

STEEL DOORS AND FRAMES

1. GENERAL

1.1 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 Install work to CSDFMA Installation Guide.

1.2 Quality Assurance

- .1 Fabrication: Comply with requirements of Canadian Steel Door and Frame Manufacturers' Association.
- .2 Source Limitations: Obtain doors and frames through one source from a single manufacturer.

1.3 Requirements of Regulatory Agencies

- .1 Fire Rated Assemblies: Labelled and listed by a nationally recognized testing agency having factory inspection service in conformance with CAN4 S104M and CAN4 S105M for fire protection ratings indicated.
- .2 Install labelled steel fire rated doors and frames to NFPA 80 except where specified otherwise.

1.4 Submittals

- .1 Shop Drawings: Indicate each type of door and frame, material, steel core thicknesses, mortises, reinforcements, location of exposed fasteners, openings, arrangement of hardware and fire rating.

1.5 Delivery, Storage and Handling

- .1 Brace and protect doors and frames to prevent distortion during shipment. Store in a secure dry location.
- .2 Store doors vertically, resting on planks, with blocking between to allow air to circulate.

2. PRODUCTS

2.1 Materials

- .1 Metallic Coated Sheet Steel: ASTM A568M Class 1 Commercial grade steel, hot-dip galvanized to ASTM A 653/A653M ZF75/A25 zinc coated (Galvanized) or ZF180/A40 zinc-iron alloy-coated (Galvannealed).

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- .2 Minimum Core Thickness, Without Coating: Metallic Coated Sheet Steel:
 - .1 Interior Door and Sidelight Frames: 1.519 mm (0.060").
 - .2 Exterior Door and Sidelight Frames: 2.0 mm (0.078").
 - .3 Doors and Panels, Hollow Steel Construction
 - .4 Face Sheets: 1.519 mm (0.060").
 - .5 Vertical Stiffeners, 0.912 mm (0.036").
 - .6 Doors and Panels, Honeycomb Core Construction:
 - .7 Face Sheets, 1.2 mm (0.047").
 - .8 Lock and Strike Reinforcements: 2.66 mm (0.1").
 - .9 Hinge and Pivot Reinforcements: 3.416 mm (0.134") thick by 38 mm (1-1/2") wide by 150 mm (6") longer than hinge and pivot, secured by not less than 6 spot welds.
 - .10 Closer or Holder Reinforcements: 2.66 mm (0.1").
 - .11 Top and Bottom End Channels and Caps: 1.6 mm (0.060").
 - .12 Mortar Guard Boxes: 0.759 mm (0.03").
 - .13 Glass Stops: 0.912 mm (0.036").
 - .14 Floor Anchors: 1.6 mm (0.060").
 - .15 Jamb Spreaders: 0.912 mm (0.036").
 - .16 Frame Anchors:
 - .1 T-strap Type: 1.214 mm (0.048").
 - .2 Insulation: Fibreglass to CAN/ULC-S702, semi-rigid.
 - .3 Adhesives for Steel Components: Heat resistant, spray grade, resin reinforced neoprene/rubber (polychloroprene) based, low viscosity, contact cement.
 - .4 Touch-Up Primer: CAN/CGSB-1.181, Zinc rich primer.
 - .5 Door Silencers: Single stud rubber or neoprene.
 - .6 Welding: CSA W59-M.

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- .7 Filler: Metallic paste, manufacturer's standard.
- .8 Thermal Break: Rigid polyvinylchloride extrusion.

2.2 Fabrication - General

- .1 Fabricate work in accordance with CSDFMA specifications.
- .2 Blank, reinforce, drill and tap units for mortised, templated hardware, and electronic hardware using templates provided by the hardware suppliers. Reinforce units for surface mounted hardware.
- .3 Do welding to CSA W59.
- .4 Apply, at factory, touch up primer to doors and frames manufactured from metallic coated steel where coating has been removed during fabrication.
- .5 Make provisions in doors and frames to suit requirements of Section providing security devices.
- .6 Fabricate fire rated assemblies to ULC requirements and bearing, Warnock-Hersey International Ltd., label, as acceptable to authorities having jurisdiction.
- .7 Locate fire rating labels on the inside of the frame hinge jamb and door hinge edge midway between the top hinge and the head of the door.

