

**Part 1            General**

**1.1                RELATED SECTIONS**

- .1        Section 01330 - Submittal Procedures.
- .2        Section 079210 - Joint Sealers
- .3        Section 087110 - Door Hardware-General
- .4        Section 099113 – Exterior Painting.
- .5        Section 099123 – Interior Painting.

**1.2                REFERENCES**

- .1        American Society for Testing and Materials (ASTM International)
  - .1        ASTM A653/A653M-01a, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
  - .2        ASTM B29-92(1997), Specification for Refined Lead.
  - .3        ASTM B749-97, 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        G40.20/G40.21-98, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
  - .2        CSA W59-M1989(R2001), Welded Steel Construction (Metal Arc Welding) (Metric Version).
- .4        Canadian Steel Door Manufacturers' Association, (CSDMA).
  - .1        CSDMA, Specifications for Commercial Steel Doors and Frames, 1990.
  - .2        CSDMA, Recommended Selection and Usage Guide for Commercial Steel Doors, 1990.
- .5        National Fire Protection Association (NFPA)
  - .1        NFPA 80-99, Standard for Fire Doors and Fire Windows.
  - .2        NFPA 252-99, Standard Methods of Fire Tests of Door Assemblies.
- .6        Underwriters' Laboratories of Canada (ULC)
  - .1        CAN4-S104-80(R1985), Fire Tests of Door Assemblies.
  - .2        CAN4-S105-85(R1992), Fire Door Frames Meeting the Performance Required by CAN4-S104.

### **1.3 DESIGN REQUIREMENTS**

- .1 Design exterior frame assembly to accommodate to expansion and contraction when subjected to minimum and maximum surface temperature of -35°C to 35°C.
- .2 Maximum deflection for exterior steel entrance screens under wind load of 1.2 kPa not to exceed 1/175th of span.

### **1.4 SHOP DRAWINGS**

- .1 Submit shop drawings in accordance with Section 01330 - Submittal Procedures.
- .2 Indicate each type of door, material, steel core thicknesses, mortises, reinforcements, location of exposed fasteners, openings, arrangement of hardware, fire rating and finishes.
- .3 Indicate each type frame material, core thickness, reinforcements, glazing stops, location of anchors and exposed fastenings reinforcing, firerating and finishes.
- .4 Include schedule identifying each unit, with door marks and numbers relating to numbering on drawings and door schedule.
- .5 Submit test and engineering data, and installation instructions.

### **1.5 REQUIREMENTS**

- .1 Steel fire rated doors and frames: labelled and listed by an organization accredited by Standards Council of Canada in conformance with CAN4-S104M for ratings specified or indicated.
- .2 Provide fire labelled frame products for those openings requiring fire protection ratings, as scheduled. Test products in strict conformance with [CAN4-S104and 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.

## **Part 2 Products**

### **2.1 MATERIALS**

- .1 Hot dipped galvanized steel sheet: to ASTM A653M,], minimum base steel thickness in accordance with CSDMA Table 1 - Thickness for Component Parts.
- .2 Reinforcement: to CSA G40.20/G40.21, Type 44W, coating designation to ASTM A653M,.
- .3 Composites: balance of core materials used in conjunction with lead: in accordance with manufacturers' proprietary design.

### **2.2 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/m<sup>3</sup> minimum sanded to required thickness.
- .2 Stiffened: face sheets welded, honeycomb / insulated core.
  - .1 Polyurethane: to CAN/ULC-S704 rigid, modified poly/isocyanurate, closed cell board. Density 32 kg/m<sup>3</sup>.
- .3 Temperature rise rated (TRR): core composition to limit temperature rise on unexposed side of door to 250°C at 30 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.

### **2.3 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.

### **2.4 PRIMER**

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

### **2.5 PAINT**

- .1 Field paint steel doors and frames in accordance with Sections 09900 – Finish Painting. Protect weather strips from paint. Provide final finish shall be free of scratches or other blemishes.

### **2.6 ACCESSORIES**

- .1 Door silencers: single stud rubber/neoprene type.
- .2 Exterior and interior top and bottom caps: rigid polyvinylchloride extrusion conforming to CGSB 41-GP-19Ma.
- .3 Fabricate glazing stops as formed channel, minimum 16 mm height, accurately fitted, butted at corners and fastened to frame sections with counter-sunk oval head sheet metal screws.
- .4 Door bottom seal: neoprene.
- .5 Metallic paste filler: to manufacturer's standard.
- .6 Fire labels: metal rivited.
- .7 Sealant: as per section 079210.

