This document contains standards that are the minimum requirements for BCIT construction projects. The information in the document is organized using the MasterFormat® and SectionFormat® systems. It is not a specification; it is intended to supplement the Consultant's own documents. Do not use this information as a standalone specification.

SECTION 08 71 00
DOOR HARDWARE

PART 1 - GENERAL

1.1 SUMMARY

.1 Furnish hardware for metal doors, with accessories as indicated and specified.

.2 Furnish hardware for aluminum entrance doors, with accessories as indicated and specified.

.3 Furnish through-bolt hardware for all door mounting hardware. Screwed-in fasteners are not acceptable.

.4 Furnish thermally broken exterior thresholds and grout under these, as indicated and specified.

.5 Furnish weather stripping, seals, and door gaskets as indicated and specified.

.6 Furnish electrified finish hardware.

.7 Furnish handicapped accessible electronic hardware devices, with touch pads / push button access areas indicated. Coordinate requirements with Division 26 Electrical for fully operable system.

.8 Furnish power supplies for electric hardware and access control.

.9 Furnish low energy door operators, sensors and actuators.

.10 Furnish access control card readers, controllers and credentials.

.11 Furnish riser Drawings and Point to Point drawings for electrified hardware.

.12 Sequencing: Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.

.13 Coordinate hardware with card access equipment, and security equipment. Provide door closer on any device with card access and motion detection systems.

.14 Coordinate with Division 26 electrical for wires, cables, connectors, conduits fittings, fire alarm system, and security alarm system.

.15 Hardware Distributor's AHC shall visit the site prior to preparing hardware schedule submittals.

.16 Concealed Closers: Entry doors.

.17 Continuous Hinges: Required for Main entry doors.

.18 Threshholds: Heavy duty, solid grouted, less tendency to collapse. Thresholds shall be set in grout.

.19 Advise Owner of doors where they are larger than 36 inches wide.

.20 Sustainability Goals - Mandatory Compliance: comply with allowable VOC levels for all adhesives, sealants, paints and other coatings as outlined in Division 1.

.21 Where hardware is being replaced, salvage hardware and turn it over to BCIT.

1.2 REFERENCES

.1 Comply with the following referenced standards unless indicated otherwise.

.2 BHMA A156.18-2012 Materials and Finishes.

.3 British Columbia Building Code, 2012 Edition (BCBC).

.4 DHI (Door and Hardware Institute Canada) - AHC and EHC certification programs.

.5 Door and Hardware Institute (DHI) A115 series.

.6 NFPA (Fire) 80 Standard for Fire Doors and Other Opening Protectives, 2016 Edition.

.7 NFPA (Fire) 252 Standard Methods of Fire Tests of Door Assemblies, 2012 Edition.

.8 UL10B Fire Tests of Door Assemblies, Revision 1.

.9 UL 305 Panic Hardware, 6th Edition.

.10 ULC 104 Standard Method for Fire Tests of Door Assemblies (CAN/ULC S104-15).

.11 ULC 132 Standard For Emergency Exit And Emergency Fire Exit Hardware (CAN/ULC S132-07).

1.3 ABBREVIATIONS

.1 Manufacturers and their abbreviations used in this Section:

CAM	Camden Marketing
GLY	Glynn-Johnson Hardware
IVE	H. B. Ives
KNC	K.N.Crowder
LCN	LCN Closers
RCH	Richelieu
SMH	Standard Metal Hardware
SCH	Schlage Lock Company
SCE	Schlage Electronics
VON	Von Duprin

1.4 SUBMITTALS

.1 Submit in accordance with Section 01 33 00 Submittal Procedures.

.2 Prior to making submittals, carefully inspect existing conditions to verify finish hardware required to complete Work, including sizes, quantities, existing hardware scheduled for re-use, and sill condition material. If conflict exists between specified and scheduled hardware and existing condition, submit request for direction from Consultant. Include date of jobsite visit in submittal.

.3 Product Data: Submit manufacturer's installation instructions and special installation requirements.

.4 Hardware Schedule: Submit one paper copy. Organize vertically formatted schedule into “Hardware Sets” with index of doors and headings, indicating complete designations of every item required for each door or opening. Include following information:

.1 Type, style, function, size, quantity and finish of hardware items.

.2 Use BHMA Finish codes per ANSI A156.18.

.3 Name, part number and manufacturer of each item.

.4 Fastenings and other pertinent information.

.5 Location of hardware set coordinated with floor plans and door schedule.

.6 Explanation of abbreviations, symbols, and codes contained in schedule.

.7 Mounting locations for hardware.

.8 Door and frame sizes, materials and degrees of swing.

.9 List of manufacturers used and their nearest representative with address and phone number.

.10 Catalog cuts.

.11 Manufacturer's technical data and installation instructions for electronic hardware.

.5 Samples:

.1 Submit one (1) sample of each hinge, latch set, lockset, and closer, illustrating style, colour, and finish.

.2 Reviewed samples may be incorporated into the Work upon Consultant's acceptance.

.6 Inspection Report: Confirming installation has been done in accordance with manufacturer's instructions and this Specification. Note deviations from reviewed Hardware Schedule if any. Indicate date by which deviations will be corrected. Issue final report on conformance to specifications.

.7 Closeout Submittals:

.1 Furnish as-built/as-installed schedule with closeout documents, including keying schedule, wiring/riser diagrams, manufacturers' installation, adjustment and maintenance information, and supplier's final inspection report.

.2 Operation and Maintenance Data: Include data on operating hardware, lubrication requirements, and inspection procedures related to preventative maintenance.

.3 Warranty Documentation: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

.4 Record Documentation:

.1 Record actual locations of installed cylinders and their master key code.

.2 Keys: Deliver with identifying tags to Owner by security shipment direct from hardware supplier. Obtain receipt.

1.5 MAINTENANCE MATERIAL SUBMITTALS

.1 Extra Stock Materials:

.1 Provide five (5) extra key lock cylinders for each master keyed group unless indicated otherwise.

.2 Tools:

.1 Provide special wrenches and tools applicable to each different or special hardware component.