2.3 Fabrication – Frames

- .1 Fabricate frames to profiles and maximum face sizes as required to suit design, welded construction.
- .2 Cut mitres and joints accurately and weld continuously on inside of frame profile.
- .3 Grind welded corners and joints to flat plane, fill with metallic paste filler and sand to uniform smooth finish.
- .4 Conceal fastenings except where exposed fastenings are required. Insulate exterior frame components with mineral fibre insulation. Provide appropriate anchorage to floor and wall construction..
- .5 Provide jamb anchors for fixing at floor.
- .6 Provide three door silencers on strike jamb for each single door, and two bumpers at head of frame for each door leaf in double doors.
- .7 Fabricate thermally broken frames for exterior doors using steel core, separating exterior portion of frame from interior portion with polyvinyl chloride thermal breaks.

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2.4 Fabrication - Doors

- .1 Fabricate doors with longitudinal edges seamless, spot welded, filled and sanded flush.
- .2 Hollow Steel Construction: Form each door face from sheet steel. Reinforce doors with vertical stiffeners, securely welded or laminated to each face sheet at 150 mm (6") on centre maximum. Fill voids between stiffeners of exterior doors with insulation.
- .3 Fabricate doors with top and bottom steel channels full width of door and welded to both faces. Provide flush steel top edge on exterior doors.

2.5 Fabrication – Glazing Stops

- .1 Fixed Glazing Stops: Formed integral with door faces and frames, minimum 16 mm (5/8") high, unless otherwise indicated.
 - .1 Locate fixed stops on outside of exterior and on secure side of interior doors and frames.
- .2 Loose Glazing Stops: Minimum 0.8 mm (0.032") thick, formed channel, fabricated from same material as frames in which they are installed. Minimum 16 mm (5/8") high unless otherwise indicated.
 - .1 Locate loose stops on inside of doors and frames.
- .3 Form corners of stops with butted or mitered hairline joints.
- .4 Coordinate rabbet width between fixed and loose stops with type of glazing and type of installation indicated.
- .5 Fasteners: Vandal resistant, countersunk flat or oval head machine screws spaced uniformly not more than 225 mm (9") o.c., and not more than 50 mm (2") from each corner.

3. EXECUTION

3.1 Installation - General

- .1 Install fire rated assemblies in accordance with NFPA 80.
- .2 Touch up with primer galvanized finish damaged during installation.

3.2 Installation - Frames

- .1 Set frames plumb, square, level and at correct elevation.
- .2 Provide suitable anchors to suit construction. Use one base anchor and two wall anchors per jamb side for frames up to 1500 mm (60") and one additional wall anchor per jamb side for each additional height of 750 mm (30") or fraction thereof.

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- .3 Secure anchorages and connections to adjacent construction.
- .4 Brace frames rigidly in position while building-in. Install temporary horizontal wood spreader at third points of door opening to maintain frame width. Remove temporary spreaders after frames are built-in.
- .5 Make allowances for deflection of structure to ensure structural loads are not transmitted to frames.

3.3 Installation - Doors

- .1 Provide even margins between doors and jambs and doors and finished floor and thresholds as follows:
 - .1 Hinge side: 3 mm (1/8").
 - .2 Latchside and head: 3 mm (1/8").
 - .3 Finished floor for non-rated assemblies: 12 mm (1/2"), unless otherwise indicated.
 - .4 Finished floor for rated assemblies: To NFPA 80 requirements.
- .2 Adjust operable parts for correct function.

3.4 Cleaning

- .1 Clean and make good all surfaces soiled or otherwise damaged in connection with work. Upon completion of work and remove debris, equipment and excess material from site.

END OF SECTION

HORIZONTAL ACCESS DOOR

TYPE K HORIZONTAL ACCESS DOOR SPECIFICATION

1. GENERAL

1.1 Summary

- .1 Work included: Furnishing and installing factory fabricated vault access doors
- .2 Related Work:
 - .1 09650 Resilient Tile Flooring
 - .2 06100 Rough Carpentry

1.2 References

- .1 American Society for Testing and Materials (ASTM), 100 Bar Harbor Drive, West Conshocken, PA 19428-2959; (610) 832-9585, fax (610) 832-9555
 - .1 ASTM A 36-93a: Standard Specification for Structural Steel

1.3 Submittals

- .1 Product Data: Provide manufacturer's product data for all materials in this specification.
- .2 Shop Drawings: Show profiles, accessories, location, and dimensions.
- .3 Samples: Manufacturer to provide upon request; sized to represent material adequately.
- .4 Contract Closeout: Vault access door manufacturer shall provide the manufacturer's Warranty prior to the contract closeout.

