

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 07 92 00 – Joint Sealing: Caulking of joints between frames and other building components.
- .2 Section 08 71 00 – Door Hardware: Supply of finish hardware, including weatherstripping and mounting heights.
- .3 Section 09 91 23 – Painting and Protective Coatings.

1.2 REFERENCES

- .1 American Society for Testing and Materials International (ASTM)
 - .1 ASTM A653/A653M-06a, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - .2 ASTM B29-03, Standard Specification for Refined Lead.
 - .3 ASTM B749-03, Standard Specification for Lead and Lead Alloy Strip, Sheet and Plate Products.
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-1.181-99, Ready-Mixed Organic Zinc-Rich Coating.
 - .2 CGSB 41-GP-19Ma-84, Rigid Vinyl Extrusions for Windows and Doors.
- .3 Canadian Standards Association (CSA International)
 - .1 CSA-G40.20-04/G40.21-04, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
 - .2 CSA W59-03, Welded Steel Construction (Metal Arc Welding).
- .4 Canadian Steel Door Manufacturers' Association (CSDMA)
 - .1 CSDMA, Recommended Specifications for Commercial Steel Doors and Frames, 2000.
 - .2 CSDMA, Selection and Usage Guide for Commercial Steel Doors, 1990.
- .5 National Fire Protection Association (NFPA)
 - .1 NFPA 80, Standard for Fire Doors and Fire Windows.
 - .2 NFPA 252-03, Standard Methods of Fire Tests of Door Assemblies.
- .6 Underwriters' Laboratories of Canada (ULC)
 - .1 CAN/ULC-S701-01, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.
 - .2 CAN/ULC-S702-97, Standard for Thermal Insulation, Mineral Fibre, for Buildings.
 - .3 CAN/ULC-S704-03, Standard for Thermal Insulation, Polyurethane and Polyisocyanurate Boards, Faced.
 - .4 CAN4-S104-M80, Standard Method for Fire Tests of Door Assemblies.

- .5 CAN4-S105-M85, Standard Specification for Fire Door Frames Meeting the Performance Required by CAN4-S104.

1.3 SYSTEM DESCRIPTION

- .1 Design Requirements:
 - .1 Design exterior frame assembly to accommodate to expansion and contraction when subjected to minimum and maximum surface temperature of -35 degrees C to 35 degrees C.
 - .2 Maximum deflection for exterior steel entrance screens under wind load of 1.2 kPa not to exceed 1/175th of span.
 - .3 Steel fire rated doors and frames: labelled and listed by an organization accredited by Standards Council of Canada in conformance with CAN4-S104 NFPA 252 for ratings specified or indicated.
 - .4 Provide fire labelled frames for openings requiring fire protection ratings. Test products in conformance with CAN4-S104, ASTM E152, NFPA 252 and listed by nationally recognized agency having factory inspection services.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide shop drawings: in accordance with E3 – Shop Drawings.
 - .1 Indicate each type of door, material, steel core thicknesses, mortises, reinforcements, location of exposed fasteners, openings, louvred, arrangement of hardware, fire rating and finishes.
 - .2 Indicate each type frame material, core thickness, reinforcements, glazing stops, location of anchors and exposed fastenings, reinforcing, fire rating and finishes.
 - .3 Include schedule identifying each unit, with door marks and numbers relating to numbering on drawings and door schedule.
 - .4 Submit test and engineering data, and installation instructions.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Provide and maintain dry, off-ground weatherproof storage.

1.6 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste materials in accordance with D14 – Environmental Protection Plan.
- .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal paper, plastic, polystyrene and corrugated cardboard packaging material in appropriate on-site for recycling in accordance with Waste Management Plan.
- .4 Divert unused paint and sealant materials from landfill to an approved, official hazardous material collections site.
- .5 Do not dispose of unused paint and sealant materials into sewer systems, into lakes, streams, onto ground or in other locations where it will pose health or environmental hazard.

- .6 Divert unused metal materials from landfill to an approved metal recycling facility.
- .7 Divert unused wood materials from landfill to an approved recycling facility.
- .8 Damaged or broken glazing materials are not recyclable. These materials must not be disposed of with materials destined for recycling.

Part 2 Products

2.1 ACCEPTABLE MANUFACTURERS

- .1 Only steel frame products manufactured by Canadian Steel Door Manufacturers' Association, (CSDMA) members are eligible for use on this project.

2.2 MATERIALS

- .1 Hot dipped galvanized steel sheet: to ASTM A653M, ZF75, minimum base steel thickness in accordance with CSDMA Table 1 - Thickness for Component Parts.
- .2 Reinforcement channel: to CSA G40.20/G40.21, Type 44W, coating designation to ASTM A653M, ZF75.
- .3 Fire-rated doors and frames: Material and construction in accordance with listing requirements. Doors to be flush type with no face seams.

2.3 DOOR CORE MATERIALS

- .1 Honeycomb construction:
 - .1 Structural small cell, 24.5 mm maximum kraft paper 'honeycomb', weight: 36.3 kg per ream minimum, density: 16.5 kg/m³ minimum sanded to required thickness.
 - .2 Insulated:
 - .1 Expanded polystyrene: CAN/ULC-S701, density 16 to 32 kg/m³.
 - .3 Temperature rise rated (TRR): core composition to limit temperature rise on unexposed side of door to 250 degrees C at 60 minutes. Core to be tested as part of a complete door assembly, in accordance with CAN4-S104, ASTM E152 or NFPA 252, covering Standard Method of Tests of Door Assemblies and listed by nationally recognized testing agency having factory inspection service.

2.4 ADHESIVES

- .1 Honeycomb cores and steel components: heat resistant, spray grade, resin reinforced neoprene/rubber (polychloroprene) based, low viscosity, contact cement.
- .2 Polystyrene and polyurethane cores: heat resistant, epoxy resin based, low viscosity, contact cement.
- .3 Lock-seam doors: fire resistant, resin reinforced polychloroprene, high viscosity, sealant/adhesive.

2.5 PRIMER

- .1 Touch-up prime CAN/CGSB-1.181.

2.6 PAINT

- .1 Field paint steel doors and frames in accordance with Sections 09 91 23 - Interior Painting. Protect weatherstrips from paint. Provide final finish free of scratches or other blemishes.