**2.7 FRAMES FABRICATION GENERAL**

- .1 Fabricate frames in accordance with CSDMA specifications.
- .2 Fabricate frames to profiles and maximum face sizes as indicated.
- .3 Exterior frames: 1.6 mm welded thermally broken type construction.
- .4 Interior frames: 1.6 mm welded type construction.
- .5 Blank, reinforce, drill and tap frames for mortised, templated hardware, and electronic hardware using templates provided by finish hardware supplier. Reinforce frames for surface mounted hardware.
- .6 Protect mortised cutouts with steel guard boxes.
- .7 Prepare frame for door silencers, 3 for single door, 2 at head for double door.
- .8 Manufacturer's nameplates on frames and screens are not permitted.
- .9 Conceal fastenings except where exposed fastenings are indicated.
- .10 Provide factory-applied touch up primer at areas where zinc coating has been removed during fabrication.
- .11 Insulate exterior frame components with polyurethane insulation.

**2.8 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.
- .4 Locate anchors for frames in existing openings not more than 150 mm from top and bottom of each jambs and intermediate at 660 mm o.c. maximum.

**2.9 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.
- .7 Securely attach lead to inside of frame profile from return to jamb soffit (inclusive) on door side of frame only.

## **2.10 DOOR FABRICATION GENERAL**

- .1 Doors: swing type, flush.
- .2 Exterior doors: hollow steel] construction. Interior doors: honeycomb construction.
- .3 Fabricate doors with longitudinal edges welded. Seams: grind welded joints to a flat plane, fill with metallic paste filler and sand to a uniform smooth finish.
- .4 Doors: manufacturers' proprietary construction, tested and/or engineered as part of a fully operable assembly, including door, frame, gasketing.
- .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. Provide flush steel top caps to exterior doors. Provide inverted, recessed, spot welded channels to top and bottom of interior doors.
- .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 strict conformance with [CAN4-S104] 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.

## **2.11 DOORS: HONEYCOMB CORE CONSTRUCTION**

- .1 Form each face sheet for exterior doors from 1.6 mm sheet steel with polyurethane core laminated under pressure to face sheets.
- .2 Form each face sheet for interior doors from 1.6 mm sheet steel with honeycomb core laminated under pressure to face sheets.
- .3

## **2.12 HOLLOW STEEL CONSTRUCTION**

- .1 Form each face sheet for exterior doors from 1.6 mm sheet steel.

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

### **2.13 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 Apply insulation.

## **Part 3 Execution**

### **3.1 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.

### **3.2 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.

### **3.3 DOOR INSTALLATION**

- .1 Install doors and hardware in accordance with hardware templates and manufacturer's instructions and Section 08710 - 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 thresholds: 13 mm.
- .3 Adjust operable parts for correct function.

**3.4 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 Canadian Steel Door and Frame Manufacturers' Association (CSDFMA).
  - .1 CSDFMA Canadian Metric Guide for Steel Doors and Frames (Modular Construction): standard hardware location dimensions.
- .2 Canadian General Standards Board (CGSB).
  - .1 CAN/CGSB-69.17-[M86(R1993)], Bored and Preamsembled Locks and Latches.
  - .2 CAN/CGSB-69.18-[M90]/ANSI/BHMA A156.1-[1981], Butts and Hinges.
  - .3 CAN/CGSB-69.19-[93]/ANSI/BHMA A156.3-[1984], Exit Devices.
  - .4 CAN/CGSB-69.20-[M90]/ANSI/BHMA A156.4-[1986], Door Controls (Closers).
  - .5 CAN/CGSB-69.21-[M90]/ANSI/BHMA A156.5-[1984], Auxiliary Locks and Associated Products.
  - .6 CAN/CGSB-69.22-[M90]/ANSI/BHMA A156.6-[1986], Architectural Door Trim.
  - .7 CAN/CGSB-69.24-[M90]/ANSI/BHMA A156.8-[1982], Door Controls - Overhead Holders.
  - .8 CAN/CGSB-69.26-[96]/ANSI/BHMA A156.10-[1991], Power-operated Pedestrian Doors.
  - .9 CAN/CGSB-69.28-[M90]/ANSI/BHMA A156.12-[1986], Interconnected Locks and Latches.
  - .10 CAN/CGSB-69.29-[93]/ANSI/BHMA A156.13-[1987], Mortise Locks and Latches.
  - .11 CAN/CGSB-69.30-[93]/ANSI/BHMA A156.14-[1991], Sliding and Folding Door Hardware.
  - .12 CAN/CGSB-69.31-[M89]/ANSI/BHMA A156.15-[1981], Closer/Holder Release Device.
  - .13 CAN/CGSB-69.32-[M90]/ANSI/BHMA A156.16-[1981], Auxiliary Hardware.
  - .14 CAN/CGSB-69.33-[M90]/ANSI/BHMA A156.17-[1987], Self-closing Hinges and Pivots.
  - .15 CAN/CGSB-69.34-[93]/ANSI/BHMA A156.18-[1987], Materials and Finishes.
  - .16 CAN/CGSB-69.35-[M89]/ANSI/BHMA A156.19-[1984], Power Assist and Low Energy Power Operated Doors.
  - .17 CAN/CGSB-69.36-[M90]/ANSI/BHMA A156.20-[1984], Strap and Tee Hinges and Hasps.