1.4 Product Handling

- .1 All materials shall be delivered in manufacturer's original packaging.
- .2 Store materials in a dry, protected, well-vented area. The contractor shall thoroughly inspect product upon receipt and report damaged material immediately to delivering carrier and note such damage on the carrier's freight bill of lading.
- .3 Remove protective wrapping immediately after installation.

1.5 Job Conditions

- .1 Verify that other trades with related work are complete before installing vault access door(s).
- .2 Mounting surfaces shall be straight and secure; substrates shall be of proper width.

HORIZONTAL ACCESS DOOR

- .3 Refer to the construction documents, shop drawings, and manufacturer's installation instructions.
- .4 Observe all appropriate OSHA safety guidelines for this work.

1.6 Warranty/Guarantee

- .1 Manufacturer's standard warranty: Materials shall be free of defects in material and workmanship for a period of (5) five years from the date of purchase. Should a part fail to function in normal use within this period, manufacturer shall furnish a new part at no charge. Electrical motors, special finishes, and other special equipment (if applicable) shall be warranted separately by the manufacturers of those products.

2. PRODUCTS

2.1 Manufacturer

- .1 The BILCO Company, P.O. Box 1203, New Haven, CT 06505; 1-203-934-6363, Fax: 1-203-933-8478, Web: www.bilco.com

2.2 Access Door

- .1 Furnish and install where indicated on plans vault access door Type K, size according to drawings. Length denotes hinge side. The vault access door shall be single leaf. The vault access door shall be pre-assembled from the manufacturer.
- .2 Performance characteristics:
 - .1 Cover: Shall be reinforced to support a minimum live load of 150 psf (732 kg/m²) with a maximum deflection of 1/150th of the span.
 - .2 Operation of the cover shall be smooth and easy with controlled operation throughout the entire arc of opening and closing.
 - .3 Operation of the cover shall not be affected by temperature.
- .3 Cover: Shall be 1/4" (6.3 mm) aluminum diamond pattern plate.
- .4 Frame: Shall be 1/4" (6.3 mm) extruded aluminum with strap anchors bolted to the exterior.
- .5 Hinges: Shall be specifically designed for horizontal installation and shall be bolted to the underside of cover.
- .6 Lifting mechanisms: Cam-action hinges shall pivot on torsion bars to provide, smooth, easy, and controlled cover operation throughout the entire arc of opening and to act as a check in retarding downward motion of the cover when closing.

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- .7 A removable exterior turn/lift handle with a spring loaded ball detent shall be provided to open the cover.
- .8 Hardware:
 - .1 Hinges: Cast steel cam-action hinges which pivot on torsion bars shall be provided.
 - .2 Cover shall be equipped with a steel hold open arm that automatically locks the cover in the open position.
 - .3 Cover shall be fitted with the required number and size of torsion bars.
 - .4 A Type 316 stainless steel snap lock with fixed handle shall be mounted on the underside of the cover.
 - .5 Hardware: Shall be zinc plated and chromate sealed.
 - .6 Finishes: Factory finish shall be mill finish aluminum with bituminous coating applied to the exterior of the frame.

3. EXECUTION

3.1 Inspection

- .1 Verify that the vault access door installation will not disrupt other trades. Verify that the substrate is dry, clean, and free of foreign matter. Report and correct defects prior to any installation.

3.2 Installation

- .1 Submit product design drawings for review and approval to the Contract Administrator or specifier before fabrication.
- .2 The installer shall check as-built conditions and verify the manufacturer's vault access door details for accuracy to fit the application prior to fabrication. The installer shall comply with the vault access door manufacturer's installation instructions.
- .3 The installer shall furnish mechanical fasteners consistent with the vault access door manufacturer's instructions.

END OF SECTION

OVERHEAD COILING DOORS AND GRILLES

1. GENERAL

1.1 Summary

- .1 Section includes exterior overhead roll-up security shutters for windows.

1.2 Submittals

- .1 Product Data: Submit manufacturer's complete product data for all specified components, including specifications, finish information and installation instructions.
- .2 Shop Drawings: Submit shop drawings showing layout, sizes and types, product materials, components and accessories, fabrication data, operation and wiring diagrams for motor driven operators, finishes, rough-in dimensions, anchorage and installation, mounting requirements and details. Contract Administrator.
- .3 Quality Assurance Submittals:
 - .1 Test Reports: Certified test reports showing compliance with specified requirements.
 - .2 Certificates: Manufacturer's certification that design criteria meets specified requirements.
 - .3 Operating and Maintenance Instructions: Submit detailed maintenance requirements and operating instructions.
 - .4 Warranty: Submit specified warranty documents.