2.7 ACCESSORIES

- .1 Door silencers: single stud rubber/neoprene type.
- .2 Exterior top and bottom caps: rigid polyvinylchloride extrusion conforming to CGSB 41-GP-19Ma steel.
- .3 Door bottom seal: to Section 08 71 00 – Door Hardware.
- .4 Metallic paste filler: to manufacturer's standard.
- .5 Fire labels: Metal rivited.
- .6 Sealant: to Section 07 92 00 – Joint Sealing.
- .7 Accessories (doors and frames) and minimum base steel thickness:
 - .1 Lock/strike reinforcements: 1.6mm
 - .2 Hinge reinforcements: 2.7mm
 - .3 Flush bolt reinforcements: 1.6mm
 - .4 Reinforcements for surface applied hardware: 1.2mm
 - .5 Top or bottom channels: 1.2mm
 - .6 Glass trim, screw fixed or snap-in types: 0.9mm
 - .7 Mortar guard boxes: 0.8mm
 - .8 Floor anchors: 1.6mm
 - .9 Jamb spreaders: 0.9mm

2.8 FRAMES FABRICATION GENERAL

- .1 Fabricate frames in accordance with CSDMA specifications, reviewed shop drawings and listing requirements.
- .2 Fabricate frames to profiles and maximum face sizes as indicated.
- .3 Finish: hot dipped galvanized after fabrication.
- .4 Exterior frames: 1.6 mm thermally broken type construction.
- .5 Interior frames: 1.6 mm knocked-down type construction.
- .6 Blank, reinforce, drill and tap frames for mortised, templated hardware, [electronic hardware] using templates provided by finish hardware supplier. Reinforce frames for surface mounted hardware.
- .7 Protect mortised cut outs with steel guard boxes.
- .8 Prepare frame for door silencers, 3 for single door, 2 at head for double door.
- .9 Manufacturer's nameplates on frames and screens are not permitted.
- .10 Conceal fastenings except where exposed fastenings are indicated.

- .11 Provide factory-applied touch up primer at areas where zinc coating has been removed during fabrication.
- .12 Insulate exterior frame components with polyurethane insulation.

2.9 FRAME ANCHORAGE

- .1 Provide appropriate anchorage to floor and wall construction.
- .2 Locate each wall anchor immediately above or below each hinge reinforcement on hinge jamb and directly opposite on strike jamb.
- .3 Provide 2 anchors for rebate opening heights up to 1520 mm and 1 additional anchor for each additional 760 mm of height or fraction thereof.

2.10 FRAMES: WELDED TYPE

- .1 Welding in accordance with CSA W59.
- .2 Accurately mitre or mechanically joint frame product and securely weld on inside of profile.
- .3 Cope accurately and securely weld butt joints of mullions, transom bars, centre rails and sills.
- .4 Grind welded joints and corners to a flat plane, fill with metallic paste and sand to uniform smooth finish.
- .5 Securely attach floor anchors to inside of each jamb profile.
- .6 Weld in 2 temporary jamb spreaders per frame to maintain proper alignment during shipment.

2.11 FRAMES: KNOCKED-DOWN TYPE

- .1 Ship knocked-down type frames unassembled.
- .2 Provide frames with mechanical joints which inter-lock securely and provide functionally satisfactory performance when assembled and installed in accordance with CSDMA Recommended Installation Guide for Steel Doors and Frames.
- .3 Securely attach floor anchors to inside of each jamb profile.

2.12 DOOR FABRICATION GENERAL

- .1 Doors: swing type, flush, with provision for louvre openings as indicated.
- .2 Exterior doors: Insulated polystyrene core construction.
- .3 Interior doors: Honeycomb hollow steel construction.
- .4 Fabricate doors with longitudinal edges locked seamed. Seams: visible.
- .5 Blank, reinforce, drill doors and tap for mortised, templated hardware and electronic hardware.
- .6 Factory prepare holes 12.7 mm diameter and larger except mounting and through-bolt holes, on site, at time of hardware installation.
- .7 Reinforce doors where required, for surface mounted hardware.

- .8 Provide factory-applied touch-up primer at areas where zinc coating has been removed during fabrication.
- .9 Provide fire labelled doors for those openings requiring fire protection ratings, as scheduled. Test such products in conformance with CAN4-S104 and ASTM E152 or NFPA 252 and list by nationally recognized agency having factory inspection service and construct as detailed in Follow-Up Service Procedures/Factory Inspection Manuals issued by listing agency to individual manufacturers.
- .10 Manufacturer's nameplates on doors are not permitted.

2.13 DOORS: HONEYCOMB CORE CONSTRUCTION

- .1 Form face sheets for exterior doors from 1.6 mm sheet steel with polystyrene core laminated under pressure to face sheets.
- .2 Form face sheets for interior doors from 1.3 mm sheet steel with honeycomb core laminated under pressure to face sheets.

2.14 HOLLOW STEEL CONSTRUCTION

- .1 Form face sheets for exterior doors from 1.6 mm sheet steel.
- .2 Form face sheets for interior doors from 1.3 mm sheet steel.
- .3 Reinforce doors with vertical stiffeners, securely welded to face sheets at 150 mm on centre maximum.
- .4 Fill voids between stiffeners of exterior doors with polystyrene core.
- .5 Fill voids between stiffeners of interior doors with honeycomb core.

2.15 THERMALLY BROKEN DOORS AND FRAMES

- .1 Fabricate thermally broken doors by using insulated core and separating exterior parts from interior parts with continuous interlocking thermal break.
- .2 Thermal break: rigid polyvinylchloride extrusion conforming to CGSB 41-GP-19Ma.
- .3 Fabricate thermally broken frames separating exterior parts from interior parts with continuous interlocking thermal break.
- .4 Welding of thermally broken frames must not cause thermal transfers between exterior and interior surfaces of frame sections.
- .5 Fill voids in frame with mineral wool insulation prior to insulation.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 INSTALLATION GENERAL

- .1 Install labelled steel fire rated doors and frames to NFPA 80 except where specified otherwise.
- .2 Install doors and frames to CSDMA Installation Guide.