.2 Provide maintenance tools and accessories supplied by hardware component manufacturer.

1.6 QUALITY ASSURANCE

.1 Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three (3) years documented experience.

.2 Installer Qualifications: Carpenter with a minimum five years' experience. Installation: subject to inspection by a qualified Architectural Hardware Consultant.

.1 Experienced craftsperson with a resume of completed projects of similar size and scope requiring installation of commercial builder's hardware products similar to those specified.

.2 Access control Installer shall be supervised by individual having completed Ingersoll-Rand factory training on installation of Sargent "bright blue" controllers, readers and associated components.

.3 Provide services of electrical personnel licensed in British Columbia to complete connections to 120VAC supply.

.3 Install hardware in accordance with requirements of authority having jurisdiction and in accordance with the Canadian Metric Guide for Steel Doors and Frames.

.4 Source Quality Control: Hardware supplier: direct factory contract supplier who employs a certified architectural hardware consultant (AHC), available at reasonable times during course Work for project hardware consultation to Owner, Consultant and Contractor. AHC: responsible for detailing, scheduling and ordering of finish hardware. Hardware: New, free of defects, blemishes and excessive play. Obtain each kind of hardware (latch and locksets, exit devices, hinges and closers) from one manufacturer.

.5 Pre-Installation Conference: One week prior to start of work initiate and conduct with supplier, Installer and related trades. Coordinate materials and techniques, and sequence complex hardware items and systems installation. Include manufacturers' representatives of locks, panic hardware and door closers in meetings. .

1.7 DELIVERY, STORAGE, AND PROTECTION

.1 Package hardware items individually; label and identify each package with door opening code to match hardware schedule.

.2 Transport, handle and store products in accordance with manufacturer’s recommendations, and protect products from damage.

.3 Deliver items individually packaged in manufacturers’ original containers, complete with proper fasteners and related pieces. Clearly mark packages to indicate contents, locations in hardware schedule and door numbers. Coordinate delivery to appropriate locations (shop or field).

.4 Delivery of Permanent keys and Cores: Secured delivery direct to Owner’s representative. Obtain receipt.

.5 Acceptance at Site: Upon receipt of hardware at site check the shipment for accuracy and completeness.

.6 Storage: Provide adequately securely locked storage area for hardware organization. Protect hardware from moisture, sunlight, paint, chemicals, dust, excessive heat and cold. Ensure hardware components are readily identifiable by related trades.

1.8 SEQUENCING AND COORDINATION

.1 Coordinate with concrete.

.2 Coordinate reinforcing of walls for wall-mounted hardware, including wall stops and guard rails.

.3 Coordinate finish floor materials and floor-mounted hardware.

.4 Coordinate conduit and raceways locations as needed for electrical, electronic and electro-pneumatic hardware items and Fire and life-safety system interfacing. Coordinate point-to-point wiring diagrams plus riser diagrams to related trades.

.5 Furnish manufacturer templates to door and door frame fabricators.

.6 Ensure proper blocking in wood doors to support wood screws for panic hardware and door closers.

.7 Ensure proper reinforcement in metal doors and frames to support machine screws for panic hardware and door closers.

.8 Use AHC to check Shop Drawings for doors and entrances to confirm adequate provisions will be made for proper hardware installation.

1.9 WARRANTY

.1 Part of respective manufacturer’s regular terms of sale. Provide the following manufacturer’s warranties:

.1	Locksets:	Seven (7) years.
.2	Exit Devices:	Three (3) years mechanical, one (1) year electrical.
.3	Closers:	Ten (10) years mechanical, two (2) years electrical.
.4	Hinges:	Life of Building.
.5	Other Hardware:	Two (2) years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

.1 Subject to compliance with specifications the following manufacturers are acceptable for the products listed.

	ITEM	MANUFACTURER:
.1	Hinges	Hager, Stanley, Mckinney
.2	Continuous Hinges	(IVE) Ives
.3	Key System	(SCH) Schlage
.4	Access Control	Sargent
.5	Access Control Locks	Sargent
.6	Locks and latches.	(SCH) Schlage
.7	Electric Strikes	(VON) Von Duprin
.8	Anti-Pry Plates	Schlage, Stanley.
.9	Closers	(LCN) LCN
.10	Flush Bolts	(IVE) Ives
.11	Push & Pull Plates	(SMH) Standard Metal Hardware
.12	Stops & Holders	(IVE) Ives
.13	Thresholds	(KNC) KN Crowder
.14	Seals & Bottoms	(KNC) KN Crowder

2.2 SUPPLIERS

.1 Subject to compliance with specifications, the following suppliers are acceptable:

.1 Accurate Door.

.2 D.G. McLaughlin.

.3 McGregor Thompson.

.4 Shanahan’s.

.5 Ramp Enterprises.

.6 Or approved alternative.

2.3 DOOR HANGING DEVICES

.1 Provide 3 knuckle concealed bearing hinges, steel base metal for all rated and interior doors, stainless steel material for all exterior hollow metal doors sized as follows:

.1 114 mm high hinges for doors up to 950 mm width.

.2 127 mm high for doors greater than 950 mm width to 1220 mm width.

.3 Two (2) each hinges to a maximum of 1524 mm in door height with an additional hinge for each 762 mm in height.

.4 Select hinge width to minimally clear all trim and permit maximum degree of opening

.2 Provide non-removable pin (NRP) for all exterior out swinging doors

.3 Provide three (3) knuckle concealed bearing heavy weight hinges for all high traffic, heavy or greater than 1066 mm wide doors as scheduled.

.4 Hinges and Pivots: to CAN/CGSB 69.18 as specified: IVES 3CB1, 3CB1HW. Provide full mortise continuous geared hinges, anodized aluminum material sized to 1" less door height for exterior and vestibule aluminum doors. IVES 112 HD.

.5 Door Mounting Hardware: Provide Through-bolts for door mounting hardware. Screw in fastening is not permitted.

2.4 LOCKSETS, LATCH SETS

.1 Locksets: Heavy duty, Vandal Guard ND Series by Schlage, no substitutions.

