code of Canada.
 - .4 Deflection of Framing Members: At design wind pressure, as follows:
 - .1 Deflection Normal to Wall Plane: Limited to edge of glass in a direction perpendicular to glass plane not exceeding $L/175$ of the glass edge length for each individual glazing lite or an amount that restricts edge deflection of individual glazing lites to 19 mm, whichever is less.
 - .2 Deflection Parallel to Glazing Plane: Limited to $L/360$ of clear span or 3.2 mm, whichever is smaller.
 - .1 Operable Units: Provide a minimum 1.6 mm clearance between framing members and operable units.
 - .5 Water Penetration under Static Pressure: No evidence of water penetration through fixed glazing and framing areas when tested according to ASTM E 331 at a minimum static-air-pressure differential of 20 percent of positive wind-load design pressure, but not less than 720 Pa.
 - .6 Thermal Movements: Allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures:
 - .1 Temperature Change (Range): 67 deg C, ambient; 100 deg C, material surfaces.
 - .2 Test Interior Ambient-Air Temperature: 24 deg C.
 - .3 Test Performance: No buckling; stress on glass; sealant failure; excess stress on framing, anchors, and fasteners; or reduction of performance when tested according to AAMA 501.5.
 - .7 Energy Performance:
 - .1 Thermal Transmittance (U-factor): Fixed glazing and framing areas shall have U-factor of not more than 0.66 (clear) per AAMA 507.
 - .2 Air Infiltration: Maximum air leakage through fixed glazing and framing areas of 0.30 L/s per sq. m of fixed wall area as determined according to ASTM E 283 at a minimum static-air-pressure differential of 300 Pa.
 - .3 Condensation Index (I): when tested to CSA-A440-04, the Condensation Index shall not be less than 68_{frame} and 54_{glass} (clear).
 - .8 Preconstruction Testing Service: Provide glazed aluminium curtain walls that comply with test-performance requirements indicated, as evidenced by reports of tests performed on manufacturer's standard assemblies by a qualified testing agency.

1.5 EXISTING CONDITIONS REVIEW

- .1 Pre-installation Meeting: In accordance with Section 01 14 10 – Scheduling and Management of Work.

1.6 SUBMITTALS

- .1 Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- .2 Shop Drawings: For windows designed as glazed aluminium curtain walls. Include plans, elevations, sections, full-size details, and attachments to other work.
 - .1 Include details of provisions for assembly expansion and contraction and for draining moisture occurring within the assembly to the exterior.
 - .2 Include half-size isometric details of each vertical-to-horizontal intersection of glazed aluminium curtain walls, showing the following:
 - .1 Joinery, including concealed welds.
 - .2 Anchorage.
 - .3 Expansion provisions.
 - .4 Glazing.
 - .5 Flashing and drainage.
- .3 Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.
- .4 Fabrication Sample: Of each vertical-to-horizontal intersection of assemblies, made from 300 mm lengths of full-size components and showing details of the following:
 - .1 Joinery, including concealed welds.
 - .2 Anchorage.
 - .3 Expansion provisions.
 - .4 Glazing.
 - .5 Flashing and drainage.
- .5 Delegated-Design Submittal: For glazed aluminium curtain walls indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- .6 Maintenance Data: For glazed aluminium curtain walls to include in maintenance manuals.
- .7 Warranties: Sample of special warranties.

1.7 QUALITY ASSURANCE

- .1 Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
- .2 Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. Aesthetic effects are

indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.

- .1 Do not revise intended aesthetic effects, as judged solely by Departmental Representative, except with Departmental Representative's approval. If revisions are proposed, submit comprehensive explanatory data to Departmental Representative for review.
- .3 Perform welding Work in accordance with CSA W59.2.
- .4 Preinstallation Conference: Conduct conference at Project site.

1.8 PROJECT CONDITIONS

- .1 Field Measurements: Verify actual locations of existing structural supports for existing window openings to receive new glazed aluminium curtain walls by field measurements before fabrication and indicate measurements on Shop Drawings.

1.9 WARRANTY

- .1 Special Assembly Warranty: Standard form in which manufacturer agrees to repair or replace components of glazed aluminium curtain walls that do not comply with requirements or that fail in materials or workmanship within specified warranty period.
 - .1 Failures include, but are not limited to, the following:
 - .1 Structural failures including, but not limited to, excessive deflection.
 - .2 Noise or vibration created by wind and thermal and structural movements.
 - .3 Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - .4 Water penetration through fixed glazing and framing areas.
 - .5 Failure of operating components.
 - .2 Warranty Period: Five years from date of Substantial Completion.
- .2 Special Finish Warranty: Standard form in which manufacturer agrees to repair finishes or replace aluminium that shows evidence of deterioration of factory-applied finishes within specified warranty period.
 - .1 Deterioration includes, but is not limited to, the following:
 - .1 Colour fading more than 5 Hunter units when tested according to ASTM D 2244.
 - .2 Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
 - .3 Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 - .2 Warranty Period: 10 years from date of Substantial Completion.