**1.2 SUBMITTALS**

- .1 Product Data:
  - .1 Submit manufacturer's printed product literature, specifications and data sheet in accordance with Section 01 33 00 - Submittal Procedures.



- .2 Samples:
  - .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
  - .2 Identify each sample by label indicating applicable specification paragraph number, brand name and number, finish and hardware package number.
  - .3 After approval samples will be returned for incorporation in the Work.
- .3 Hardware List:
  - .1 Submit contract hardware list in accordance with Section 01 33 00 - Submittal Procedures.
  - .2 Indicate specified hardware, including make, model, material, function, size, finish and other pertinent information.
- .4 Manufacturer's Instructions:
  - .1 Submit manufacturer's installation instructions.
- .5 Closeout Submittals
  - .1 Provide operation and maintenance data for door closers, locksets, door holders [electrified hardware] and fire exit hardware for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

## **Part 2 General**

### **2.1 QUALITY ASSURANCE**

- .1 Furnish services of an Architectural Hardware Consultant (AHC) for preparation of hardware shop drawings, keying, co-ordination with other Sections, consultation with the City and the Contract Administrator and for On-Site inspections.
- .2 Inspect all hardware after installation by the Manufacturer's Representative who shall certify in writing to the City, that all hardware has been supplied and installed in accordance with the specifications and reviewed Shop Drawings, and are functioning properly.
- .3 Hardware for doors in fire separations and exit doors certified by a Canadian Certification Organization accredited by Standards Council of Canada.
- .4 Provide to applicable Sections templates and information required for proper preparation and application of hardware in ample time to facilitate progress of Work.
- .5 Before supplying and installing any hardware, carefully check Hardware Schedule, Drawings and Specifications. Verify door hands, door and frame material and operating conditions, and assure that hardware will fit work to which it is to be attached. Advise Contract Administrator in writing of required revisions.
- .6 Templates: Check Hardware Schedule, Drawings and Specifications, and Supply promptly to applicable Sections any templates, template information and Manufacturer's literature, required for proper preparation for hardware, in ample time to facilitate progress of work.
- .7 Provide services of competent mechanics for the installation of hardware. Make adjustments necessary to leave hardware in perfect working order. Provide written summary of work completed and status of all items, including any adjustments, revisions or modifications.

- .8 Maintenance Seminar: Instruct the City regarding proper care, cleaning and general maintenance.
- .9 Source Limitations: Obtain each type of product from a single Manufacturer.

## **2.2 REGULATORY REQUIREMENTS**

- .1 Ensure hardware for fire-rated openings complies with requirements of authorities having jurisdiction, with door and frame Manufacturer's tested assemblies, and that hardware items bear labels acceptable to authorities having jurisdiction.