3.3 FRAME INSTALLATION

- .1 Set frames plumb, square, level and at correct elevation.
- .2 Secure anchorages and connections to adjacent construction.
- .3 Brace frames rigidly in position while building-in. Install temporary horizontal wood spreader at third points of door opening to maintain frame width. Provide vertical support at centre of head for openings over 1200 mm wide. Remove temporary spreaders after frames are built-in.
- .4 Make allowances for deflection of structure to ensure structural loads are not transmitted to frames.
- .5 Caulk perimeter of frames between frame and adjacent material.
- .6 Maintain continuity of air barrier and vapour retarder.

3.4 DOOR INSTALLATION

- .1 Install doors and hardware in accordance with hardware templates and manufacturer's instructions and Section 08 71 00 - Door Hardware.
- .2 Provide even margins between doors and jambs and doors and finished floor and thresholds as follows.
 - .1 Hinge side: 1.0 mm.
 - .2 Latchside and head: 1.5 mm.
 - .3 Finished floor and thresholds: 13 mm.
- .3 Adjust operable parts for correct function.
- .4 Install louvres.
- .5 Install vinyl top caps in out swinging exterior doors for weather protection.

3.5 FINISH REPAIRS

- .1 Touch up with primer finishes damaged during installation.
- .2 Fill exposed frame anchors and surfaces with imperfections with metallic paste filler and sand to a uniform smooth finish.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 Aluminum Association (AA)
 - .1 AA DAF 45-03(R2009), Designation System for Aluminum Finishes.
- .2 ASTM International
 - .1 ASTM A1008/A1008M-10, Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable.
 - .2 ASTM D523-08, Standard Test Method for Specular Gloss.
 - .3 ASTM D822-01(2006), Standard Practice for Filtered Open-Flame Carbon-Arc Exposures of Paint and Related Coatings.
- .3 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-1.105-M91, Quick-Drying Primer.
 - .2 CAN/CGSB-1.213-04, Etch Primer (Pretreatment Coating or Tie Coat) for Steel and Aluminum.
 - .3 CAN/CGSB-1.181-99, Ready-Mixed, Organic Zinc-Rich Coatings.
- .4 CSA International
 - .1 CAN/CSA-G164-M92(R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.

1.2 SYSTEM DESCRIPTION

- .1 Design Requirements:
 - .1 Design exterior door assembly to withstand windload in accordance with code requirements with a maximum horizontal deflection of 1/240 of opening width.
 - .2 Design door panel assemblies with thermal insulation factor 2.8 RSI.

1.3 SUBMITTALS

- .1 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for doors, hardware, and accessories and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Submit two copies of WHMIS MSDS – Material Safety Data Sheets. Indicate VOC's:
 - .1 For caulking materials during application and curing.
 - .2 For door materials and adhesives.
- .2 Shop Drawings:
 - .1 Submit shop drawings in accordance with E3 – Shop Drawings.

- .2 Indicate sizes, service rating, types, materials, operating mechanisms, glazing locations and details, hardware and accessories and required clearances.
- .3 Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
- .4 Test Reports: submit certified test reports showing compliance with specified performance characteristics and physical properties.
- .5 Manufacturers Reports:
 - .1 Manufacturer's Field Reports: submit manufacturer's written reports within 3 days of review, verifying compliance of Work.

1.4 CLOSEOUT SUBMITTALS

- .1 Provide operation and maintenance Data for sectional metal doors and door hardware in accordance with E5 – Additional Submittals.

1.5 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste materials in accordance with D14 – Environmental Protection Plan.
- .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .3 Dispose of corrugated cardboard polystyrene plastic packaging material in appropriate on-site bin for recycling in accordance with site waste management program.
- .4 Divert unused metal and wiring materials from landfill to metal recycling facility approved by Contract Administrator.
- .5 Divert unused paint material from landfill to official hazardous material collections site approved by Contract Administrator.
- .6 Do not dispose of unused paint materials into sewer systems, into lakes, streams, onto ground or in locations where it will pose health or environmental hazard.
- .7 Unused or damaged glazing materials are not recyclable and must not be diverted to municipal recycling programs.

Part 2 Products

2.1 GENERAL

- .1 This Section of the specifications is based on heavy duty insulated sectional overhead metal doors for industrial applications.
- .2 Manufacturers of insulated sectional metal doors having products conforming to the requirements of this section, considered acceptable for use:
 - .1 Richards-Wilcox
 - .2 Overhead Door Company
 - .3 Approved equal in accordance with B7.
- .3 Models

- .1 Insulated Sectional Overhead Metal Doors:
 - .1 Richards-Wilcox Thermatite – Model T175
 - .2 Overhead Door Company Thermacore

2.2 MATERIALS

- .1 Galvanized steel sheet: commercial quality Z275 zinc coating.
- .2 Steel sheet: commercial quality to ASTM A1008/A1008M, exposed (E), with factory applied powder coating or baked enamel finish.
- .3 Aluminum sheet: Prefinished embossed pattern utility sheet.
- .4 Aluminum extrusions: Aluminum Association alloy AA6063-T5.
- .5 Primer: to CAN/CGSB-1.105 for steel, CAN/CGSB-1.213 for aluminum, CAN/CGSB-1.181, for galvanized steel surfaces.
- .6 Insulation: polyurethane core to minimum insulating value RSI 2.84.
- .7 Plastic glazing: to CAN/CGSB-12.12.
 - .1 Material: acrylic, clear, double glazed, sealed units.
- .8 Cable: multi-strand galvanized steel aircraft cable with minimum safety factor of 5 to 1.

2.3 DOORS

- .1 Fabricate 45 mm thick insulated flush panel doors of interlocking steel sections from steel sheets with minimum core thickness of 0.48 mm with embossed texture pattern and horizontal stiffening ribs, foamed-in-place insulation core self-laminated to each skin, thermal break between skins, non-corrosive metal end caps.
- .2 Fabricate panel frames in a continuous box frame with vertical stiffeners at 600 mm centres.
- .3 Install glazing for door sections, vision panels:
 - .1 Double glazed lites, size 600 mm wide x 200 mm high x 3 mm thick acrylic with rounded corners, mounted in continuous rubber mouldings individually in inner and outer door skins. Number of lites as indicated on drawings.
- .4 Assemble components by means of spot or arc welding or coated rivet system or adhesive and self tapping screws to manufacturer's recommendations.
- .5 Fabricate doors from pre-painted steel stock.