Part 2 Products

2.1 MATERIALS

- .1 Aluminium: Alloy and temper recommended by manufacturer for type of use and finish indicated.
 - .1 Sheet and Plate: ASTM B 209M.
 - .2 Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221M.
 - .3 Extruded Structural Pipe and Tubes: ASTM B 429.
 - .4 Structural Profiles: ASTM B 308/B 308M.
 - .5 Welding Rods and Bare Electrodes: AWS A5.10/A5.10M.
- .2 Steel Reinforcement: Manufacturer's standard zinc-rich, corrosion-resistant primer complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM and prepare surfaces according to applicable SSPC standard.
 - .1 Steel sections: CSA-G40.20/G40.21M; shaped to suit mullion sections.

2.2 FRAMING

- .1 Framing Members: Manufacturer's standard extruded- or formed-aluminium framing members of thickness required and reinforced as required to support imposed loads.
 - .1 Vertical members: As required for compliance with structural performance criteria, but in no case less than sizes indicated on drawings.
 - .2 Horizontal members: As required for compliance with structural performance criteria, but in no case less than sizes indicated on drawings.
 - .3 Mullion covers: Manufacturer's standard snap on cover.
 - .4 Construction: Thermally broken.
 - .5 Glazing System: Retained mechanically with gaskets on four sides.
 - .6 Glazing Plane: Front.
- .2 Brackets and Reinforcements: Manufacturer's standard high-strength aluminium with nonstaining, nonferrous shims for aligning system components.
- .3 Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, non-bleeding fasteners and accessories compatible with adjacent materials.
 - .1 Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
 - .2 Reinforce members as required to receive fastener threads.
- .4 Anchors: Three-way adjustable anchors with minimum adjustment of 25.4 mm that accommodate fabrication and installation tolerances in material and finish compatible with adjoining materials and recommended by manufacturer.
 - .1 Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A 123/A 123M or ASTM A 153/A 153M requirements.
- .5 Flashing:

- .1 Concealed Locations: Manufacturer's standard corrosion-resistant, nonstaining, non-bleeding flashing compatible with adjacent materials.
- .2 Exposed locations: aluminium, finish to match curtain wall mullion sections, secured with concealed fastening method.
- .6 Framing Sealants: Manufacturer's standard sealants.
- .7 Air Vapour Barrier: specified in Section 07 27 13 – Modified Bituminous Sheet Air Barriers.
- .8 Column covers: aluminium, full contact pressure bonded to marine-grade plywood unless otherwise noted, ensuring flat surface, finish to match curtain wall mullion sections.

2.3 GLAZING

- .1 Glazing: Comply with Section 08 80 00 - Glazing.
- .2 Glazing Gaskets: Manufacturer's standard sealed-corner pressure-glazing system of black, resilient elastomeric glazing gaskets, setting blocks, and shims or spacers.

2.4 OPERABLE UNITS

- .1 Doors: Comply with Section 08 11 16 – Aluminum Doors and Frames.

2.5 ACCESSORY MATERIALS

- .1 Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos, formulated for 0.762 mm thickness per coat.

2.6 FABRICATION

- .1 Form or extrude aluminium shapes before finishing.
- .2 Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by de-scaling or grinding.
- .3 Fabricate components that, when assembled, have the following characteristics:
 - .1 Profiles that are sharp, straight, and free of defects or deformations.
 - .2 Accurately fitted joints with ends coped or mitered.
 - .3 Physical and thermal isolation of glazing from framing members.
 - .4 Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
 - .5 Provisions for field replacement of glazing from exterior.
 - .6 Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
- .4 Fabricate components that, when assembled, have the following characteristics:

- .1 Pressure-equalized system or double barrier design with primary air and vapour barrier at interior side of glazed aluminium curtain wall and secondary seal weeped and vented to exterior.
- .5 After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.7 ALUMINIUM FINISHES

- .1 Provide finishes for aluminium components to match finishes on existing windows.
 - .1 Location: interior and exterior exposed aluminum surfaces.
- .2 Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.
- .3 Colour Anodic Finish: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm or thicker.
 - .1 Colour: to be selected by Departmental Representative from full range of industry colours and colour densities.
- .4 Black anodic finish: AA-M12C22A42, Class 1
- .5 High-Performance Organic Finish: Two-coat fluoropolymer finish complying with AAMA 2605 and containing not less than 70% PVDF resin by weight in colour coat. Prepare, pre-treat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - .1 Colour and Gloss: As indicated. To be selected by Departmental Representative from manufacturer's full range.
- .6 Touch-up Primer for Galvanized Steel Surfaces: SSPC-Paint 20, Type II-Organic or MPI #19, organic, zinc-rich primer.
- .7 Concealed Steel Items: Hot-dip galvanized to appropriate grade for type and size of steel material indicated, coating thickness ASTM A123/A123M.
- .8 Concealed Steel Items: Primed with iron oxide paint.
- .9 Apply one (1) coat of bituminous paint to concealed aluminum surfaces in contact with cementitious or dissimilar materials.