1.3 Quality Assurance

- .1 Installer Qualifications:
 - .1 Use only manufacturer's factory trained installers or qualified licensed installers approved by shutter manufacturer.
- .2 Regulatory Requirements:
 - .1 Comply with all local and governing code requirements.
- .3 Unless required otherwise, fabricate to withstand wind loads that carry same rating as component and cladding of walls.
 - .1 Pre-Installation Conference: Conduct a pre-installation meeting to verify project installation and coordination requirements, field conditions, and manufacturer instructions.

OVERHEAD COILING DOORS AND GRILLES

1.4 Delivery, Storage and Handling

- .1 Deliver components in manufacturer's original, unopened, undamaged containers with identification labels intact. Store components protected from harmful weather conditions and damage from other construction activity.

1.5 Project Conditions

- .1 Field Measurements: Verify actual measurements of openings by field measurements before fabrication. Show recorded measurements on shop drawings.
- .2 Prior to installation, coordinate backing and mounting requirements with all related trades.

1.6 Warranty

- .1 Manufacturer's Warranty: Submit, for City's acceptance, manufacturer's standard warranty document executed by an authorized company official.
 - .1 Warranty period: five years.

2. PRODUCTS

2.1 Manufacturer

- .1 Roll-a-way
- .2 Unishut
- .3 Talius

2.2 Materials

- .1 Shutter Components:
 - .1 Slat Types:
 - .1 Aluminum Extruded Double Wall Slats: Aluminum, 6063-T6 alloy. Color: selected by Contract Administrator from manufacturers standard colour palette. Use electrostatically applied paint.
 - .2 Bottom Slat: Extruded aluminum, 6063-T6 alloy, 0.050 inch wall thickness.
 - .3 Operation: Manual operator type: Pull strap-coiler.
 - .4 Side Frames: Die-cast aluminum.
 - .5 Box Cover (hood): Roll formed aluminum; .036 inch thickness, 3105-H14 alloy.

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- .6 Track Guides: Aluminum extrusions; 6063-T6. Provide manufacturer's standard.
- .7 Mounting: Surface.
- .8 Purlin (stormbar) Assembly: Aluminum extrusions, 6005-T5 or 6063-T6 alloy. 3.0", 4.0" with or without I beam inserts, for fixed or removable application.
- .9 Slat Hangers: Stainless steel spring design, powder coated.
- .10 Reels: (Aluminum, 6063-T6 alloy - round & octagonal).
- .11 Slat Reinforcement Extruded aluminum, 6005-T5 alloy.

2.3 Shop Finish

- .1 Side Box Cover Frames and Track: electrostatically applied paint finish to AMAA 2603.
- .2 Color: To match slats.

3. EXECUTION

3.1 Examination

- .1 Verify conditions of substrates to determine if acceptable for shutter installation in accordance with manufacturer's instructions. Correct all unsatisfactory conditions prior to commencing shutter installations.

3.2 Installation

- .1 Install track and all shutter components to comply with project shop drawings and manufacturer's written installation requirements.
 - .1 Where metal surfaces are in contact with masonry, concrete or dissimilar metals, protect with manufacturer's recommended isolation coatings or tape.
- .2 After installation, lubricate, test and adjust shutters to operate properly and free from distortion.

3.3 Cleaning

- .1 Clean installed components in accordance with manufacturer's instructions prior to City's acceptance. Properly remove from the site all debris remaining from this installation.
- .2 Inadequate surface cleaning will result in corrosion formation & potential structural damage.

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3.4 Protection

- .1 Comply with manufacturer recommendations and protect completed shutter installations from damage during remaining construction so as not to void warranty.