.2 Chassis: modular cylindrical design, corrosion-resistant plated cold-rolled steel, through-bolted with locking anti-rotation plate.

.3 Spindle/Spring cage: Deep drawn seamless stainless steel spindles with thru-bolted, with integral dual coil compression spring cages.

.4 Latch Retractors: forged steel. Balance of inner parts: corrosion-resistant plated steel, or stainless steel.

.5 Lever Trim: Accessible design, independent operation, spring-cage supported, minimum 50 mm (2 in.) clearance from lever mid-point to door face.

.6 Lock Series and Design: Refer to Hardware Schedule.

.7 Certifications:

.1 ANSI A156.2, 1994, Series 4000, Grade 1.

.2 ULC listed for up to A label 4ft x 8ft wide single doors.

2.5 LOCKSETS - ACCESS CONTROL

.1 Locks: Mortise Locks, L-Series by Schlage, no substitutions.

.2 Lockset and Exit device trim to meet or exceed UL294.

.3 Match lockset with motion detector in room.

.4 Lockset to be modular in design, to have ability to change credential reader without being removed from door.

.5 Lockset to have the following standard status switches: Lock/Unlock Status (Clutch Position), Request-to-Exit Switch, Request to Enter Switch, Door Position Switch, Deadbolt Position, Interior Cover Tamper Guard.

.6 Should power or communication be lost to device, Lockset and Exit Device Trim to have the ability to be field configured to manage access control in one of the three field configurable methods below:

.1 Fail locked (secured)

.2 Fail unlocked (unsecured)

.3 Fail As-Is

.7 Hardwired electronic bored type locksets:

.1 Bored type locksets to be non-handed, heavy-duty cylindrical type, with 70 mm (2-3/4 in.) backset or greater, as specified, with 13 mm (1/2 in.) throw latchbolt with 19 mm (3/4 in.) throw available. Chassis will accommodate standard 161 cylindrical lock prep for 45 mm (1-3/4 in.) doors standard; with 35 to 70 mm (1-3/8 to 2-3/4 in.) thick doors in 3 mm (1/8 in.) increments. Backset to be 70 mm (2-3/4 in.) standard, with 60, 95, and 130 mm (2-3/8, 3-3/4 and 5 in.) backset optional.

.2 Acceptable Manufacturers: Schlage Electronics Model: AD-300-CY Series – Sparta Design.

2.6 DEAD BOLTS

.1 Provide 25 mm (1 in.) throw deadbolt with hardened steel roller.

.2 Cylinder collar: 22 mm (7/8 in.) solid brass or bronze.

.3 Mounting bolts: 6 mm (1/4 in.) diameter with hardened steel ball bearings.

.4 Steel mounting plate and security shield

.5 Deadbolt Series: B600 series. [Adamsrite not preferred]

.6 Certifications: ANSI A156.5 Grade 1.

2.7 EXIT DEVICES

.1 Supply heavy duty exit devices or fire exit hardware certified ANSI 156.3 Grade 1 to meet door labeling requirements.

.2 Supply product featuring a dead latching mechanism on all latches, heavy duty extruded aluminum housing, stainless steel touchpad and bell crank mechanism with all compression springs and zinc dichromated parts.

.3 No exposed screws to show through glass doors.

.4 Non-handed basic device design with center case interchangeable with all functions, no extra parts required to effect change of function.

.5 Where lever trim on doors to be locked is required to meet barrier free requirements, provide trim with breakaway feature to protect internal trim parts.

.6 Specialized functions to include CX - Chexit Delayed Egress.

.1 CD - Cylinder Dogged.

.2 Q-EL - Quiet Electric Latch Retraction.

.7 Product: Von Duprin Mortise type: Series, 996L-17 Trim or approved alternative.

2.8 CLOSERS

.1 Surface Closers: Series 4000 by LCN (4040XPO), no substitutions.

.1 Full rack-and-pinion type cylinder with high strength cast iron cylinder. Double heat-treated pinion shaft, single piece 38 mm (1-1/2 in.) diameter forged piston, chrome-silicon steel spring.

.2 Supply extra duty parallel arm mount closer at locations generally accessible to the public

.3 Plates, brackets and special templating when needed for interface with particular header, door and wall conditions and neighboring hardware.

.4 Separate adjusting valves for closing speed, latching speed and back check, fourth valve for delayed action where scheduled.

.5 Independent lab-tested 10,000,000 cycles.

.6 Door Closer Series - LCN 4041, 4040XP.

2.9 LOW ENERGY OPERATORS

.1 Comply with ANSI/BHMA 156.19 Electric power-open, hydraulically checked spring power closing. Modular construction. Finished metal cover.

.2 Field-adjustable opening force, opening speed, time-open, closing and latching speeds. Door reopens and timing cycle restores if system is reactivated during closing cycle.

.3 Breakaway clutch protection from forced closing. Door, frame, motor and drive train protected by attenuated initiation of opening cycle.

.4 Self-contained low-voltage power supply, terminal strip and sequencing for incorporation of electric hardware with system operation.

2.10 OTHER HARDWARE

.1 Door Pulls/Push Plates:

.1 Supply straight pulls 19 mm (3/4 in.) dia.; 254 mm (10 in.) length pull centre to centre with 102 x 406 mm (4 x 8 in.) stainless steel backplate on all public washrooms.

.2 Supply push plates 152 x 406 x 1.3 mm (6 x 8 x 0.05 in.) stainless steel on push side of doors equipped with pulls described in 2.8.1.

.3 Door Pull/Push plate: Standard Metal Hardware 2412 x K11A

.2 Protective Plates:

.1 Supply stainless steel protective plates as indicated.

.2 Supply kick plates not less than 254 mm (10 in.) in height, mop plates not less than 100 mm (4 in.) in height.

.3 Door Stops and Holders:

.1 Supply wall stops, stainless steel base with convex or concave bumper appropriate to operating trim of door located at the maximum degree of opening provided wall construction permits proper anchoring so that damage to hardware or wall surface will not result during normal use.

.2 Supply an independent overhead door stop on doors where a wall or floor stop is inappropriate due to limitations described above. Stainless steel material – exterior doors, Powder coated steel - interior doors. When a door closer is not used supply a friction style stop.