Part 3 Execution

3.1 EXAMINATION

- .1 Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- .2 Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- .1 General:

- .1 Comply with manufacturer's written instructions.
- .2 Do not install damaged components.
- .3 Fit joints to produce hairline joints free of burrs and distortion.
- .4 Rigidly secure non-movement joints.
- .5 Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
- .6 Weld components in concealed locations to minimize distortion or discolouration of finish. Protect glazing surfaces from welding.
- .7 Install foamed-in-place insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier. Do NOT compromise curtain walls ability to contract and expand by over-insulating.
- .8 Coordinate attachment and seal of perimeter air barrier.
- .9 Seal joints watertight unless otherwise indicated.
- .2 Metal Protection:
 - .1 Where aluminium will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape or installing nonconductive spacers as recommended by manufacturer for this purpose.
 - .2 Where aluminium will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
- .3 Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within glazed aluminium curtain wall to exterior.
- .4 Install components plumb and true in alignment with established lines and grades.
- .5 Install operable units level and plumb, securely anchored, and without distortion. Adjust weather-stripping contact and hardware movement to produce proper operation.
- .6 Install glazing as specified in Section 08 80 00 - Glazing.

3.3 FOAM SEALANT

- .1 Provide low expanding, single component polyurethane foam sealant installed at head, jamb and sill perimeter of window for sealing to building air/vapour retarder and window frame. Foam sealant width to be adequate to provide required air tightness and vapour diffusion control to building interior. Refer to Section 07 21 20 – Low Expanding Foam Sealant.

3.4 ERECTION TOLERANCES

- .1 Erection Tolerances: Install glazed aluminium curtain walls to comply with the following maximum tolerances:
 - .1 Plumb: 3.2 mm in 3 m; 6 mm in 12 m.
 - .2 Level: 3.2 mm in 6 m; 6 mm in 12 m.
 - .3 Alignment:

- .1 Where surfaces abut in line or are separated by reveal or protruding element up to 12.7 mm wide, limit offset from true alignment to 1.6 mm.
- .2 Where surfaces are separated by reveal or protruding element from 12.7 to 25.4 mm wide, limit offset from true alignment to 3.2 mm.
- .3 Where surfaces are separated by reveal or protruding element of 25.4 mm wide or more, limit offset from true alignment to 6 mm.
- .4 Location: Limit variation from plane to 3.2 mm in 3.7 m; 12.7 mm over total length.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Division 01 – General Requirements.
- .2 Section 02 41 19 – Selective Structure Demolition.
- .3 Section 07 21 20 - Low Expanding Foam Sealant.
- .4 Section 07 27 13 - Modified Bituminous Sheet Air Barriers.
- .5 Section 07 62 00 – Sheet Metal Flashing and Trim
- .6 Section 07 92 00 - Joint Sealants
- .7 Section 08 11 16 – Aluminum Doors and Frames.
- .8 Section 08 44 13 – Glazed Aluminum Curtain Walls.
- .9 Section 08 80 00 – Glazing.

1.2 SUMMARY

- .1 Design and install aluminum windows to function as windows in existing buildings.
Windows to be compatible with existing window openings and wall construction.

1.3 REFERENCES

- .1 Aluminum Association (AA),
 - .1 AA-DAF 45-03 (R2009), Designation System for Aluminum Finishes.
- .2 American Society for Testing and Materials (ASTM International)
 - .1 ASTM E1748-95 (2009), Standard Test Method for Evaluating the Engagement Between Windows and Insect Screens as an Integral System.
- .3 Canadian Standards Association (CSA International)
 - .1 CAN/CSA A440-11, NAFS – North American Fenestration Standard/Specification for Windows, Doors, And Skylights, Includes Update No. 1 (2014).
 - .2 CAN/CSA A440.4-07 (R2012), Window, Door, and Skylight Installation.
 - .3 CSA G164-M92 (R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.
 - .4 CAN/CSA S157-05/S157.1-05 (R2015), Strength Design in Aluminum/Commentary on CSA S157-05, Strength Design in Aluminum.

- .5 CSA W59.2-1991 (Reaffirmation Notice, 2013), Welded Aluminum Construction.
- .6 CAN/CSA-Z91-02 (R2013), Health and Safety Code for Suspended Equipment Operations.
- .4 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-1.40-97, Primer, Structural Steel, Oil Alkyd Type.
 - .2 CAN/CGSB-79.1-M91, Insect Screens.

1.4 SUBMITTALS

- .1 Shop Drawings: Indicate materials and details in full size scale for head, jamb and sill, frame, glazing, profiles of components, interior and exterior trim junction between combination units, elevations of unit, anchorage details, location of isolation coating, description of related components, finishes and exposed finishes, fasteners, waterproofing method and sealant. Indicate location of manufacturer's nameplates.
 - .1 Shop drawings to indicate continuation of air barrier between existing wall assembly and aluminum window.
 - .2 Include 150 mm long samples of head, jamb, sill, meeting rail mullions to indicate profile.

1.5 EXISTING CONDITIONS REVIEW

- .1 Pre-installation Meeting: In accordance with Section 01 14 10 – Scheduling and Management of Work.