2.4 PREFINISHED STEEL SHEET

- .1 Prefinished steel with factory applied silicone modified polyester:
 - .1 Class F1S.
 - .2 Color selected by Contract Administrator from manufacturer's standard range.
 - .3 Specular gloss: 30 units +/- in accordance with ASTM D523.
 - .4 Coating thickness: not less than 20 micrometres.

2.5 HEAVY DUTY INDUSTRIAL HARDWARE

- .1 Track: high lift hardware with 75 mm size 2.66 mm core thickness, galvanized steel track.
- .2 Track Supports: 2.3 mm core thickness continuous galvanized steel angle track supports.
- .3 Spring counter balance: heavy duty oil tempered torsion spring, to counter balance door weight for easy lift operation, with manufacturer's standard brackets.
 - .1 Drum: 200 mm diameter die cast aluminum.
 - .2 Shaft: 32 mm diameter galvanized steel.
- .4 Top roller carrier: galvanized Steel 3.04 mm thick, adjustable.
- .5 Rollers: full floating grease packed hardened steel, ball bearing 75 mm diameter solid steel tire.
- .6 Roller brackets: adjustable, minimum 2.5 mm galvanized steel.
- .7 Hinges: heavy duty, 3.04 mm thick galvanized or stainless steel as recommended by manufacturer.
- .8 Cable: 6 mm diameter galvanized steel aircraft cable.

2.6 ACCESSORIES

- .1 Overhead horizontal track and operator supports: galvanized steel, type and size to suit installation, adequately reinforced, braced and suspended.
- .2 Handles:
 - .1 Flat bar door latch with night latch.
 - .2 Handles: keyed, handle operated from outside, handle operated from inside.
- .3 Two horizontal sliding lock bolts on interior.
- .4 Weatherstripping:
 - .1 Sills: bulb type, full width extruded neoprene weatherstrip.
 - .2 Jambs and head: extruded aluminum and arctic grade vinyl weatherstrip to manufacturer's standard on exterior surface of each panel.
 - .3 Rubber joint seals full length between sections.
- .5 Weather breaks: overlap each door 25mm on jambs and head of door opening.
- .6 Finish ferrous hardware items with minimum zinc coating of 300 g/m² to CAN/CSA-G164.

2.7 OPERATORS

- .1 Equip doors for operation by:
 - .1 Electric operator, and
 - .2 Chain hoist with galvanized steel chain.
- .2 Cable fail safe device.

- .1 Able to stop door immediately if cable breaks on door free fall. Braking capacity 500 kg.

2.8 ELECTRICAL OPERATOR

- .1 Electrical jack shaft side mounted type operator.
- .2 Electrical motors, controller units, remote pushbutton stations, relays and other electrical components: to CSA approval with CSA enclosure type NEMA 3.
- .3 Power supply: 120 V, single phase, 60 Hz.
 - .1 Motor: $\frac{3}{4}$ Hp.
- .4 Controller units with integral motor reversing starter, solenoid operated brake, overload protection, including low voltage pushbuttons and control relays as applicable.
- .5 Operation:
 - .1 Remote pushbutton stations: surface mounted, in interior and exterior locations, with "OPEN-STOP-CLOSE", "SECURITY LOCKOUT" designations on pushbuttons in English and French, key operated for exterior stations.
- .6 Safety switch: combination roll rubber with limit switches for full length of bottom rail of bottom section of door, to reverse door to open position when coming in contact with object on closing cycle.
- .7 For jack shaft operators:
 - .1 Provide floor level disconnect device to allow for manual operation in event of power failure.
 - .2 Equip Operator with:
 - .1 Electrical interlock switch to disconnect power to operator when in manual operation.
 - .2 Built-in chain hoist for manual operation in event of power failure.
- .8 Door speed: 300 mm per second.
- .9 Control transformer: for 24 VAC control voltage.
- .10 Mounting brackets: galvanized steel, size and gauge to suit conditions.

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 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for sectional metal doors installation in accordance with manufacturer's written instructions.

- .1 Visually inspect substrate prior to installation.
- .2 Inform Contract Administrator of unacceptable conditions immediately upon discovery.
- .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Contract Administrator.

3.3 INSTALLATION

- .1 Install doors and hardware in accordance with manufacturer's instructions.
- .2 Do all drilling, tapping and cutting of frames and other work as required to install doors, guides, operators, hardware, fittings, etc., and provide all necessary bolts, anchors, inserts and supplementary framing.
- .3 Rigidly support rail and operator and secure to supporting structure.
- .4 Touch-up steel doors with primer where galvanized finish damaged during fabrication.
- .5 Install operator including electrical motors, controller units, pushbutton stations, relays and other electrical equipment required for door operation.
- .6 Lubricate and adjust door operating components to ensure smooth opening and closing of doors.
- .7 Adjust weatherstripping to form a weather tight seal.
- .8 Adjust doors for smooth operation.

3.4 CLEANING

- .1 Perform cleaning after installation to remove construction and accumulated environmental dirt.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.
 - .1 Remove traces of primer; clean doors and frames.
 - .2 Clean glass and glazing materials with approved non-abrasive cleaner.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 07 92 00 – Joint Sealing.
- .2 Section 08 80 50 – Glazing.