END OF SECTION

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1. GENERAL

1.1 References

- .1 American Architectural Manufacturers Association (AAMA)
 - .1 AAMA 2604-98, Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels - Series: Components, Coatings and Finishes.
- .2 American Society for Testing and Materials (ASTM)
 - .1 ASTM B209M-00, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate Metric.
 - .2 ASTM B221M-92a, Standard Specification for Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes Metric.
 - .3 ASTM E283-91(1999), Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
 - .4 ASTM E330-97e1, Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls and Doors by Uniform Static Air Pressure Difference.
 - .5 ASTM E331-00, Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.
- .3 Canadian Standards Association (CSA) International
 - .1 CAN/CSA-A440-00/A440.1-00, Windows/User Selection Guide to CSA Standard A440-00.
 - .2 CAN/CSA-A440.2-04/A440.3-04, Energy Performance Evaluation of Windows and Other Fenestration Systems / User Guide to CSA Standard A440.2-98.
 - .3 CAN/CSA ISO 14040-97, Environmental Management - Life Cycle Cost Assessment - Principle and Framework.
 - .4 CSA-S157-05, Strength Design in Aluminum.

1.2 Submittals

- .1 Submit shop drawings in accordance with Section 01300 - Submittals.
- .2 Indicate materials and details in full size scale for head, jamb and sill, profiles of components, interior and exterior trim, junction between combination units, elevations of unit, anchorage details, location of isolation coating, materials, fabrication, hardware,

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dimensions, tolerances, electrical wiring diagrams, options, accessories, description of related components and exposed finishes fasteners, and caulking. Indicate location of manufacturer's nameplates.

- .3 Aluminum window system shall be engineered to meet the requirements of the 2005 National Building Code of Canada, Climatic Information for Building Design in Winnipeg, Manitoba.
- .4 Manufacturer's certification: Submit manufacturer's printed information in sufficient detail substantiating that products comply with specified requirements and are suitable for the intended application.
- .5 Operation and maintenance manual: submit manufacturer's operation and maintenance documentation including operation, maintenance, adjustment, and cleaning instructions, trouble shooting guide, parts list, and electrical wiring diagrams.

1.3 Design Requirements

- .1 Exterior aluminum window system shall consist of shop fabricated thermally broken tubular extruded aluminum sections with supplementary support framing, full rain screen capability, factory applied finish, vision glass, related flashings, anchorage and attachment devices.
- .2 Structural performance shall be in accordance with CAN/CSA-S157, and a maximum deflection of $L/175$ of the span.
- .3 Fixed window air tightness shall meet the FIXED rating (less than $0.25 \text{ (m}^3/\text{h) m}^{-1}$) (0.045 cfm/ft) at 75 Pa (1.57 psf) when tested in accordance with CAN/CSA-A440.
- .4 Operating window air tightness shall meet the A3 rating (less than $0.55 \text{ (m}^3/\text{h) m}^{-1}$) (0.10 cfm/ft) at 75 Pa (1.57 psf) when tested in accordance with CAN/CSA-A440.
- .5 Fixed and operating window water tightness shall meet the B7 rating (no water leakage at 700 Pa (14.6 psf) when tested in accordance with CAN/CSA-A440.
- .6 Wind load resistance for fixed and operating windows shall meet the C5 rating when tested with configurations in accordance with CAN/CSA-A440.
- .7 Full rain screen design (fixed and operable units) ensuring water entering joints, condensation occurring in glazing channels, or migrating moisture occurring within system, will be vented, pressure equalized and drained to the exterior by a weep drainage network.

1.4 Samples

- .1 Submit samples in accordance with Section 01300 - Submittals.
- .2 Submit one representative model of each type window.
- .3 Include frame, sash, sill, glazing and weatherproofing method, insect screens, surface finish and hardware. Show location of manufacturer's nameplates.

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- .4 Include 150 mm long samples of head, jamb, sill, meeting rail, mullions to indicate profile.

1.5 Quality Assurance

- .1 Aluminum window units shall be fabricated and installed by a qualified manufacturer's distributor with minimum five (5) years experience on projects of equal or greater size and degree of complexity. Information confirming these criteria may be requested by the Contract Administrator.
- .2 Inspection and testing of aluminum window fabrication and installation will be conducted by a testing agency designated by the Contract Administrator.
 - .1 City will pay for required tests.
 - .2 Smoke and pressure tests will be performed on mock-up of aluminum window installation including connection and seal to aluminum windows.
 - .3 Once tested and approved, mock-up will set a standard of acceptance for all other installations.
 - .4 Following this, review and testing will be performed at random areas during installation.
 - .5 The aluminum windows fabricator and installer shall be responsible for all re-testing costs associated with return visits by the independent testing agency as a result of work that has failed testing procedures.