.3	Integral stop closers:	"Cush" “SCush”
.4	Overhead stops (heavy duty):	Glynn-Johnson 90,100 series
.5	Overhead stops (medium duty):	Glynn-Johnson 450,410 series
.6	Wall Stops:	IVES - WS406CCV, WS406CVX

.4 Gasketing:

.1 Supply weather strip minimum 6.35 x 28 mm (1/4 x 1.1 in.) closed cell sponge neoprene gasketing with aluminum extrusion for all exterior doors complete with door sweep for RHR/LHR doors or door shoe with rain drip for RH/LH doors

.2 Supply self adhesive gasketing 6.35 x 12.7 mm (1/4 x 1/2 in.) where required to control passage of smoke.

.3 Supply material listed by Intertek/Warnork Hersey or Underwriters Laboratories for rated doors and frames.

.5 Thresholds:

.1 Exteriors: Thermally broken. Seal perimeter to exclude water and vermin. Use butyl-rubber or polyisobutylene sealant complying with requirements in Division 7 "Thermal and Moisture Protection". Non-ferrous 1/4inch fasteners and lead expansion shield anchors, or Red-Head #SFS-1420 (or approved equivalent) Flat Head Sleeve Anchors (SS/FHSL).

.2 Fire-rated openings - comply with NFPA80 1-11.2 requirements.

.3 Comply with BCBC 2012.

.4 Set thresholds in grout.

2.11 ACCESSORIES

.1 Fasteners: Door hardware shall be fastened with through-bolts sized to suit application.

2.12 KEYING

.1 Include construction keying, control keying with removable core cylinders. Key to Owner's keying requirements.

.2 Do not provide construction keys to building occupants.

.3 Supply keys in the following quantities:

.1 4 construction keys.

.2 4 control keys and 4 extra cylinder cores.

2.13 FINISHES

.1 Reference products using BHMA finish nomenclature where applicable:

.1	600	prime coat – steel base metal.
.2	626 (C26D)	satin chromium - brass base metal.
.3	627	mill finish aluminum.
.4	28 (C28)	clear anodized aluminum.
.5	630 (C32D)	satin stainless steel.
.6	652 (C26D)	satin chromium - steel base metal.
.7	689	aluminum powder coat.
.8	AL	extruded aluminum, mill finish.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Prior to installation, arrange for AHC to provide training on proper installation and adjustment requirements of hardware. Coordinate with the work of Section 06 20 00 Finish Carpentry.

.2 Install hardware at mounting heights as specified in manufacturer's templates or specific references in reviewed Shop Drawings. Use templates provided by hardware item manufacturer.

.3 Where mounting height is not otherwise specified, install hardware at mounting heights as indicated in "Recommended Locations for Architectural Hardware - Standard Steel Doors – 1990" and "Recommended Locations for Architectural Hardware - Flush Wood Doors - 1993".

.1 Locksets and Latch sets: 1025 mm (40-5/16 in.)

.2 Exit Devices: 1025 mm (40-5/16 in.)

.3 Deadlocks/Deadbolts: 1220 mm (48 in)

.4 Push bars and Pull bars: 1067 mm (42 in.)

.5 Push plate: 1143 mm (45 in.)

.4 Install hardware to template using only manufacturer supplied fasteners in compliance with manufacturer's published installation instructions.

.5 Adjust and function hardware to ensure proper operation of each component.

.6 Fasten hardware to wood doors with manufacturer supplied through bolts.

.7 Ensure finish is properly prepared to permit tape mounting of protective plates.

.8 Countersink thru bolts of door pulls prior to application of protective plates.

3.2 CLOSEOUT REQUIREMENTS

.1 Turn over all locks to Owner at or before Substantial Performance.

.1 Label key and locks by room and location.

.2 Bag locks and keys prior to delivery to Owner.

.3 Obtain written receipt.

END OF SECTION

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SECTION 08 71 13
AUTOMATIC DOOR OPERATORS

PART 1 - GENERAL

1.1 SUMMARY

.1 Provide automatic swing door system consisting of electro-mechanical swinging door operator and electronic control, aluminum header, connecting hardware and power on/off switch.

.2 Provide automatic sliding door system consisting of electro-mechanical sliding door operator and electronic control, aluminum header, connecting hardware and power on/off switch

.3 Provide automatic door system to swinging doors in storefront and curtain wall systems, unless indicated otherwise.

.4 Provide fire rated system where indicated.

.5 For existing doors being retrofitted provide surface mounted operators. Ensure door does not exceed 700 pounds (320 Kg) panel weight and is not wider than 54 inches (1371 mm).

.6 For new doors provide concealed operators.

.7 Coordinate with Divisions 26 for electrical connections.

1.2 RELATED SECTIONS

.1 05 50 00 Metal Fabrications.

.2 08 71 00 Door Hardware.

.3 Division 26 Electrical.

1.3 DEFINITIONS

.1 Activation Device: Device that, when actuated, sends an electrical signal to the door operator to open door.

1.4 REFERENCES

.1 ANSI/ICC 117.1-2009 Standard for Accessible and Usable Building and Facilities.

.2 ANSI/BHMA A156.10-2011 Power Operated Pedestrian Doors.

.3 ANSI/BHMA A156.19-2013 Power Assist and Low Energy Power Operated Doors.

.4 British Columbia Building Code, 2012 Edition (BCBC).

.5 CAN/CSA-C22.2 No. 100-14 Motors and Generators.

.6 CAN/CSA-C22.2 No. 247-14 Operators and Systems of Doors, Gates, Draperies and Louvres.

.7 CSA C22.1-15 Canadian Electrical Code, Part I (23rd Edition), Safety Standard for Electrical Installations.

.8 NEMA MG1-2014 Motors and Generators.

.9 UL 325-2013 Door, Drapery, Gate, Louvre, and Window Operators and Systems.

1.5 SYSTEM DESCRIPTION

.1 Performance Requirements:

.1 Design system to operate, hold open, and close doors under wind and suction loads calculated in accordance with applicable code.