1.2 REFERENCES

- .1 National Building Code of Canada (NBC).
- .2 Manitoba Building Code (MBC).
- .3 Aluminum Association (AA)
 - .1 AA DAF 45-03(R2009), Designation System for Aluminum Finishes.
- .4 ASTM International
 - .1 ASTM A123/A123M-12, Standard Specification for Zinc (Hot-Dip galvanized) Coatings on Iron and Steel Products.
 - .2 ASTM E1748-95(2009), Standard Test Method for Evaluating the Engagement Between Windows and Insect Screens as an Integral System.
- .5 CSA Group
 - .1 AAMA/WDMA/CSA 101/I.S.2/A440-11, NAFS - North American Fenestration Standard for Windows, Doors, and Skylights.
 - .2 CSA A440S1-09, Canadian Supplement to AAMA/WDMA/CSA 101/I.S.2/A440, NAFS - North American Fenestration Standard for Windows, Doors, and Skylights.
 - .3 CAN/CSA-A440.4-07(R2012), Window, Door, and Skylight Installation
 - .4 CAN/CSA-A440.2/A440.3-09, Fenestration energy performance/User guide to CSA A440.2, Fenestration energy performance.
 - .5 CAN/CSA-Z91-02(R2013), Health and Safety Code for Suspended Equipment Operations.
 - .6 CAN/CSA-Z809-08(R2013), Sustainable Forest Management.
- .6 Forest Stewardship Council (FSC)
 - .1 FSC-STD-01-001-2004, FSC Principle and Criteria for Forest Stewardship.
 - .2 SCAQMD Rule 1168-05, Adhesives and Sealants.

1.3 DESIGN

- .1 Design aluminum windows to:
 - .1 Accommodate expansion and contraction within service temperature range expected in locality.
 - .2 Limit deflection to maximum 1/175 of span, under design loads in accordance with requirements of the latest version of the National Building Code of Canada.

1.4 PERFORMANCE

- .1 Design aluminum windows to meet or exceed air and water infiltration performance criteria of the applicable CGSB specifications.

1.5 SHOP DRAWINGS

- .1 Submit shop drawings in accordance with E3 – Shop Drawings.
- .2 Indicate materials and details in full size scale for head, jamb and sill, profiles of components, interior and exterior trim elevations of unit, anchorage details, location of isolation coating, description of related components and exposed finishes fasteners, and caulking.

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.
- .2 All test reports that reference the NAFS must include, on the first page, a summary of the results including, at minimum:
 - .1 The product manufacturer.
 - .2 The type of product.
 - .3 The model number/series number.
 - .4 The primary product designation.
 - .5 The secondary product designation.
 - .1 Positive design pressure.
 - .2 Negative design pressure.
 - .3 Water penetration resistance test pressure.
 - .4 Canadian air infiltration and exfiltration levels.
 - .6 The test completion date.
 - .7 The report will also contain the following information:
 - .1 Test dates.
 - .2 Report preparation dates.
 - .3 Test information retention period.
 - .4 Location of testing facilities.
 - .8 Full description of test samples, including:
 - .1 Weathering characteristics.
 - .2 Condensation resistance.
 - .3 Sash pull-off - vinyl windows.
 - .4 Forced entry resistance.

- .5 Mullian deflection - combination and composite windows.
- .9 Complete description of amendments, as applicable.
- .10 Conclusion.
- .11 Drawings signed by the testing laboratory, if provided.

1.7 CLOSEOUT SUBMITTALS

- .1 Provide operation and maintenance data for windows for incorporation into manual specified in E5 – Operation and Maintenance Manuals.

1.8 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Store materials off ground, indoors, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .3 Store and protect windows from nicks, scratches, and blemishes.
- .4 Replace defective or damaged materials with new.
- .5 Do not remove crates or protective coverings until units are ready for installation.

1.9 PROTECTION

- .1 Protect work of this section during erection against disfiguration, damage or contamination from harmful materials.
- .2 Protect work of other trades from damage resulting from work of this section. Make good such damage to satisfaction of Contract Administrator.

1.10 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste materials in accordance with D14 – Environmental Protection Plan.
- .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .3 Divert unused caulking material from landfill to official hazardous material collections site approved by Contract Administrator.
- .4 Plastic caulking tubes are not recyclable and must not be diverted for recycling with other plastic materials.

Part 2 Products

2.1 ACCEPTABLE SOURCES

- .1 Manufacturers of Aluminum Windows having Products conforming to the requirements of this Section, considered acceptable for use:
 - .1 Commdoor Aluminum.
 - .2 Commercial Aluminum.
 - .3 Kawneer Company Canada Limited.

- .4 Or approved equal in accordance with B7 – Substitutes.
- .2 Models:
 - .1 Commdoor Aluminum series 411.
 - .2 Commercial Aluminum series 425.
 - .3 Kawneer 516 Isoport Custom Vent.

2.2 MATERIALS

- .1 Materials: to CSA-A440/A440.1 supplemented as follows:
- .2 All windows by same manufacturer.
- .3 Aluminum extrusions:
 - .1 Alloy 6063 T5 with clean sharply defined profiles, free from defects impairing strength and performance.
- .4 Frames:
 - .1 Type: aluminum, 125mm depth.
 - .2 Style: fixed.
 - .3 Thermal break: extruded polyvinyl chloride separator.
 - .4 Fasteners: concealed or tamper proof.
- .5 Glass and Glazing: In accordance with Section 08 80 50 - Glazing.
- .6 Window sills: extruded aluminum, minimum 3 mm wall thickness to profiles indicated, complete with splice plates, jamb drip deflectors and concealed anchoring devices, to match finish of window framing.
- .7 Isolation coating: alkali resistant bituminous paint.
- .8 Fasteners in contact with aluminum: stainless steel, of sufficient strength to perform functions for which they are intended.
- .9 Sealants for aluminum window components: as recommended by window manufacturer.
- .10 Sealants for caulking aluminum window system to other building components: as specified under section 07 92 00 – Joint sealing.