## **Part 3 Products**

### **3.1 MATERIALS**

- .1 Type and Design: Matching in all respects to samples of hardware and finishes approved by City. Use one Manufacturer's products for all similar items.
- .2 Metal Finishes: Free from defects, clean and unstained, and of uniform colour.
- .3 Fire Rated Doors: Meeting requirements of ULC as part of fire rated door assembly, with ULC or WHI label, or as acceptable to authority having jurisdiction.
- .4 Fasteners: Screws, bolts, expansion shields and other fastening devices as required for satisfactory installation and operating of hardware.
  - .1 Same finish as hardware to which it is to be fastened.
- .5 Supply hardware complete with all necessary screws, bolts and other fastening of suitable size and type to anchor the hardware in position neatly and properly in accordance with the best practices and to the Contract Administrator's approval.
- .6 Fastenings: All fastenings shall harmonize with the hardware materials and finishes.
- .7 Hardware for fire rated and labelled door and frame assemblies: ULC listed or as accepted by authorities having jurisdiction.
- .8 Following Manufacturer's are acceptable subject to review by the City of samples and list of items proposed.
  - .1 Hinges:
    - .1 All Doors: Full mortised, stainless steel, minimum 114 mm x 102 mm, heavy weight, 5 knuckles, ball bearing, stainless steel screws.
    - .2 Non Removal Pin: Out swinging exterior doors and where scheduled.
    - .3 Stamp hinge catalogue numbers on face of leaf of each hinge at factory to enable easy recognition of hinge material and manufacture after doors are hung.

- .4 Where doors are required to swing to 180 degrees, Supply and Install hinges of sufficient throw to clear trim.
- .2 Locksets:
  - .1 Type and Finish: Heavy duty, stainless steel construction, orb handle and raised escutcheon.
  - .2 Backset: 125 mm for exterior doors, 70 mm for interior doors.
  - .3 Cylinders: 6 pin cylinders.
  - .4 Strikes: Stainless Steel, ANSI standard size with curved lip strikes for latch bolts and no lip strikes for dead locks. Provide complete with wrought boxes finished to match strike.
- .3 Closers:
  - .1 Hydraulically controlled and full rack and pinion operation, clear anodized aluminium arm and full cover.
  - .2 Adjustable closing speed, latch speed and back check control.
  - .3 Adjustable swing power.
  - .4 Install all necessary attaching brackets, mounting channels, cover plates where necessary for correct application of door closers.
  - .5 Parallel arms at out swinging exterior doors and at interior doors where specified.
  - .6 Delayed action for barrier free application.
  - .7 Coordinate closers with overhead holders.
- .4 Construction Keying:
  - .1 Equip lock cylinders in construction system.
  - .2 The construction key system to be inoperative once the City's keys are inserted in the cylinders.
- .5 Push Plates and Kickplates:
  - .1 Length: 40 mm (1½") less than door width for single doors and 20 mm (¾") less than door width for doors in pairs.
  - .2 Thickness: 1.3 mm (0.050"), free of rough or sharp edges. Corners and edges to be slightly radiused.
  - .3 Installation: 3M tape.
- .6 Surface Bolts:

- .1 Stainless steel top and bottom bolts, chain pull for top bolt.
- .2 Dust free strikes.
- .7 Door Stops:
  - .1 Surface mount, stainless steel retainer, half dome shaped neoprene stop.
  - .2 Install floor stops in manner so as not to create a tripping hazard and allows maximum opening of doors.
  - .3 Supply and Install door stops of height to engage doors.
- .8 Astragals: Stainless steel bar with neoprene bulb.
- .9 Weatherstrippings: Surface mounted extruded aluminium housing with neoprene bulb having spring mounted adjustment, 770A by Zero International.
- .10 Door Bottoms: Surface mounted, extruded aluminium housing, pressure spring loaded neoprene bulb, 365A by Zero International.
- .11 Thresholds: Extruded aluminium, high seat, except flat saddle for barrier free application.

### **3.2 KEYING SYSTEM**

- .1 Lay out keying system for building in consultation with the Contract Administrator. Keying system shall include keying alike, keying differently, keying in groups, master keying and grand-master keying locks and exit devices as required.
- .2 Prepare and submit keying chart and related explanatory data for approval. Do not order cylinders until written confirmation of keying arrangements is received from the City.
- .3 Stamp keys "DO NOT DUPLICATE".
- .4 Provide two (2) change keys for each lock. Three (3) keys for each submaster level and six (6) grand master keys. In the case of keyed alike groups, supply six (6) cut keys only and supply the balance as blanks.
- .5 Supply 1 Key Control System complete with cabinet and necessary components as Lund Model 1201, 2 tag system.
- .6 Confirm with Contract Administrator and the City for shipping directions.

## **Part 4 Execution**

### **4.1 PREPARATION**

- .1 Thoroughly check design and provide required hardware for openings to required detail.
- .2 Trim undesignated openings with hardware of equal quality and design to that specified for similar opening.