1.6 TEST REPORTS

- .1 Submit test reports from approved independent testing laboratories, certifying compliance with specifications, for:
 - .1 Windows classifications
 - .2 Air tightness
 - .3 Water tightness
 - .4 Wind load resistance
 - .5 Condensation resistance
 - .6 Forced entry resistance
 - .7 Glazing
 - .8 Sash strength and stiffness
 - .9 Mullian deflection - combination and composite windows
 - .10 Anodized finish

1.7 CLOSEOUT SUBMITTALS

- .1 Provide operation and maintenance data for windows for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.8 WARRANTY

- .1 Provide a written warranty for work under this section from manufacturer for failure due to defective materials and from contractor for failure due to defective installation and workmanship, for five (5) years respectively from the date of Substantial Completion.

1.9 MOCK-UP

- .1 Construct mock-up of one (1) aluminum window installation in location designated by Departmental Representative.
- .2 Construct mock-up showing typical window installed in existing wall opening. Accepted mock-up may form part of complete work.
- .3 Allow 48 hours for inspection of mock-up by Departmental Representative before proceeding with window work.
- .4 When accepted, mock-up will demonstrate minimum standard for this work. Mock-up may remain as part of finished work.

Part 2 Products

2.1 DESCRIPTION

- .1 Thermally broken, aluminum framed fixed and awning windows with double glazed insulating glass units and concealed tamperproof fasteners.

2.2 DESIGN CRITERIA

- .1 Design aluminum components to CAN/CSA S157.
- .2 Classification rating: to CSA A440.
 - .1 Air tightness: A3 with operable sashes; without: fixed.
 - .2 Water tightness: B7.
 - .3 Wind load resistance: C5.
 - .4 Condensation resistance: Temperature Index, I58.
 - .5 Forced Entry: F2.
 - .6 Insect Screens: S2.
 - .7 Operable Sashes: life-cycle tested AW-85 rating.
- .3 Energy ratings: windows to be Energy Star certified to Canadian Standards Association for various regions of Nova Scotia as follows:
 - .1 Zone B

2.3 MATERIALS

- .1 Materials: to CSA-A440/A440 supplemented as follows:
- .2 All aluminum windows by same manufacturer.
- .3 Sash: aluminum thermally broken.
- .4 Main frame: extruded aluminum to ASTM B221, 6063 alloy with T5 or T6 temper, thermally broken.
- .5 Depth: to suit project conditions.
- .6 Insulating Glass Units: in accordance with Section 08 80 00 – Glazing.
- .7 Interior and exterior metal sills: extruded aluminum of type and size to suit project conditions; minimum 3 mm thick, complete with joint covers, jamb drip deflectors, chairs, anchors, anchoring devices.
- .8 Thermal break: PVC porthole extrusion.

2.4 HARDWARE FOR OPERABLE WINDOWS

- .1 Hinges:
 - .1 Equip each window with one (1) pair of stainless steel, four (4) bar friction arm hinges complete with semi-concealed operating tension adjustment device.
- .2 Operators:
 - .1 Equip each window unit with crank operator.
- .3 Locking:
 - .1 Equip each window with two (2) locking claw handles or cam handle locks with painted or plated finish.

2.5 SCREENS

- .1 Screens:
 - .1 Insect screening mesh: 18 x 16 count fibreglass black mesh.
 - .2 Screen frame: extruded aluminum secured with turn-clip fasteners and colour to match exterior window frame.
 - .3 Screen mounting: interior.
 - .4 Install at ventilating portion of the window.

2.6 FABRICATION

- .1 Fabricate in accordance with CSA-A440/A440.1:
 - .1 Do glazing in accordance with Section 08 80 00 – Glazing.

- .2 Fabricate units square and true with maximum tolerance of plus or minus 1.5 mm for units with a diagonal measurement of 1800 mm or less and plus or minus 3.0 mm for units with a diagonal measurement over 1800 mm.
- .3 Fabricate aluminum assemblies of extruded sections to sizes and profiles to suit existing conditions.
- .4 Brace frames to maintain squareness and rigidity during shipment and installation.
- .5 Finish steel clips and reinforcement with 380 g/m² zinc coating to CAN/CGSB-1.40.

2.7 ALUMINIUM FINISHES

- .1 Provide finishes for aluminium components to match finishes on existing windows.
 - .1 Location: interior and exterior exposed aluminum surfaces.
- .2 Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.
- .3 Colour Anodic Finish: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm or thicker.
 - .1 Colour: to be selected by Departmental Representative from full range of industry colours and colour densities.
- .4 Black anodic finish: AA-M12C22A42, Class 1
- .5 High-Performance Organic Finish: Two-coat fluoropolymer finish complying with AAMA 2605 and containing not less than 70% PVDF resin by weight in colour coat. Prepare, pre-treat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - .1 Colour and Gloss: As indicated. To be selected by Departmental Representative from manufacturer's full range.
- .6 Touch-up Primer for Galvanized Steel Surfaces: SSPC-Paint 20, Type II-Organic or MPI #19, organic, zinc-rich primer.
- .7 Concealed Steel Items: Hot-dip galvanized to appropriate grade for type and size of steel material indicated, coating thickness ASTM A123/A123M.
- .8 Concealed Steel Items: Primed with iron oxide paint.
- .9 Apply one (1) coat of bituminous paint to concealed aluminum surfaces in contact with cementitious or dissimilar materials.