2.3 WINDOW TYPE AND CLASSIFICATION

- .1 Types:
 - .1 Fixed with insulating glass.
- .2 Classification rating: to CSA-A440/A440.1:
 - .1 Air tightness: A3
 - .2 Water tightness: B7
 - .3 Wind load resistance: C4
 - .4 Condensation resistance: Temperature Index, I53.5
 - .5 Forced entry: F1, F2
 - .6 Glazing: see section 08 80 50 - Glazing

2.4 FABRICATION

- .1 Fabricate in accordance with CSA-A440/A440.1 supplemented as follows:
 - .1 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 mm for units with a diagonal measurement over 1800 mm.
 - .2 Jointing and intersections shall be accurately made with square or mitred cuts tightly fitted, sealed and made in true planes, with adequate fastenings.
 - .3 Work shall be made and erected square, plumb, straight and true, accurately fitted, and with tight joints and intersections. Work shall be adequately anchored in place.
 - .4 Exposed work shall be finished smooth with even close joints and neat connections.
 - .5 Intermediate members within units shall be of either solid or tubular design to suit wind loading and weight-carrying requirements.
 - .6 Construct units with clean, sharply defined profiles. Joints to be accurately machined, fitted, assembled and sealed to provide neat weather tight joints.
 - .7 Draw joints together and secure by means of screws driven through the walls and into the integrally extruded screw channels of abutting extrusions.
 - .8 Glass stops to be screw-less, lock-in type.
 - .9 Provide for 25 mm thick insulating glass units in fixed and operable window openings.
 - .10 Provide shielded drainage and pressure equalizing vents where required in window systems.
 - .11 Face dimensions detailed are maximum permissible sizes.
 - .12 Brace frames to maintain squareness and rigidity during shipment and installation.
 - .13 Clips and anchors shall be stainless steel.

2.5 ALUMINUM FINISHES

- .1 Finish exposed surfaces of aluminum components in accordance with Aluminum Association Designation System for Aluminum Finishes.
 - .1 Clear anodized.

2.6 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.

2.7 AIR BARRIER AND VAPOUR RETARDER

- .1 Equip window frames with air barrier and vapour retarder material for sealing to building air barrier and vapour retarder as follows:

- .1 Material: identical to, or compatible with, building air barrier and vapour retarder materials to provide required air tightness and vapour diffusion control throughout exterior envelope assembly.
- .2 Material width: adequate to provide required air tightness and vapour diffusion control to building air barrier and vapour retarder from interior.

Part 3 Execution

3.1 EXAMINATION

- .1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for product installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate prior to installation.
 - .2 Inform Contract Administrator of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Contract Administrator.

3.2 INSTALLATION

- .1 Window installation:
 - .1 Install in accordance with manufacturer's written instructions.
 - .2 Install in accordance with CSA-A440/A440.1.
 - .3 Arrange components to prevent abrupt variation in colour.
 - .4 All items in this section shall be set in their correct locations and shall be level, square, plumb and at proper elevations and alignment with other work to the Contract Administrator's approval.
 - .5 Clean down all material furnished under this Section as it is installed, leaving it free of dirt and surface blemishes.
 - .6 Aluminum to be placed in contact with concrete or dissimilar metals shall be given a heavy coat of alkali resistant bituminous paint on contacting surfaces.
 - .7 Interface aluminum window system with the building components using fixing devices in accordance with the window manufacturer's recommendations, and reviewed shop drawings.
 - .8 Arrange components to prevent abrupt variation in color.
- .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. Use maximum practical lengths in continuous runs, with minimum number of joints.
 - .2 Secure sills in place with concealed anchoring devices located at ends and joints of continuous sills and evenly spaced 600 mm on centre in between.
 - .3 Fasten expansion joint cover plates and drip deflectors with self tapping stainless steel screws finished to match adjacent material.

- .4 Maintain 6 to 9 mm space between butt ends of continuous sills. For sills over 1200 mm in length, maintain 3 to 6 mm space at each end.
- .3 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 Contract Administrator.

3.3 CLEANING

- .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

3.4 PROTECTION

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

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 08 11 00 – Metal Doors and Frames

1.2 REFERENCES

- .1 National Building Code of Canada (NBC).
- .2 Manitoba Building Code (MBC).
- .3 American National Standards Institute (ANSI) / Builders Hardware Manufacturers Association (BHMA)
 - .1 ANSI/BHMA A156.1-2006, American National Standard for Butts and Hinges.
 - .2 ANSI/BHMA A156.2-2011, Bored and Preassembled Locks and Latches.
 - .3 ANSI/BHMA A156.3-2008, Exit Devices.
 - .4 ANSI/BHMA A156.4-2008, Door Controls - Closers.
 - .5 ANSI/BHMA A156.5-2010, Auxiliary Locks and Associated Products.
 - .6 ANSI/BHMA A156.6-2010, Architectural Door Trim.
 - .7 ANSI/BHMA A156.8-2010, Door Controls - Overhead Stops and Holders.
 - .8 ANSI/BHMA A156.10-1999, Power Operated Pedestrian Doors.
 - .9 ANSI/BHMA A156.12-2013, Interconnected Locks and Latches.
 - .10 ANSI/BHMA A156.13-2012, Mortise Locks and Latches Series 1000.
 - .11 ANSI/BHMA A156.14-2013, Sliding and Folding Door Hardware.
 - .12 ANSI/BHMA A156.15-2011, Release Devices - Closer Holder, Electromagnetic and Electromechanical.
 - .13 ANSI/BHMA A156.16-2013, Auxiliary Hardware.
 - .14 ANSI/BHMA A156.17-2010, Self-closing Hinges and Pivots.
 - .15 ANSI/BHMA A156.18-2012, Materials and Finishes.
 - .16 ANSI/BHMA A156.19-2013, Power Assist and Low Energy Power - Operated Doors.
- .4 Canadian Steel Door and Frame Manufacturers' Association (CSDMA)
 - .1 CSDMA Recommended Dimensional Standards for Commercial Steel Doors and Frames - 2009.

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 Shop Drawings:
 - .1 Submit Shop Drawings in accordance with E3 – Shop Drawings.

- .3 Hardware List:
 - .1 Submit hardware list in accordance with E3 – Shop Drawings.
 - .2 Indicate specified hardware, including make, model, material, function, size, finish and other pertinent information.
- .4 Manufacturer's Instructions: submit manufacturer's installation instructions.

1.4 CLOSEOUT SUBMITTALS

- .1 Provide Operation and Maintenance data for door hardware for incorporation into manual as specified in E5 – Operation and Maintenance Manuals.

1.5 MAINTENANCE MATERIALS SUBMITTALS

- .1 Extra Stock Materials:
 - .1 Supply maintenance materials in accordance with E5 – Additional Submittals.
 - .2 Tools:
 - .1 Supply 2 sets of wrenches for door closers, locksets and fire exit hardware.