.2 Provide for thermal expansion and contraction of door and frame units, transmitted to operating equipment.

.3 Provide for dimensional distortion of components during operation.

.4 Provide for opening and closing operation of door panels in the event of power failure.

.5 Operating temperature range: -33˚C to 72˚C (-27˚F to 162˚F) ambient.

.6 Eliminate system performance interference by ambient light and radio frequencies.

.7 Provide for manual open and close operation of door leaves in the event of power failure.

.8 Break Away Requirements: Automatic door operators provided with a breakaway device shall require no more than 50 lbf (222 N) applied at 1" (25 mm) from the latch edge of the door.

.9 Sliding doors to have break-away capability.

.10 Entire operator to be removable from header as a unit.

1.6 PROJECT CONDITIONS

.1 Field Measurements: General Contractor shall verify openings to receive automatic door operators by field measurements before fabrication and indicate measurements on Shop Drawings.

.2 Mounting Surfaces: General Contractor shall verify all surfaces to be plumb, straight and secure; substrates to be of proper dimension and material.

.3 Other trades: General Contractor Advise of any inadequate conditions or equipment.

1.7 SUBMITTALS

.1 Submit in accordance with Section 01 33 00 Submittal Procedures.

.2 Product Data:

.1 Provide data on system components, sizes, features, and finishes.

.2 Installation Data: Manufacturer's special installation requirements.

.3 Shop Drawings:

.1 Indicate layout and dimensions; head, jamb, and sill conditions; elevations; components, anchorage, recesses, materials, and finishes, electrical characteristics and connection requirements.

.2 Identify related items shown on shop drawings which are not intended to be supplied as part of the work of this Section. Clearly note dimensions and detail methods of fastening and anchoring. Show accurately and identify adjacent materials.

.3 Identify installation tolerances required, assembly conditions, routing of service lines and conduit, and locations of operating components and boxes.

.4 Show complete elevations, detail and method of anchorage to location; installation of hardware; size, shape, joints and connections; and details of joining with other construction.

.5 Provide templates and diagrams and Shop Drawings to fabricators and installers of related work for coordination of operators with doors, frames, hardware, concrete work and other work.

.6 Indicate special procedures, perimeter conditions requiring special attention.

.4 Samples: Submit two (2) samples of exposed to view hardware and attachment hardware.

.5 Closeout Submittals:

.1 Maintenance Contracts: Provide service and maintenance of operating equipment for one year from Date of Substantial Completion.

.2 Operation and Maintenance Data: Include manufacturer's parts list and maintenance instructions for each type of hardware and operating component.

.3 Warranty Documentation: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

.4 Record Documentation: Record actual locations of concealed equipment, services, and conduit.

.6 Maintenance Materials: Tools: Provide wrenches and tools required for maintenance of equipment.

1.8 QUALITY ASSURANCE

.1 Installation shall be in conformity with laws, by-laws and regulations which govern design and installation of sliding storefronts and latest and most current CSA, CGSB and ASTM standards specified.

.2 Installer Qualifications:

.1 Automatic and barrier free door equipment shall be installed by installers recommended and approved by the automatic door operator manufacturer.

.2 Installers shall be certified and recognized by the American Association of Door Manufacturers (AAADM).

.3 Conform to applicable code for automatic release of control drive unit to permit manual opening of doors.

.4 Comply with ULC Certified (equivalent to CSA listed) and ANSI A117.1.

1.9 WARRANTY

.1 Provide five (5) year manufacturer warranty for motor and compressor.

.2 During the warranty period the Owner shall engage a factory-trained technician to perform service and affect repairs. A safety inspection shall be performed after each adjustment or repair and a completed inspection form shall be submitted to he Owner.

.3 During the warranty period all warranty work, including but not limited to emergency service, shall be performed during normal working hours.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

.1 Manufacturers: Subject to compliance with specifications the following manufacturers are acceptable:

.1 Stanley Access Technologies, www.stanleyaccesstechnologies.com.

.2 Or approved alternative.

2.2 MATERIALS

.1 Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.

.1 Headers: 6063-T6.

.2 Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.

.3 Sheet and Plate: ASTM B 209.

2.3 COMPONENTS

.1 Header Case:

.1 Header case shall not exceed 6-1/8 inch x 4 inch (156 mm x 102 mm) in rectangular section and shall be fabricated from extruded aluminum with structurally integrated end caps, designed to conceal door operators and controls.

.2 The operator shall be sealed against dust, dirt, and corrosion within the header case.

.3 Access to the operator and electronic control box shall be provided by a full-length removable cover, edge rabbeted to the header to ensure a flush fit.

.4 Removable cover shall be secured to prevent unauthorized access.

.5 Rated covers shall conform to NFPA (Fire) 101 and be ULC listed.

.2 Door Arms and Linkage Assembly: A combination of door arms and linkage shall provide positive control of door through entire swing; units shall permit use of butt hung, center pivot, and offset pivot-hung doors.

.3 Fasteners and Accessories: Manufacturer's standard corrosion-resistant, non-staining, non-bleeding fasteners and accessories compatible with adjacent materials.

.4 Signage: Provide signage in accordance with ANSI/BHMA A156.19.

2.4 SWING DOOR OPERATOR / MOTOR

.1 Swing Door Operator: Acceptable Product: "Magic Access Operator Low Energy" by Stanley or approved alternative.

.2 General: Provide door operators of size recommended by manufacturer for door size, weight, and movement; for condition of exposure, and for long-term, maintenance-free operation under normal traffic load for type of occupancy indicated.

.3 Operators: Self-contained units powered by a minimum fractional horsepower, permanent-magnet DC motors.

.1 Electro-mechanical Operator: Transmit power from operator to door through reduction gear train, splined spindle, door arm, and linkage assembly. Drive train shall have positive constant engagement.

.2 Operation: Power opening and spring closing.

.3 Capacity: rated for door panels weighing up to 125 lb (57 Kg).

.4 Mounting: Visible.

.5 Features:

.1 Adjustable opening, open check, and closing speeds.

.2 Adjustable opening force.