1.6 Pre-installation Meetings

- .1 A pre-installation meeting shall be held prior to commencement of the aluminum windows installation with all building envelope Contractors in attendance. Purpose of the meeting shall be to discuss the quality of workmanship expected, and to ensure that all Contractors are fully aware of the testing procedures that will be undertaken on their work to ensure that the quality of workmanship is met. The independent testing agency will be in attendance to identify testing procedures that will be used on the project and to answer any questions.
- .2 Convene one week prior to commencing Work of this section.

2. PRODUCTS

2.1 Materials

- .1 Aluminum Entrance Doors: Thermally broken, 360 Insulclad by Kawneer or 400A Insuldor by Alumicor.
- .2 Aluminum Windows acceptable manufacturers:

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- .1 Alumicor.
- .2 Kawneer.
- .3 Aluminum pass-through window:
 - .1 Easi-Serv Products Inc. custom sized unit to size indicated, and compatible with surrounding fixed window system, or accepted equal.
- .4 Extruded aluminum: Aluminum Association AA 6063-T54 alloy and temper in accordance with ASTM B221M and CSA-S157.
- .5 Member wall thickness: Each framing member shall provide structural strength to meet specified performance requirements.
- .6 Exposed formed sheet aluminum: Formed aluminum components shall be min. 3 mm thick sheet of alloy and temper suitable for their purpose and finish to sizes and profiles indicated, colour to match extruded aluminum.
- .7 Sealants: In accordance with Section 07900.
- .8 Glass and glazing materials: In accordance with Section 08800.
- .9 Plywood: In accordance with Section 06100.
- .10 Isolation coating: Alkali resistant bituminous paint.
- .11 The manufacturing process must adhere to Lifecycle Assessment (LCA) Standards as per ISO 14040/14041 LCA Standards.

2.2 Components

- .1 Main frame and sash:
 - .1 Extruded aluminum, thermally broken, 127 mm width typical.
- .2 Automated Slider Window Unit:
 - .1 Service Opening: As indicated.
 - .2 Opening Direction: Left to Right when viewed from outside.
 - .3 Window Operation: Automatic Open and Close.
 - .4 Mechanism: Electric motor drive and optical sensor with three-position logic lock (fully automatic open/close, locked open, locked close).
 - .5 Window Type: Side-sliding, one moving panel.

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- .6 Frame: Extruded Aluminum.
 - .7 Bottom Sill: Thermally broken, angled downwards, integral window guide track (Illuminated Fluorescent Greeting Panel) (Stainless Steel Sill Cover).
 - .8 Security Lock: Automatic self-locking Adams Rite Deadlatch MS1848-11 with aluminum spring loaded thumb latch Adams-Rite 1000-21-23.
 - .9 Security Bar: Drop down aluminum lock bar.
 - .10 Security Override: Limits window opening when on to 8 inches.
 - .11 Fasteners: Robertson Head zinc plated self-tapping machine screws and stainless steel rivets.
 - .12 Glazing tempered glass tinted where indicated.
 - .13 Weatherproofing: Interlocking jambs between moving panel and frame interlocking jambs between moving panel and fixed panel. Double mohair seals on all edges of moving panel.
 - .14 Glazing Sealant: Face Vinyl - Extruded Polymers for Glazing, Inc. FC-120 Silicon Glazing Sealant: CR Laurence Category 33S Clear/Black.
 - .15 Electrical: 110V 60Hz 15A circuit Certified CAN/CSA c22.2 no. 68-92 Certified UL 73, Eighth Edition.
 - .16 Insect screen frame shall be extruded aluminum finish to match window frame and rigidly joined at the corners. Screen shall be glassfibre mesh. Splines shall be extruded elastomer removable to permit re-screening.
- .3 Isolation Coating: Alkali resistant bituminous paint as recommended by manufacturer.

2.3 Fabrication

- .1 Fabricate in accordance with CSA-A440/A440.1 supplemented as follows:
- .2 Exterior aluminum framing sections shall be integrated with a glass-reinforced nylon thermal break to form a rigid composite assembly without the use of fasteners or other thermal bridging elements.
- .3 Composite frame assembly shall have a minimum of 7224 N/100 mm resistance to shear between the aluminum and the thermal break materials.
- .4 Dry shrinkage of the thermal break shall not exceed 0.10% of the framing member length.
- .5 Fixed framing shall be designed for screw spline corner construction. Operating sash extrusions shall be tubular with mitred, clip, adhesive, stake joint construction.