2.8 ACCESSORIES

- .1 Gasketing: silicone compatible EPDM gaskets keyed into extrusions.
- .2 Fasteners: tamperproof, cadmium plated stainless steel 300 series to meet window requirements and as recommended by manufacturer.

- .3 Setting blocks: in accordance with Section 08 80 00 – Glazing.
- .4 Spacers: in accordance with Section 08 80 00 – Glazing.

2.9 ISOLATION COATING

- .1 Isolate aluminum from following components, by means of isolation coating:
 - .1 Dissimilar metals except stainless steel, zinc, or white bronze of small area.
 - .2 Concrete, mortar and masonry.
 - .3 Wood.

Part 3 Execution

3.1 WINDOW INSTALLATION

- .1 Install windows in existing openings in accordance with CSA-A440.
- .2 Arrange components to prevent abrupt variation in colour.
- .3 Install shims between windows and building frame at each installation screw location. Shim and fasten windows in accordance with manufacturer's recommendations and CAN/CSA A440.4.

3.2 SILL INSTALLATION

- .1 Install metal sills with uniform wash to exterior, level in length, straight in alignment with plumb upstands and faces. Use one piece lengths at each location.
- .2 Cut sills to fit existing window openings.
- .3 Secure sills in place with anchoring devices located at ends joints of continuous sills and evenly spaced 600 mm oc in between.
- .4 Fabricate and install sills to provide minimum 2% slope away from window.
- .5 Fasten drip deflectors with self tapping stainless steel screws.
- .6 Maintain 6.0 to 9.0 mm space between butt ends of continuous sills. For sills over 1200 mm in length, maintain 3.0 to 6.0 mm space at each end.

3.3 FOAM SEALANT

- .1 Provide low expanding, single component polyurethane foam sealant installed at head, jamb and sill perimeter of window for sealing to building air/vapour retarder and window frame. Foam sealant width to be adequate to provide required air tightness and vapour diffusion control to building interior. Refer to Section 07 21 20 – Low Expanding Foam Sealant.

3.4 CAULKING

- .1 Seal joints between windows and window sills with sealant. Bed sill expansion joint cover plates and drip deflectors in bedding compound. Caulk between sill upstand and window-frame. Caulk butt joints in continuous sills.
- .2 Apply sealant in accordance with Section 07 92 00 - Joint Sealants. Conceal sealant within window units except where exposed use is permitted by Departmental Representative.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 08 11 16 – Aluminum Doors and Frames.

1.2 REFERENCES

- .1 American National Standards Institute (ANSI) :
 - .1 ANSI/BHMA A156.3-14, Exit Devices.
 - .2 ANSI/BHMA A156.4-13, Door Controls - Closers.
 - .3 ANSI/BHMA A156.8-10, Door Controls – Overhead Stops and Holders.
 - .4 ANSI/BHMA A156.18-12, Materials and Finishes.
 - .5 ANSI/BHMA A156.21-14, Thresholds.
 - .6 ANSI/BHMA A156.22-12, Door Gasketing Systems.
 - .7 ANSI/BHMA A156.26-12, Continuous Hinges.
- .2 Canadian Steel Door and Frame Manufacturers' Association (CSDMA)
 - .1 Recommended Dimensional Standards for Commercial Doors and Frames, 2006.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for door hardware and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Hardware List:
 - .1 Submit contract hardware list.
 - .2 Indicate specified hardware, including make, model, material, function, size, finish and other pertinent information.
- .3 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.
- .4 Manufacturer's Instructions: submit manufacturer's installation instructions.

1.4 MAINTENANCE MATERIALS SUBMITTALS

- .1 Extra Stock Materials:
 - .1 Supply maintenance materials.
 - .2 Tools:
 - .1 Supply 2 sets of wrenches for locksets and door closers.

1.5 QUALITY ASSURANCE

- .1 Hardware supplier to have certified Architectural Hardware Consultant on staff.
- .2 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.6 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials indoors, and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect door hardware from nicks, scratches, and blemishes.
 - .3 Protect prefinished surfaces with wrapping or strippable coating.
 - .4 Replace defective or damaged materials with new.

1.7 WARRANTY

- .1 Warranty date is from date of installation.
- .2 No liability is to be assumed where damage is due to improper installation, usage or abuse.
- .3 Provide guarantee:
 - .1 Closers 5 year
 - .2 Exit devices 3 year
 - .3 Hinges Lifetime of Building
 - .4 Remaining Hardware 1 year

Part 2 Products

2.1 HARDWARE ITEMS

- .1 Ensure hardware is suitable for aluminum entrance doors.
- .2 Use one manufacturer's products only for similar items.
- .3 Soffit-applied hardware requires mounting brackets. Bracket to suit frame rebate.
- .4 Ensure all hardware includes all mounting equipment and accessories to provide a complete installation.