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- .3 Furnish door and frame Manufacturers with complete instructions and templates for preparation of their Work to receive hardware.

#### **4.2 INSTALLATION**

- .1 Install finish hardware to template in accordance with Manufacturer's written instructions. Do not modify finish hardware without Manufacturer's written approval.
- .2 Install finish hardware for fire rated doors in accordance with NFPA 80 requirements.
- .3 Install finish hardware secure, plumb, level, and true to line.
- .4 Cut and fit to substrates avoiding damage and weakening. Reinforce attachment substrate as necessary for proper installation and operation.
- .5 Size cutouts so that hardware item completely covers cut out.
- .6 Mortise work to correct location and size without gouging, splintering, and causing irregularities in exposed finish work.
- .7 Where cutting and fitting is required on substrates to be painted or similarly finished, install, fit, and adjust hardware prior to finishing.
- .8 Remove hardware and place in original packaging.
- .9 Re-install hardware after finishing operation is complete.
- .10 Install hardware items affixed to concrete and masonry with machine screws and threaded metal expansion shields.
- .11 Set, fit and adjust hardware according to Manufacturer's templates and instructions. Hardware shall operate freely. Protect installed hardware from damage and paint spotting.
- .12 Consult with manufacturer of security hardware items such as door monitoring equipment, card reader access equipment, electric strikes, and electric hinges operated by card access equipment and combination magnetic door holder releases/door closers and install in accordance with Manufacturer's recommendations under the Contractor's supervision Sections Fire Detection and Alarm System. Use templates as supplied by Manufacturer for predrilling doors and frames.
- .13 Pre-drill kickplates and doors before attachment of plates. Apply with water resistant adhesive and countersunk stainless steel screws.
- .14 Weatherstrip exterior doors. Install effectively to tightly seal entire perimeter of door. Secure in place with non-ferrous screws, in accurate alignment.
- .15 Maintain integrity of weather seal at head of doors fitted with closers. Adapt weatherstripping as required to achieve specified performance and provide any necessary accessories.
- .16 After installation of hardware under this Section, check opening units for correct fit and uniformity of space around perimeter of units, or between units. Provide smoothly operating opening units free from binding.

#### **4.3 FIELD QUALITY CONTROL**

- .1 Have hardware Manufacturer's Representative visit Site and submit written report of each visit to Site, giving storage conditions and installation details, date and name of hardware Manufacturer's Representative.
- .2 Before completion of Work but after hardware installation, have hardware Manufacturer's Representative inspect work and submit certificate to Contract Administrator stating that final inspection has been made and that hardware of proper type has been properly installed and adjusted, is in good working order and condition, and is in conformance with Contract requirements.

#### **4.4 ADJUSTMENTS AND CLEANING**

- .1 Adjust and clean hardware according to Manufacturer's written instructions.
- .2 Turn over construction keys and extractor key to the City and provide any required adjustment or modifications prior to Substantial Performance of the Contract.
- .3 Hand over to the City Grand-master and master keys, Change Keys, Control Keys and Permanent Cylinders and core. The City will be responsible for interchanging temporary construction cores with permanent cylinder cores in locks. Temporary construction cores will be returned to Contractor.

#### **4.5 EXTENDED WARRANTY**

- .1 Warrant work against defects in materials and quality of performance for a period of five (5) years for door closers and two (2) years for other hardware.

**END OF SECTION**

## **Part 1 General**

### **1.1 GENERAL REQUIREMENTS**

- .1 This Section includes glazing Work not specified in other Sections. Refer to other Sections for other glazing.

### **1.2 SUBMITTALS**

- .1 Provide samples of materials as requested. Label samples with manufacturer's name, with registered name of product, weight, and quality of glazing material.
- .2 Provide maintenance data of glass and glazing system used in this Project including cleaning instructions for incorporation into manual.

### **1.3 QUALITY ASSURANCE**

- .1 Perform Work in accordance with recommendations of Glazing Association of North America (GANA). Size glass to Code requirements and verify that openings for glazing are correctly sized and within tolerance.
- .2 Glass Lites: Float, tempered, laminated or heat strengthened and in thicknesses in accordance with requirements of glass manufacturer as substantiated by the glass manufacturer's stress analysis for each location required, unless otherwise indicated.
- .3 Design Conditions: Conforming to requirements of Division 8 Sections Curtain Wall and Entrances.
- .4 Use a safety factor of 2.5:1 minimum for glass design.