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- .6 All framing joints shall be accurately machined, assembled, and sealed to provide neat weathertight connections. Coupling mullions shall be designed to provide a functional split to permit modular construction and allow for thermal expansion.
- .7 All glazing pockets shall be vented, pressure equalized and drained to the exterior. Glass stops shall be lock-in screwless type.
- .8 Visible manufacturer's identification labels not permitted.
- .9 Brace frames to maintain squareness and rigidity during shipment and installation.
- .10 Make allowance for deflection of structure to ensure that structural loads are not transmitted to aluminum windows.
- .11 Break form aluminum closures to details indicated and of same finish as aluminum windows.

2.4 Fabrication Aluminum Trim

- .1 Fabricate work and support members in a manner which will provide an installation free of exposed fastenings, with sufficient support and allowance for thermal movement.
- .2 Fabricate trim, sills, corner pieces and filler pieces of 3 mm (1/8") thick plate aluminum to profiles shown, by welding prior to application of finish. Make all planes flat, free of visible distortion and with edges straight and true, corners square and bend of minimum radius. Provide concealed clips for fastening plate assemblies in place.
- .3 Reinforce work as required to prevent warpage, oil canning, buckling effect and to meet design requirements. Weld marks shall not telegraph to the finished side.
- .4 Provide inconspicuous weep holes to properly drain to exterior.
- .5 Aluminum Sills: Extrude to size and shape as detailed, complete with end drip deflectors, expansion cover plates and necessary anchors.

2.5 Fabrication - Entrance System

- .1 Preparation for Hardware: Drill and cut to template for hardware. Reinforce frames and door stiles to receive hardware in accordance with Manufacturer's Recommendations.
- .2 Arrange fasteners and attachments to conceal from view.
- .3 Accurately fit and secure joints and corners. Make joints hairline in appearance.
- .4 Prepare components with internal reinforcement for door hardware.
- .5 Door Frame: Fabricate and assemble units with joints only at intersection of aluminum members with uniform hairline joints; rigidly secure, and sealed in accordance with manufacturer's recommendations.

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- .6 Doors: Corner Construction: Mechanical clip fastening, sigma deep penetration plug welds and 30 mm (1 1/8") long fillet welds inside and outside of all four corners.
- .7 Glazing Stops: Manufacturer's standard snap-in glazing stops with EPDM glazing gaskets. Factory glaze doors.
- .8 Door Hardware: Hinges: Stainless steel, continuous hinges.
- .9 Closers: Overhead concealed, barrier free, heavy duty, complete with integral stop arms or overhead doorstops.
- .10 Locks: Thumb piece on inside, high security deadbolt.
- .11 Flushbolts, Pairs of Doors: Manual top and bottom concealed flush bolts.
- .12 Push/Pulls: Full height and width of doors, round bar type, finish to match entrances.
- .13 Weatherstripping: Manufacturer's standard pile type in replaceable rabbets for stiles; Manufacturer's standard EPDM bulb type in door frames.
- .14 Thresholds: Barrier free, mill finish aluminum threshold with elastomer weather-strip and counterflashed.

2.6 Aluminum Finishes

- .1 Finish exposed surfaces of aluminum components in accordance with Aluminum Association Designation System for Aluminum Finishes.
- .2 Exposed aluminum sections shall be given an anodic oxide treatment in accordance with Aluminum Association Designation AA-M12C22-A31, clear anodized, to match existing aluminum windows that are to remain.
- .3 Apply one coat of bituminous paint to concealed aluminum surfaces in contact with cementitious or dissimilar materials.

2.7 Isolation Coating

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

2.8 Air Barrier and Vapour Retarder

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

ALUMINUM WINDOWS AND ENTRANCES

- .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.

3. EXECUTION

3.1 Window Installation

- .1 Install in accordance with CSA-A440/A440.1.
- .2 Arrange components to prevent abrupt variation in colour.
- .3 Install aluminum windows in accordance with manufacturer's instructions.
- .4 Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.
- .5 Provide alignment attachments and shims to permanently fasten system to building structure.
- .6 Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances and align with adjacent work.
- .7 Provide thermal isolation where components penetrate or disrupt building insulation.
- .8 .Set thresholds in bed of mastic and secure.