2.2 DOOR HARDWARE

- .1 Exit Devices: to ANSI/BHMA A156.3.
 - .1 Double doors: narrow stile concealed vertical rod exit device.
 - .1 Type: 6
 - .2 Grade:1
 - .3 Outside trim function: O8
 - .4 Mortise cylinder
 - .5 Trim: pull, 25.4 x 254 mm (1" x 10")
 - .6 Mechanism case: smooth

- .7 Less bottom rod
- .8 Finish: 628 or 630
- .2 Single door: narrow stile rim exit device.
 - .1 Type: 4
 - .2 Grade: 1
 - .3 Outside trim function: O8
 - .4 Mortise cylinder
 - .5 Trim: pull, 25.4 x 254 mm (1" x 10")
 - .6 Mechanism case: smooth
 - .7 Finished to: 628 or 630
- .2 Door Controls – Closers: to ANSI/BMHA A156.4
 - .1 Type: C02021.
 - .2 Size: in accordance with ANSI/BMHA A156.4, Table 1
 - .3 Mounting location: push side.
 - .4 Finished to: 689 powder coated
- .3 Door Controls – Overhead Stops and Holders: to ANSI/BHMA A156.8.
 - .1 Type:
 - .1 Exterior doors: C01541
 - .2 Stop angle: 100°
 - .3 Mounting location: push side
 - .4 Finished to: 628
- .4 Thresholds: to ANSI/BHMA A156.21:
 - .1 type: J32293.
 - .2 Size: 152.4 mm x full width of door opening.
 - .3 Finish: mill finish
- .5 Door Gasketing System: to ANSI/BHMA A156.22.
 - .1 Head and jamb seal: ROE155
 - .2 Door Sweep: ROA415.
 - .1 Refer to Section 08 11 16 – Aluminum Doors and Frames for door bottom seal.
 - .3 Astragal: ROY715
- .6 Continuous Hinges: to ANSI/BHMA A156.26
 - .1 Type: geared, full mortise.
 - .2 Material: aluminum.
 - .3 Grade: 1
 - .4 Finished to: 628

2.3 FASTENINGS

- .1 Use only fasteners provided by manufacturer. Failure to comply may void warranties and applicable licensed labels.

- .2 Supply screws, bolts, expansion shields and other fastening devices required for satisfactory installation and operation of hardware.
- .3 Exposed fastening devices to match finish of hardware.
- .4 Where pull is scheduled on one side of door and push plate on other side, supply fastening devices, and install so pull can be secured through door from reverse side. Install push plate to cover fasteners.
- .5 Use fasteners compatible with material through which they pass.

2.4 KEYING

- .1 All locks to be masterkeyed as per instructions from Departmental Representative.
- .2 Doors to be keyed differently
- .3 Supply keys in duplicate for every lock in this Contract.
- .4 Supply 3 master keys.
- .5 Stamp keying code numbers on keys and cylinders.
- .6 Supply construction cores
- .7 Hand over permanent cores and keys to Departmental Representative.

Part 3 Execution

3.1 EXAMINATION

- .1 Examination should be done on all doors and frames to be assured of a proper fit before hardware is installed.

3.2 INSTALLATION

- .1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.
- .2 Supply metal door and frame manufacturers with complete instructions and templates for preparation of their work to receive hardware.
- .3 Supply manufacturers' instructions for proper installation of each hardware component.
- .4 Install hardware to standard hardware location dimensions in accordance with CSDFMA Canadian Metric Guide for Steel Doors and Frames (Modular Construction).
- .5 Exterior thresholds to be set in sealants.
- .6 Use only manufacturer's supplied fasteners.
 - .1 Use of "quick" type fasteners, unless specifically supplied by manufacturer, is unacceptable.
- .7 Remove construction cores when directed by Departmental Representative.
 - .1 Install permanent cores and ensure locks operate correctly.

3.3 ADJUSTING

- .1 Adjust door hardware, operators, closures and controls for optimum, smooth operating condition, safety and for weather tight closure.
- .2 Lubricate hardware, operating equipment and other moving parts.
- .3 Adjust door hardware to ensure tight fit at contact points with frames.

3.4 CLEANING

- .1 Leave Work area clean at end of each day.
- .2 Clean hardware with damp rag and approved non-abrasive cleaner, and polish hardware in accordance with manufacturer's instructions.
- .3 Remove protective material from hardware items where present.
- .4 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment
- .5 Waste Management: separate waste materials for reuse or recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.5 DEMONSTRATION

- .1 Maintenance Staff Briefing:
 - .1 Brief maintenance staff regarding:
 - .1 Proper care, cleaning, and general maintenance of hardware.
 - .2 Description, use and handling.
 - .3 Use and application of wrenches for door closers and locksets.
- .2 Demonstrate operation, operating components, adjustment features, and lubrication requirements.

3.6 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by door hardware installation.

3.7 CERTIFICATION

- .1 Hardware supplier to have certified member of Architectural Hardware Consultants (AHC) inspect and certify in writing that hardware and installation are in accordance with requirements.