.3 Adjustable hold-open time between 0 and 30 seconds.

.4 Reverse on obstruction.

.5 Push to operate activation.

.4 Closing Operation: The operator shall close the door by spring energy employing the motor, as a dynamic brake to provide closing speed control. The Closing spring shell be adjustable for positive closing action at a low material stress level for long spring life.

.5 Electrical service to door operators shall be provided under Division 16 Electrical. Minimum service to be 120 VAC, 5 amps.

.6 Acceptable Products: Subject to compliance with specifications, the following product is acceptable: Surface mounted.

2.5 ELECTRICAL CONTROLS

.1 Electrical Control System: Electrical control system shall include a solid state controller with quick connect plugs.

.2 Controller Protection: The controller shall incorporate the following features to ensure trouble free operation:

.1 Main Fuse Protection.

.2 Electronic Surge Protection.

.3 Internal Power Supply Protection.

.4 Motor Protection, over-current protection.

.3 Program Dip Switches: The controller shall have program dip switches to allow selection or change of activation options; standard activation or push-to-operate.

.4 Power Switch: Automatic door operators shall be equipped with a two position On/Off switch to control power to the door.

2.6 ACTIVATION DEVICE

.1 Activation Device: Touchless activator model 8310-813 by LCN no substitutions. Provide weather resistant gasket at exterior locations.

.2 Wiring to be minimum trade size #12 AWG copper conductor with 600V insulation of cross-linked thermosetting polyethylene material rated (RW90 XLPE), non jacketed. Install electrical wiring in minimum 1/2" EMT conduit, concealed in wall or painted to match wall colour. Provide all mounting hardware including fitting, fasteners, outlet boxes, weather barriers and similar finish hardware for a complete conduit system.

2.7 ACCESSORIES

.1 Accessories: provide manufacturer's standard accessories including the following:

.1 Wall Push Plate.

.2 Wall mounting Box.

.3 Electric Strike and interface.

.4 Store room Lockset.

.5 Key switch.

.6 Wiring.

2.8 FINISHES

.1 Anodic Coating: Architectural Class I, integrally colored or electrolytically deposited color coating 0.70 mils minimum. Colour: clear anodized.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Examine doors to receive operators with Installer present.

.2 Verify that surfaces and openings and recesses are ready to receive work and dimensions are as indicated on reviewed Shop Drawings.

.3 Verify that electric power is available and of the correct characteristics.

.4 Correct unsatisfactory conditions.

3.2 PREPARATION

.1 Ensure electrical installer furnishes and installs conduit and electrical wiring for activating and door operator. Provide a minimum of 5 amperes, 120 volt, A/C, 1-phase circuit for each door operator, terminate and connect to operator control panel in operator housing.

3.3 INSTALLATION

.1 Install equipment in accordance with manufacturer's printed instructions and reviewed Shop Drawings.

.2 Provide for thermal expansion and contraction of door and frame units and live and dead loads that may be transmitted to operating equipment.

.3 Provide for dimensional distortion of components during operation.

.4 Install pneumatic lines and door power units in a manner to prevent condensation or freezing.

.5 Coordinate installation of components with related and adjacent work; level and plumb.

3.4 ADJUSTING

.1 Test each door to ensure operation meets Code requirements.

.2 Adjust door equipment for correct function and smooth operation.

.3 Ensure bearings fully lubricated and sealed.

3.5 CLEANING

.1 Remove temporary protection, clean exposed surfaces.

3.6 DEMONSTRATION AND INSTRUCTIONS

.1 Demonstrate operation, operating components, adjustment features, and lubrication requirements.

END OF SECTION

This document contains standards that are the minimum requirements for BCIT construction projects. The information in the document is organized using the MasterFormat® and SectionFormat® systems. It is not a specification; it is intended to supplement the Consultant's own documents. Do not use this information as a standalone specification.

PART 1 - GENERAL

1.1 SUMMARY

.1 Provide transparent and translucent glass glazing for general and special purpose applications.

.2 Provide double glazed Insulated Glass Units.

.3 Provide triple glazed Insulated Glass Units.

.4 Provide the following types of glass: float, heat strengthened, impact resistant, laminated, and tempered glass.

.5 Provide back painted glass and glazing as indicated.

.6 Provide films for glazing systems.

.7 Provide glazing accessories as indicated and as required for a complete installation.

.8 Prior to ordering glazing products coordinate the work of this Section with Section 07 92 00 Joint Sealants to ensure sealants and caulking specified there are compatible with sealant specified in insulated glass units.

1.2 RELATED SECTIONS

.1 08 10 00 Metal Doors and Frames.

.2 08 21 00 Wood Doors.

.3 08 41 00 Aluminum Framed Entrances and Storefront.

.4 08 44 13 Glazed Aluminum Curtain Walls.

.5 08 51 13 Aluminum Windows.

1.3 REFERENCES

.1 ANSI Z97.1 American National Standard for Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test.

.2 ASTM C162 Standard Terminology of Glass and Glass Products.

.3 ASTM C1036 Standard Specification for Flat Glass.

.4 ASTM C1048 Standard Specification for Heat-Treated Flat Glass -- Kind HS, Kind FT Coated and Uncoated Glass.

.5 ASTM C 1349 Standard Specification for Architectural Flat Glass Clad Polycarbonate.

.6 ASTM C1376 Standard Specification for Pyrolytic and Vacuum Deposition Coatings on Glass.

.7 ASTM C1464 Standard Specification for Bent Glass.

.8 ASTM E1300 Standard Practice for Determining the Minimum Thickness and Type of Glass Required to Resist a Specified Load.

.9 ASTM E2188 Standard Test Method for Insulating Glass Unit Performance.

.10 ASTM E2189 Standard Test Method for Testing Resistance to Fogging in Insulating Glass Units.

.11 ASTM E2190 Standard Specification for Insulating Glass Unit Performance and Evaluation.

.12 CPSC 16 CFR 1201 Safety Standard for Architectural Glazing Materials.

.13 CAN/CGSB-12.1-M Tempered or Laminated Safety Glass.

.14 CAN/CGSB-12.2-M Flat, Clear Sheet Glass.