3.2 Sill Installation

- .1 Install metal sills with uniform wash to exterior, level in length, straight in alignment with plumb upstands and faces. Use one piece lengths at each location.
- .2 Cut sills to fit 6 mm longer than window opening.
- .3 Secure sills in place with anchoring devices located at ends joints of continuous sills and evenly spaced 600 mm on centre in between.
- .4 Fasten expansion joint cover plates and drip deflectors with self-tapping stainless steel screws.
- .5 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.

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3.3 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 07900 - Joint Sealers. Conceal sealant within window units except where exposed use is permitted by Contract Administrator.

END OF SECTION

DOOR HARDWARE

1. GENERAL

1.1 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 furnishing 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 furnish 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 Instruct City regarding proper care, cleaning and general maintenance.
- .9 Source Limitations: Obtain each type of product from a single manufacturer.

1.2 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.

1.3 Extended Warranty

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

DOOR HARDWARE

2. PRODUCTS

2.1 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.
- .5 Same finish as hardware to which it is to be fastened.
- .6 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.
- .7 Fastenings: All fastenings shall harmonize with the hardware materials and finishes.
- .8 Hardware for fire rated and labelled door and frame assemblies: ULC listed or as accepted by authorities having jurisdiction.
- .9 Following manufacturers are acceptable subject to review by 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, furnish 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.

DOOR HARDWARE

- .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 aluminum 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 (1-1/2") less than door width for single doors and 20 mm (3/4") 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.

DOOR HARDWARE

.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 Furnish doorstops of height to engage doors.
- .8 Astragals: Stainless steel bar with neoprene bulb.
- .9 Weatherstrippings: Surface mounted extruded aluminum housing with neoprene bulb having spring-mounted adjustment, 770A by Zero International.
- .10 Door Bottoms: Surface mounted, extruded aluminum housing, pressure spring-loaded neoprene bulb, 365A by Zero International.
- .11 Thresholds: Extruded aluminum, high seat, except flat saddle for barrier free application.

2.2 Keying System

- .1 Lay out keying system for building in consultation with City. 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 City.
- .3 Stamp keys "DO NOT DUPLICATE".
- .4 Provide 2 change keys for each lock. 3 keys for each submaster level and 6 grand master keys. In the case of keyed alike groups, supply 6 (six) 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 Contractor and Contract Administrator for shipping directions.

3. EXECUTION

3.1 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.

DOOR HARDWARE

- .3 Furnish door and frame manufacturers with complete instructions and templates for preparation of their work to receive hardware.
- .4 Co-ordinate voltages with Division 16, Electrical where applicable.

3.2 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 cutout.
- .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 supervision of Division 16 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.

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- .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.

3.3 Field Quality Control

- .1 Have hardware supplier's representative visit Site and submit written report of each visit to Site, giving storage conditions and installation details, date and name of hardware supplier's representative.
- .2 Before completion of Work but after hardware installation, have hardware supplier's representative inspect work and submit certificate to City 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.

3.4 Adjustments And Cleaning

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

END OF SECTION

GLASS AND GLAZING

1. GENERAL

1.1 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.

1.2 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 Use a safety factor of 2.5:1 minimum for glass design.

1.3 Environmental Requirements

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

1.4 Warranty

- .1 Submit a 10 year warranty 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.

GLASS AND GLAZING

2. PRODUCTS

2.1 Materials

- .1 Float Glass: CAN/CGSB-12.3, clear, glazing quality, minimum 6 mm (1/4") thick.
- .2 Tinted Glass: Heat absorbing glass, Solargray by PPG.
- .3 Low emissivity coating: Solarban 60 by PPG.

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: CAN/CGSB-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.

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: CAN/CGSB-12.8, double glazed, composed of lites of minimum 6 mm thick glass separated by a 13 mm wide dehydrated air space, double sealed and

GLASS AND GLAZING

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.

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 surfaces to receive mirrors are sealed.
- .6 Ensure that ambient and surface temperatures are above 5 degree 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.

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- .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 Interior Glazing

- .1 Set glazing in fire rated assemblies in accordance with NFPA 80 and the Code requirements. Install glazing to ULC tested proprietary methods of installation.
- .2 Unless otherwise specified, all interior glazing shall be dry glazing.
- .3 Provide glazing gasket around entire perimeter of glass. Make tight butt joint at corners of lights. Place setting blocks at sill and spacers at both jambs as required to centre the unit in the frame. Place the unit into the frames and apply the stops against the gaskets. Tighten the screws or clips to obtain positive uniform pressure avoiding excessive pressure.
- .4 Ensure rattle-free cushioning.

3.5 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