3.8 SCHEDULE – HARDWARE GROUPS

- .1 HG1
 - Exterior – Pair Doors, Aluminum
 - Each door:
 - .1 Continuous hinge
 - .2 Closer.

- .3 Door sweep
- .4 Head and jamb seal.
- .5 Threshold.
- .6 Exit device with cylinder and pull
- .7 Door stop
- Either leaf:
- .8 Astragal

.2 HG2

Exterior – Single Door, Aluminum

- .1 Continuous Hinge
- .2 Closer.
- .3 Door sweep
- .4 Head and jamb seal.
- .5 Threshold.
- .6 Exit device with cylinder and pull
- .7 Door stop

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Division 01 – General Requirements
- .2 Section 02 41 19 – Selective Structure Demolition.
- .3 Section 08 11 16 – Aluminum Doors and Frames
- .4 Section 08 44 13 – Glazed Aluminum Curtain Walls.
- .5 Section 08 51 13 – Aluminum Windows.

1.2 REFERENCES

- .1 American Society for Testing and Materials (ASTM International)
 - .1 ASTM C542-05 (2011), Standard Specification for Lock-Strip Gaskets.
 - .2 ASTM D2240-15, Standard Specification Test Method for Rubber Property – Durometer Hardness.
 - .3 ASTM E330/E330M-14, Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights 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 (Amendment), Insulating Glass Units.
 - .4 CAN/CGSB-12.9-M91, Spandrel Glass.
 - .5 CAN/CGSB-12.10-M76, Glass, Light and Heat Reflecting.
 - .6 CAN/CGSB-12.20-M89, Structural Design of Glass.
- .3 Glass Association of North America (GANA)
 - .1 GANA Glazing Manual - 2008.

1.3 PERFORMANCE REQUIREMENTS

- .1 General: Installed glazing systems shall withstand normal thermal movement, wind loads, dead loads and positive and negative live loads acting normal to plane of glass to a design pressure of 0.95 kPa, as measured in accordance with ASTM E330 and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction,
- .2 Provide continuity of building enclosure air barrier using glass and glazing materials as follows:
 - .1 Utilize inner light of multiple light sealed units for continuity of air and vapour seal.

- .3 Limit glass deflection to 1/200 flexural limit of glass with full recovery of glazing materials.
- .4 Delegated Design: For glass panels having a dimension in any one direction 1500 mm or greater design glass, including comprehensive engineering analysis according to CAN/CGSB-12.20 by a qualified professional engineer, using the following design criteria:
 - .1 Design Wind Loads: Calculated as per the National Building Code of Canada for project location, type of building and adjacent site conditions, but in no case less than 1.4 KPa and in no case less than loadings containing in *Cladding Wind Load Estimates*, if so attached with this project Manual.
 - .2 Design Snow Loads: As per the National Building Code of Canada for project location, type of building and adjacent site conditions.
 - .3 Minimum Glass Thickness for Exterior Lites: Not less than 6.0 mm.
 - .4 Thickness of Heat-Absorbing Glass: Provide the same thickness for each tint colour indicated throughout Project.
 - .5 Probability of Breakage for Sloped Glazing: For glass surfaces sloped more than 15 degrees from vertical, design glass for a probability of breakage not greater than 0.001.
 - .6 Maximum Lateral Deflection: For glass supported on all four edges, limit center-of-glass deflection at design wind pressure to not more than 1/50 times the short-side length or 25 mm, whichever is less.
 - .7 Differential Shading: Design glass to resist thermal stresses induced by differential shading within individual glass lites.
 - .8 Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.
 - .1 Temperature Change: 67 deg C, ambient; 100 deg C, material surfaces.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Product Data:
 - .1 Submit manufacturer's printed product literature, specifications, data sheets, and installation instructions.
- .2 Glass Samples: For each type of glass product other than clear monolithic vision glass; 300 mm square.
 - .1 Spandrel glass.
 - .2 Insulating glass.
- .3 Glazing Accessory Samples: For gaskets and sealants, in 300-mm lengths. Install sealant Samples between two strips of material representative in colour of the adjoining framing system.
- .4 Delegated-Design Submittal: For glass indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 QUALITY ASSURANCE

- .1 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties to Departmental Representative.
 - .1 Provide testing and analysis of glass.
 - .2 Provide shop inspection and testing for glass.
- .2 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.6 WARRANTY

- .1 Manufacturer's Special Warranty on Insulating Glass: Manufacturer's standard form in which insulating-glass manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.
 - .1 Warranty Period: 10 years from date of Substantial Completion.
- .2 Manufacturer's Special Warranty for Opacifer Coatings on Spandrel Glass: Manufacturer's standard form in which coated-glass manufacturer agrees to replace coated-glass units that deteriorate within specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.
 - .1 Warranty Period: 5 years from date of Substantial Completion.