.15 CAN/CGSB-12.3-M Flat, Clear Float Glass.

.16 CAN/CGSB-12.4-M Flat, Heat Absorbing Glass.

.17 CAN/CGSB-12.8-M Insulating Glass Units.

.18 CAN/CGSB-12.10-M Light and Heat Reflecting Glass

.19 Insulating Glass Manufacturers Alliance (IGMA) Glazing Guidelines.

.20 Insulating Glass Manufacturers Association of Canada (IGMAC) Glazing Guidelines.

.21 GANA Glazing Manual; Glass Association of North America.

.22 GANA Sealant Manual; Glass Association of North America.

1.4 ABBREVIATIONS & ACRONYMS

.1	ANSI:	American National Standards Institute
.2	ASTM:	American Society for Testing and Materials
.3	CAN/CGSB:	Canadian General Standards Board
.4	CPSC:	Consumer Products Safety Commission
.5	CSA:	Canadian Standards Association
.6	FT:	Fully Tempered
.7	GANA:	Glass Association of North America
.8	HS:	Heat-strengthened
.9	ICC:	International Code Council
.10	IGCC:	Insulating Glass Certification Council
.11	IGMA:	Insulating Glass Manufacturers Alliance
.12	IGU	Insulating Glass Unit (sealed unit).
.13	LBNL:	Lawrence Berkeley National Laboratories
.14	LEED:	Leadership in Energy & Environmental Design
.15	NFRC:	National Fenestration Rating Council
.16	USGBC:	U.S. Green Building Council

1.5 DEFINITIONS

.1 Double Glazed - Insulated Glass Units (IGU) Surface Numbers:

Surface 1 - Exterior surface of outer pane (surface facing outdoors of outboard lite)

Surface 2 - Interior surface of outer pane (surfacing facing indoors of outboard lite)

Surface 3 - Exterior surface of inner pane (surface facing outdoors of inboard lite)

Surface 4 - Interior surface/room side of inner pane (surface facing indoors of inboard lite).

.2 Triple Glazed - Insulated Glass Units (IGU) Surface Numbers:

Surface 1 - Exterior surface of outer pane (surface facing outdoors of outboard lite).

Surface 2 - Interior surface of outer pane (surfacing facing indoors of outboard lite).

Surface 3 - Exterior surface of middle pane (surface facing outdoors of middle lite).

Surface 4 - Interior surface of middle pane (surface facing indoors of middle lite).

Surface 5 - Exterior surface of inner pane (surface facing outdoors of inboard lite).

Surface 6 - Interior surface/room side surface of inner pane (surface facing indoors of inboard lite).

.3 Air space: The space between the lites of glass in an insulating glass unit. This space may be specified to contain air or argon gas.

.4 Low-E (Emissivity): Low-emissivity coated glass has various combinations of metal, metal oxide and metal nitride layers that are nearly invisible to the eye. This extremely thin coating is applied to the glass substrate after the float and annealing process. The low-e coating reflects radiant heat, keeping radiant heat on the side of the glass where it originated. Radiant heat originating from indoors in winter is reflected back inside, while heat radiation from the summer sun is reflected away, keeping it cooler inside.

.5 LSG (Light to Solar Gain): Is the ratio between the SHGC and VLT. It provides a gage of the relative efficiency of different glass or glazing types in transmitting daylight while blocking heat gains. The higher the number, the more light transmitted without adding excessive amounts of heat.

.6 SC (Shading Coefficient): An alternative measure of the heat gain through glass from solar radiation. SC is an older term being replaced by SHGC. A lower SC indicates lower solar heat gain. The SC is a ratio of the solar heat gain through a specific glass product in relation to the solar heat gain through a lite of 3 mm (1/8 in.) clear glass. For reference, clear uncoated glass of 3 mm (1/8 in.) thickness is given a value of 1.0.

.7 SHGC (Solar Heat Gain Coefficient): The portion of directly transmitted and absorbed solar energy that enters into the building's interior. The lower the solar heat gain coefficient, the less solar energy transmitted into the building.

.8 VLT (Visible Light Transmittance): The percentage of total visible light that is transmitted through the glass. The lower the number, the less visible light transmitted. Some glazing applications benefit from high visible light while others require lower VLT to reduce glare and overheating.

1.6 GLASS TYPES

.1 Annealed Glass: Glass in its unprocessed form without internal stresses caused by heat treatment, such as rapid cooling, or by toughening or heat strengthening.

.2 Float Glass: A sheet of glass made by floating molten glass on a bed of molten metal. This gives the glass a uniform thickness and very flat surfaces. Float glass is slowly cooled to produce annealed glass.

.3 Heat Soaked Glass: Glass that has been tested using heat soaking. The heat soak test or heat soak process is used to minimize the risk of spontaneous breakage of tempered glass caused by nickel sulfide (NiS) inclusions.

.4 Heat Strengthened Glass: Produced with surface and edge compression levels that are lower than fully tempered glass. Heat strengthened glass does not meet safety glazing requirements. The lower compression levels yield a product that is twice as strong as annealed glass with a large break pattern that typically remains engaged in the glazing pocket, decreasing the possibility of fallout. Heat strengthened glass is typically used in applications that require additional strength and resistance to thermal breakage but do not require safety glazing.

.5 Laminated Glass: A type of safety glass that is made by bonding two or more layers of glass together with layers of polyvinyl butyral (PVB) or ionoplast (SGP). This creates a single sheet of glass. When broken, the interlayer keeps glass layers bonded and prevents them from breaking apart. The added rigidity and stiffness of SGP allows it to maintain its structural integrity even when fully broken.

.6 PVB: Polyvinyl Butyral, the material used as an interlayer in laminated glass.

.7 Safety Glass: Glass that has been tempered or laminated and is less likely to cause injury due to its additional strength and break pattern.

.8 Tempered Glass: A form of safety glass that has been heat-treated to have either a minimum surface compression of 10,000 psi or an edge compression not less than 9,700 psi in accordance with the requirements of ASTM C 1048. Tempered glass is approximately four

times stronger than annealed glass and can withstand greater thermal stresses and impact. When broken tempered glass will break into small pieces that are less likely to cause injury.