### **1.4 ENVIRONMENTAL REQUIREMENTS**

- .1 Install glazing when ambient temperature is 10°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.

### **1.5 WARRANTY**

- .1 Submit a 10 year warranty from Total Performance, against defects in the insulating glass units and warrant them to be free from material obstruction of vision as a result of dust or film formation on the internal glass surfaces by any cause, under design conditions, other than extrinsic glass breakage, but including breakage due to thermal shock and temperature differential due to inherent glass faults.
  - .1 The glass coatings will not discolour, oxidize, delaminate, or have scratches and pinholes and shall be uniform in thickness and uniform in colour throughout each glass unit and from glass unit to glass unit.

- .2 Insulating glass units will be free from condensation, fogging material obstruction of vision as a result of dust or film formation on the internal glass surfaces by any cause under normal conditions.
- .3 The insulating glass units will not change their mechanical design properties and shall not in any way deteriorate, degrade, delaminate or change their visual appearance.

## **Part 2 Products**

### **2.1 MATERIALS**

- .1 Float Glass: CAN/CGSB-12.3, clear, glazing quality, minimum 6 mm (1/4") thick.
- .2 Tempered Safety Glass: CAN/CGSB-12.1 Type 2, Class B, minimum 6 mm(1/4") thick, heat treated using the horizontal tong free method, with roll-wave distortion parallel to bottom edge of glass as installed.
- .3 Heat Strengthened Glass: ASTM C1048 Type HS, minimum 6 mm (1/4") thick, heat treated using the horizontal tong free method, with roll-wave distortion parallel to bottom edge of glass as installed.
- .4 Laminated Safety Glass: CAN/CGSB-12.1, Type 1, Class B, fabricated with minimum 1.6 mm clear polyvinylbutyral interlayer between 2 lites of minimum 3 mm (1/8") thick glass, minimum overall 7.6 mm (5/16") thick. Treat exposed edges of laminated glass susceptible to degradation by organic solvents and glazing compounds.
- .5 Wired Glass: Clear, 6 mm (1/4") thick, polished Georgian 12 mm (1/2") square wire-reinforced, float glass, having the required fire resistance rating based on ULC testing.
- .6 Tinted Glass: Heat absorbing glass, Solargray by PPG.
- .7 Low Emissivity Coating: Solarban 60 by PPG.
- .8 Ceramic Frit Coated Glass: Ceramic enamel applied by silk-screened process on No. 2 surface.
- .9 Spandrel Glass: CAN2-12.9-M, minimum 6 mm (1/4") thickness or as indicated on Drawings, heat strengthened glass.
- .10 Safety Scrim Backing: Self adhering polyester or polyethylene film 0.05 mm to 0.125 mm (2 mils to 5 mils) thick.

### **2.2 ACCESSORIES**

- .1 Glazing materials, primers and cleaning solvents: Mutually compatible, standard colours.
- .2 Insulated Glass Unit Spacer Core: Extruded, thermoset polymer structural silicone foam tape with integrally incorporated desiccants, resistant to ozone, sunlight, oxidation, black, Super Spacer Premium Plus by Edgetech.
- .3 Glazing Compound: CAN2-19.13, one component silicone base.



- .4 Glazing Tape, Preshimed: Extruded, ribbon shaped, non-drying, non-skinning, non-oxidizing polyisobutylene tape with continuous synthetic rubber spacer rod, sufficiently wide and thick as to completely cover bite area of glazing unit when unit is pushed into place.
- .5 Glazing Tape: Extruded, ribbon-shaped, non-drying, non-skinning, non-oxidizing, reinforced, polyisobutylene tape of sufficient width and thickness, 6 mm (1/4") minimum, to permit a continuous seal.
- .6 Shims, Spacers and Setting Blocks: 45, 50 and 90 Durometer A hardness plus/minus 5 respectively, neoprene rubber. Resistance to sunlight, weathering, oxidation and permanent deformation under load shall be prime essentials of shims, spacers and setting blocks.
- .7 Glazing Gaskets: Neoprene, EPDM, thermoplastic or other approved material, of sufficient thickness to be 25% compressed when installed. Gaskets shall have a 13.8 MPa (2000 psi) tensile strength, Durometer A hardness of 50, plus/minus 5, resistance to permanent set 30% maximum, minimum elongation at break of 300% and resistance to ozone showing no cracks.
- .8 Safety Decals: 50 mm (2") diameter round, self-adhesive, pressure-sensitive, black, non-facing, decals with clear, colourless, non-yellowing adhesive.