1.7 SITE CONDITIONS

- .1 Environmental Requirements:
 - .1 Install glazing when ambient temperature is 10⁰ C minimum. Maintain ventilated environment for 24 hours after application.
 - .2 Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.8 WASTE MANAGEMENT AND DISPOSAL

- .1 Waste management and disposal to be in accordance with Section 01 74 21 – Construction/Demolition Waste Management and Disposal.

Part 2 Products

2.1 GLASS PRODUCTS, GENERAL

- .1 Insulating vision glass units: to CAN/CGSB-12.8, double unit, 25 mm overall thickness.
 - .1 Glass: to CAN/CGSB-12.3, CAN/CGSB-12.1 and CAN/CGSB-12.10.

- .2 Glass thickness: 6 mm each lite.
- .3 Assembly: assembled with Edgetech "Super-U" Warm Edge Technology.
- .4 Glass coating: surface number 2, low "E", Sungate 400.
- .5 Inert gas fill: argon.
- .6 Inner and outer lites to be tempered glass.
 - .1 Heat strengthened glass to be used when lites exceed 1500 mm in any direction. Inner and out lites to be tempered.
- .2 Insulated spandrel glass units: to CAN/CGSB-12.8, double unit, 25 mm overall thickness.
 - .1 Glass:
 - .1 Outer lite: to CAN/CGSB-12.1, CAN/CGSB-12.3, CAN/CGSB-12.10.
 - .2 Inner lite: to CAN/CGSB 12.9
 - .2 Glass thickness: 6 mm each lite.
 - .3 Assembly: assembled with Edgetech "Super-U" Warm Edge Technology.
 - .4 Glass Coating:
 - .1 Surface 2: low "E", Sungate 400.
 - .2 Surface 4: ceramic or silicone coating
 - .1 Colour to be selected by Departmental Representative from manufacturer's full colour range.
 - .5 Inert gas fill: argon
 - .6 Inner and outer lites: heat strengthened

2.2 ACCESSORIES

- .1 Setting blocks: neoprene 80-90 Shore A durometer hardness to ASTM D2240, minimum 100 mm x width of glazing rabbet space minus 1.5 mm x height to suit glazing method, glass light weight and area.
- .2 Spacer shims: neoprene Silicone, 50-60 Shore A durometer hardness to ASTM D2240, 75 mm long x one half height of glazing stop x thickness to suit application. Self-adhesive on one face.
- .3 Glazing tape:
 - .1 Preformed butyl compound with integral resilient tube spacing device, 10-15 Shore A durometer hardness to ASTM D2240; coiled release paper; black colour.
 - .2 Closed cell polyvinyl chloride foam, coiled on release paper over adhesive on two sides, maximum water absorption by volume 2%, designed for compression of 25%, to effect an air and vapour seal.
- .4 Glazing splines: resilient polyvinyl chloride, extruded shape to suit glazing channel retaining slot, colour as selected by Departmental Representative.
- .5 Glazing clips: manufacturer's standard type.
- .6 Lock-strip gaskets: to ASTM C542.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

- .1 Compliance: comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

3.2 EXAMINATION

- .1 Verify that openings for glazing are correctly sized and within tolerance.
- .2 Verify that surfaces of glazing channels or recesses are clean, free of obstructions, and ready to receive glazing.

3.3 PREPARATION

- .1 Clean contact surfaces with solvent and wipe dry.
- .2 Seal porous glazing channels or recesses with substrate compatible primer or sealer.
- .3 Prime surfaces scheduled to receive sealant.

3.4 INSTALLATION: EXTERIOR WET/DRY METHOD (PREFORMED TAPE AND SEALANT)

- .1 Cut glazing tape to length and set against permanent stops, 6 mm below sight line. Seal corners by butting tape and dabbing with sealant.
- .2 Apply heel bead of sealant along intersection of permanent stop with frame ensuring full perimeter seal between glass and frame to complete continuity of air and vapour seal.
- .3 Place setting blocks at ¼ points, with edge block maximum 150 mm from corners.
- .4 Rest glazing on setting blocks and push against tape and heel head of sealant with sufficient pressure to attain full contact at perimeter of light or glass unit.
- .5 Install removable stops with spacer strips inserted between glazing and applied stops 6 mm below sight line. Place glazing tape on glazing lite or unit with tape flush with sight line.
- .6 Fill gap between glazing and stop with sealant to depth equal to bite of frame on glazing, maximum 9 mm below sight line.
- .7 Apply cap head of sealant along void between stop and glazing, to uniform line, flush with sight line. Tool or wipe sealant surface smooth.

3.5 CLEANING

- .1 Perform cleaning after installation to remove construction and accumulated environmental dirt.

- .2 Remove traces of primer, caulking.
- .3 Remove glazing materials from finish surfaces.
- .4 Remove labels after work is complete.
- .5 Clean glass and mirrors using approved non-abrasive cleaner in accordance with manufacturer's instructions.
- .6 Upon completion of installation remove surplus materials, rubbish, tools, and equipment barriers.

3.6 PROTECTION OF FINISHED WORK

- .1 After installation, mark light with an "X" by using removable plastic tape or paste. Do not mark heat absorbing or reflective glass units.

END OF SECTION