1.6 QUALITY ASSURANCE

- .1 Regulatory Requirements:
 - .1 Hardware for doors in fire separations and exit doors certified by a Canadian Certification Organization accredited by Standards Council of Canada.
- .2 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.7 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 Package items of hardware including fastenings, separately or in like groups of hardware, label each package as to item definition and location.
- .4 Storage and Handling Requirements:
 - .1 Store materials off ground, indoors, in dry location 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.

Part 2 Products

2.1 HARDWARE ITEMS

- .1 Use one manufacturer's products only for similar items.

2.2 DOOR HARDWARE

- .1 Butts and hinges: to CAN/CGSB-69.18, (three per door for doors up to 2135 and four per door for doors up to 2440 in height or over 914 in width), NRP, ball bearing type, stainless steel:
 - .1 Acceptable products:
 - .1 Stanley FBB191 x 626
 - .2 Or Approved equal in accordance with Bidding Procedures B7 - Substitutes.
 - .2 Exit devices: to CAN/CGSB-69.19, rim exit device, ULC rated, with cylinder core, exterior lever handle trim and vinyl touch bar:
 - .1 Acceptable products:
 - .1 Von Duprin 98 series
 - .2 Or Approved equal in accordance with Bidding Procedures B7 – Substitutes.
 - .2 Locksets:
 - .1 Locksets to CAN/CGSB-69.17 –M86, Grade 1 lever handle, bored locksets.
 - .2 Provide construction cylinder cores and final cores with keying to the City’s BEST master key system.
 - .3 Acceptable products for locksets:
 - .1 Schlage “AL” series x SAT x 626
 - .2 Or Approved equal in accordance with Bidding Procedures B7 – Substitutes.
 - .3 Door Closers and Accessories:
 - .1 Door controls (closers): to CAN/CGSB-69.20, one per door. All door closers shall be through bolted. Finish aluminum lacquer.
 - .1 Acceptable products:
 - .1 LCN 4040 Super Smoothee by LCN closers x 626
 - .2 Or Approved equal in accordance with B7.
 - .2 Door controls - overhead holders: to CAN/CGSB-69.24, extruded bronze, 110 degree hold-open and stop, one per door.
 - .1 Acceptable products:
 - .1 Sargent 598H
 - .2 Or Approved equal in accordance with Bidding Procedures B7 – Substitutes.

- .4 Flush Bolts:
 - .1 281D flush bolts (top and bottom) complete with strike x C26D
- .5 Architectural door trim: to CAN/CGSB-69.22, as listed below.
 - .1 Door protection plates: kick plate type, 1.27 mm thick x 250 mm high, stainless steel.
 - .1 Acceptable products:
 - .1 Canadian Builders Hardware.
 - .2 Or Approved equal in accordance with Bidding Procedures B7 – Substitutes.
 - .6 Thresholds: 150 mm, extruded aluminum with thermal break:
 - .1 Acceptable products:
 - .1 K. N. Crowder CT-46.
 - .2 Or Approved equal in accordance with Bidding Procedures B7 – Substitutes.
 - .7 Weatherstripping:
 - .1 Head and jamb seal: Adjustable spring loaded, vinyl in extruded aluminum trim.
 - .1 Acceptable products:
 - .1 K. N. Crowder W44.
 - .2 Or Approved equal in accordance with Bidding Procedures B7 – Substitutes.
 - .2 Door bottom seal: Neoprene rubber in extruded aluminum trim
 - .1 Acceptable products:
 - .1 K. N. Crowder Type CT-54 Automatic door bottom.
 - .2 Or Approved equal in accordance with Bidding Procedures B7 – Substitutes.
 - .8 Astragal:
 - .1 3 mm thick steel on active leaf of double door.

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.

- .6 All fasteners to be non-corroding.

2.4 KEYING

- .1 Lay out keying system in consultation with the City. Keying system shall include keying alike, keying differently, keying in groups, submaster keying and grand master keying locks as necessary to meet the requirements of the City.
- .2 Keying chart and related explanatory data shall be prepared and submitted to the City for approval, and lock work shall not be commenced until written confirmation of keying arrangements is received from the City.
- .3 Provide keys in duplicate for every lock.
- .4 Stamp keying code numbers on keys and cylinders.
- .5 Provide cabinet for key control with two tag security system complete with key loan register, three-way cross reference index, and cabinet door locking device.
- .6 All locks shall be operated by a construction master key in construction cylinder cores while the building is under construction, but shall not operate when the temporary construction cores are replaced with permanent master keyed cylinders at completion of the building.
- .7 Provide all permanent cores and keys to City.

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.
- .2 Furnish metal door and frame manufacturers with complete instructions and templates for preparation of their work to receive hardware.
- .3 Furnish manufacturers' instructions for proper installation of each hardware component.

3.2 INSTALLATION

- .1 Install hardware to standard hardware location dimensions in accordance with CSDFMA Canadian Metric Guide for Steel Doors and Frames (Modular Construction).
- .2 Where door stop contacts door pulls, mount stop to strike bottom of pull.
- .3 Use only manufacturer's supplied fasteners.
 - .1 Use of "quick" type fasteners, unless specifically supplied by manufacturer, is unacceptable.
- .4 Remove construction cores when directed by Contract Administrator.
 - .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 Progress 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.

3.5 DEMONSTRATION

- .1 Keying System Setup and Cabinet:
 - .1 Set up key control system with file key tags, duplicate key tags, numerical index, alphabetical index and key change index, label shields, control book and key receipt cards.
 - .2 Place file keys and duplicate keys in key cabinet on their respective hooks.
 - .3 Lock key cabinet and turn over key to Contract Administrator.
- .2 Maintenance Staff Briefing:
 - .1 Brief maintenance staff regarding:
 - .1 Proper care, cleaning, and general maintenance of projects complete hardware.
 - .2 Description, use, handling, and storage of keys.
 - .3 Use, application and storage of wrenches for door closers, locksets and fire exit hardware.
- .3 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.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 08 50 00 - Windows.