### **2.3 FABRICATION**

- .1 Accurately size glass to fit openings allowing clearances recommended by Glass Association of North America. Cut glass clean and free of nicks and damaged edges. Grind smooth and polish exposed glass edges. Do not cut or abrade tempered, heat treated, or coated glass.

### **2.4 FABRICATION – INSULATING GLASS UNITS**

- .1 Insulating glass units: CAN2-12.8, double and triple glazed, composed of lites of minimum 6 mm thick glass separated by a 13 mm wide dehydrated air space, double sealed and atmospheric pressure equalized to prevent bowing of the glass lites in the vertical position. Edges of glass shall be straight cut, free of nicks and other imperfections conducive to breakage. Coatings used in structural glazing shall be edge deleted 10 mm.
  - .1 Sealing System: At Contractor's option, dual seal with polyisobutylene primary and polysulfide secondary sealants, or dual seal with polyisobutylene primary and silicone secondary sealants.
- .2 Set spacer core straight and even into glass units with a maximum variation in line of spacer core of plus or minus 2 mm (0.080") and the primary seal not extend past the inside edge of spacer core by more than 1.6 mm (0.060"). Weld or vulcanize spacer core corners and joints.

### **2.5 GLASS AND GLAZING TYPES**

- .1 Exterior Vision Units: Double glazed Insulating glass units, tinted glass outer lite, clear glass inner lite with low emissivity coating on No. 3 surface.
- .2 Exterior Spandrel Glass: Single glazed clear glass, ceramic frit coating and scrim backing on No.2 surface.

### **Part 3 Execution**

#### **3.1 INSPECTION**

- .1 Verify dimensions at the Site before proceeding with fabrication or glazing units.
- .2 Ensure that openings are free from distortion, and that surfaces are free from protrusions that will obstruct face and edge clearances.
- .3 Ensure that ferrous metals are painted or zinc coated; and that surfaces are suitable for adhesion of the glazing materials.
- .4 Ensure that operable units to be glazed are adjusted for proper operation.
- .5 Ensure that ambient and surface temperatures are above 5°C.

#### **3.2 PREPARATION**

- .1 Free rabbets, stops and glass edges of dust, dirt, moisture, oil and other foreign matter detrimental to or obstructing the glazing material.

#### **3.3 INSTALLATION - GENERAL**

- .1 Handle and install glass in accordance with manufacturer's directions. Prevent nicks, abrasions and other damage likely to develop stress on edges.
- .2 Without limitations, cracked or scratched glass, shrinking, cracking, staining, hardening, sagging of glazing materials; loosening or rattling of glass; leaking of glazed joints will be rejected.
- .3 Remove and replace glazing stops in original locations, using original fasteners, securely set and undamaged.
- .4 Use setting blocks and spacers as required to properly support the glass, centred in place in the glazing space independent of the materials and to uniformly distribute its load.
- .5 Use a minimum of 2 setting blocks, located at the quarter points. Locate spacers at jamb edges of glass, uniformly spaced at 600 mm (24") o.c. maximum, and 300 mm (12") maximum from top and bottom.
- .6 Assess coloured glass units for colour uniformity and arrange to avoid abrupt variation in appearance.
- .7 Set glass properly centred with uniform bite and face and edge clearance, free from twist, warp or other distortion likely to develop stress.
- .8 Leave labels on glass until it has been set and inspected and approved. Leave glass whole and without cracks, scratches or other defects and with setting in perfect condition at completion, to the approval of the Contract Administrator.
- .9 Remove rejected, broken or damaged glass due to defective materials or improper setting and replace with perfect materials. Units producing distorted vision will be rejected and replaced at the reasonable discretion of the Contract Administrator.

**3.4 CLEANING**

- .1 Clean and make good to the approval of the Contract Administrator, surfaces soiled or otherwise damaged in connection with the Work of this Section. Pay the cost of replacing finishes or materials that cannot be satisfactorily cleaned.
- .2 Upon completion of the Work, remove all debris, equipment and excess material resulting from the Work of this Section from the Site.

**END OF SECTION**