1.2 REFERENCES

- .1 ASTM International
 - .1 ASTM C542-05, Standard Specification for Lock-Strip Gaskets.
 - .2 ASTM D790-07e1, Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
 - .3 ASTM D1003-07e1, Standard Test Method for Haze and Luminous Transmittance of Plastics.
 - .4 ASTM D1929-96(R2001)e1, Standard Test Method for Determining Ignition Temperature of Plastics.
 - .5 ASTM D2240-05, Standard Test Method for Rubber Property - Durometer Hardness.
 - .6 ASTM E84-10, Standard Test Method for Surface Burning Characteristics of Building Materials.
 - .7 ASTM E330-02, Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.
 - .8 ASTM F1233-08, Standard Test Method for Security Glazing Materials and Systems.
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-12.1-M90, Tempered or Laminated Safety Glass.
 - .2 CAN/CGSB-12.2-M91, Flat, Clear Sheet Glass.
 - .3 CAN/CGSB-12.3-M91, Flat, Clear Float Glass.
 - .4 CAN/CGSB-12.4-M91, Heat Absorbing Glass.
 - .5 CAN/CGSB-12.6-M91, Transparent (One-Way) Mirrors.
 - .6 CAN/CGSB-12.8-97, Insulating Glass Units.
 - .7 CAN/CGSB-12.8-97 (Amendment), Insulating Glass Units.
 - .8 CAN/CGSB-12.9-M91, Spandrel Glass.
 - .9 CAN/CGSB-12.10-M76, Glass, Light and Heat Reflecting.
 - .10 CAN/CGSB-12.11-M90, Wired Safety Glass.
 - .11 CAN/CGSB-12.12-M90, Plastic Safety Glazing Sheets.
 - .12 CAN/CGSB-12.13-M91, Patterned Glass.
- .3 Glass Association of North American (GANA)
 - .1 GANA Glazing Manual - 2008.
 - .2 GANA Laminated Glazing Reference Manual - 2009.

1.3 ADMINISTRATIVE REQUIREMENTS

- .1 Pre-Installation Meetings:
 - .1 Convene pre-installation meeting 1 week prior to beginning work of this Section, with Contract Administrator to:
 - .1 Verify project requirements.
 - .2 Review installation and substrate conditions.
 - .3 Co-ordination with other building subtrades.
 - .4 Review manufacturer's written installation instructions and warranty requirements.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for glass, sealants, and glazing accessories and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Shop Drawings:
 - .1 Submit Shop Drawings in accordance with E3 – Shop Drawings.
- .3 Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
- .4 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.

1.5 CLOSEOUT SUBMITTALS

- .1 Provide operation and maintenance data for glazing for incorporation into manual specified in E5 – Additional Submittals.

1.6 QUALITY ASSURANCE

- .1 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
- .2 Mock-ups:
 - .1 Construct mock-up to include glass, plastic glazing, and perimeter air barrier and vapour retarder seal.
 - .2 Mock-up will be used:
 - .1 To judge quality of work, substrate preparation, operation of equipment and material application.
 - .3 Locate where directed.
 - .4 Allow 24 hours for inspection of mock-up before proceeding with work.
 - .5 When accepted, mock-up will demonstrate minimum standard of quality required for this work. Approved mock-up may remain as part of finished work.

1.7 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 off ground, indoors, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect glazing and frames from nicks, scratches, and blemishes.
 - .3 Protect prefinished aluminum surfaces with wrapping or strippable coating.
 - .4 Replace defective or damaged materials with new.

1.8 PROTECTION

- .1 Protect work of this section during erection against disfiguration, damage or contamination from harmful materials.
- .2 Protect work of other trades from damage resulting from work of this section. Make good such damage to satisfaction of Contract Administrator.

1.9 WASTE MANAGEMENT

- .1 Separate and recycle waste materials in accordance with D14 – Environmental Protection Plan.
- .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .3 Divert unused caulking material from landfill to official hazardous material collections site approved by Contract Administrator.

1.10 AMBIENT CONDITIONS

- .1 Ambient Requirements:
 - .1 Install glazing when ambient temperature is 10 degrees 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.

Part 2 Products

2.1 MATERIALS

- .1 Design Criteria:
 - .1 Ensure continuity of building enclosure vapour and air barrier using glass and glazing materials as follow:
 - .1 Utilize inner light of multiple light sealed units for continuity of air and vapour seal.

- .2 Size glass to withstand wind loads, dead loads and positive and negative live loads to ASTM E330.
- .3 Limit glass deflection to 1/200 with full recovery of glazing materials.
- .2 Glass and Glazing:
 - .1 Sealed double glazed units consisting of 6mm exterior and interior float glass.
 - .2 Low e coating on second surface.
 - .3 Argon filled cavity.
 - .4 Non-thermal conducting spacers providing a 12mm gap between panes.
 - .5 Wired glass: to CAN/CGSB-12.11, 6 mm thick.
 - .1 Type 1-polished both sides (transparent).
 - .2 Wire mesh style 3-square.
- .3 Insulating Glass Units:
 - .1 Insulating glass units: to CAN/CGSB-12.8, double unit, 25 mm overall thickness.
 - .1 Glass: to CAN/CGSB-12.3, CAN/CGSB-12.1, CAN/CGSB-12.2, CAN/CGSB-12.4, CAN/CGSB-12.10.
 - .2 Glass thickness: 6 mm each light.
 - .3 Inter-cavity space thickness: with low conductivity spacers, 12 mm between inner and outer lights.
 - .4 Glass coating: low "E".
 - .5 Inert gas fill: argon.
 - .6 Glazing classification rating: G2
- .4 Sealant: in accordance with Section 07 92 00 - Joint Sealants.

2.2 ACCESSORIES

- .1 See Section 08 50 00 – Windows.

Part 3 Execution

3.1 EXAMINATION

- .1 See Section 08 50 00 – Windows.

3.2 PREPARATION

- .1 See Section 08 50 00 – Windows.

3.3 INSTALLATION

- .1 See Section 08 50 00 – Windows.

3.4 INSTALLATION: MIRRORS

- .1 Set mirrors with adhesive, applied in accordance with adhesive manufacturer's instructions.

- .2 Set mirrors with clips. Anchor rigidly to wall construction.
- .3 Set in frame.
- .4 Place plumb and level.

3.5 CLEANING

- .1 See Section 08 50 00 – Windows.

3.6 PROTECTION

- .1 See Section 08 50 00 – Windows.

END OF SECTION