.9 Toughened Glass: Alternative name for tempered glass, commonly used outside of North America. See tempered glass definition.

.10 Wired Glass: Glass in which a thin metal wire mesh has been embedded. Wired glass is weaker than unwired glass due to the incursions of wire into the glass structure. Wired glass can often cause heightened injury in comparison to unwired glass and should not be used as a safety product. Wired Glass may be specified as a fire-rated glazing option in jurisdictions that still permit it.

1.7 PERFORMANCE REQUIREMENTS – GENERAL

Note to Specifier: The performance of insulating glass units (IGUs) is affected by several factors including the type of glass specified (float glass, tempered glass), the color of the glass, the coating specified (Low E), and on which surface the coating is placed (No. 2, No. 3, No. 4), back painting if any, the type of IGU selected (double glazed or triple glazed), and the unit's orientation (north, south, east, west). To obtain the performance required the designers can select one of two paths for ensuring IGUs meet their requirements. Fabricators have software to assist the design professional in selecting appropriate glazing systems to meet specific project requirements.

Method One: Identify the performance measures required (U-Value, VLT and SHGC) and in consultation with the glazing fabricator, select glazed units that can meet those performance requirements.

Method Two: Select the desired glazing combinations (glass color, sealed unit type, back painting or fritting required), and in consultation with the glazing manufacturer, determine the performance capabilities of the units selected.

Note to Specifier: For units indicated below insert the exposure, elevation or location of the unit (i.e. podium, amenities building, north, south, etc). All performance values are center-of-glass. Delete performance requirements that are not applicable.

.1 Performance Requirements – LOCATION 1

.1 Insulating Glass Unit #1 (IGU-1): Double Glazed Unit

.1 Visible Light Transmittance: [60-70%] [70-75%]

.2 Exterior Reflectance: [Input Exterior Reflectance %]

.3 Winter U-Value: [Input U-Value]

.4 Solar Heat Gain Coefficient (SHGC): [Input SHGC]

.5 Light to Solar Gain Ratio (LSG): [Input LSG]

.6 Sound Transmission Class: [Input STC]

.2 Performance Requirements – LOCATION 2

.1 Insulating Glass Unit #2 (IGU-2): Triple Glazed Unit

.1 Visible Light Transmittance: [60-70%] [70-75%]

.2 Exterior Reflectance: [Input Exterior Reflectance %]

.3 Winter U-Value: [Input U-Value]

.4 Solar Heat Gain Coefficient (SHGC): [Input SHGC]

.5 Light to Solar Gain Ratio (LSG): [Input LSG]

.6 Sound Transmission Class: [Input STC]

1.8 SUBMITTALS

.1 Product Data:

.1 Include manufacturer's installation and maintenance instructions.

.2 Submit data on exterior and interior sealant proposed for use.

.2 Shop Drawings: Shop Drawings shall be signed and sealed by a structural engineer licensed to practice in the jurisdiction specified. Engineer to provide Letters of Assurance indicating compliance with the building code specified.

.1 Letters of Assurance: Engineer who seals Shop Drawings will submit Schedules S-B and S-C to the Coordinating Registered Professional (CRP):

.1 Initial Shop Drawing Submission: Submit Schedule S-B, “Assurance of Professional Design and Commitment for Field Review.”

.2 After Completion of Field Reviews: Submit Schedule S-C, “Assurance of Professional Field Review and Compliance.”

.2 Provide Shop Drawings indicating extent and locations of specialty glass.

.3 Samples: Submit three 300 mm (12 in.) square samples of each type of glass specified, except clear monolithic glass products.

.4 Certification: Submit documentation certifying that glass meets special requirements indicated.

1.9 DELIVERY, STORAGE AND HANDLING

.1 Comply with manufacture's instruction for receiving, handling, storing and protecting glass and glazing materials.

.2 Delivery: Deliver materials in manufacturer's original, unopened, undamaged container with identification labels intact.

.3 Storage and Protection: Store materials protected from exposure to harmful environmental conditions and at temperature and humidity conditions recommended by the manufacturer.

.4 Exercise exceptional care to prevent edge damage to glass and damage/deterioration to coating on glass.

.5 Where insulating glass units will be exposed to substantial altitude changes, comply with Fabricator’s recommendations for venting and sealing.

1.10 QUALITY ASSURANCE

.1 Source Quality Control: Glass and glazing products specified in this Section shall be supplied from a single fabricator.

.2 Manufacturers: Fabrication processes, including, insulating, laminated, screen-printing and tempering shall be completed by a single Fabricator with a minimum of ten (10) years of fabrication experience and be IGMA or IGMAC certified.

.3 Mock-Ups:

.1 Before glazing, build mock-ups for [each glass product] [sealed unit] [tempered glass unit] [laminated glass unit] [reflective glass] indicated to verify selections and to demonstrate aesthetic effects and qualities of materials and execution.

.2 Construct mock-ups with glass and glazing systems specified, including typical lite size, framing systems and glazing methods, and accessories, including air barrier, membrane flashing and metal flashing.

.3 Notify Consultant [__] days in advance of dates when mock-ups will be available for viewing.

.4 Maintain mock-ups during construction in an undisturbed condition as a standard for judging the completed work. Accepted mock-ups may become part of the completed work if undisturbed at the time of Substantial Completion [Performance].

1.11 PROJECT CONDITIONS

.1 Do not proceed with glazing when ambient and substrate temperature conditions are outside limits recommended by the glazing material manufacture and when glazing channel substrates are wet from rain, frost, condensation or other sources.

.2 Installation of glass products at ambient air temperatures below 4^0C is prohibited.

1.12 WARRANTY

.1 Provide manufacturer's standard one (1) year warranty from date of manufacture on Heat Strengthened, Tempered, and Painted Glass.

.2 Provide Fabricator's five (5) year warranty from date of manufacture on laminated glass.

.3 Provide Fabricator's five (5) year warranty from date of manufacture on float mirror.

.4 Provide Fabricator's five (5) year warranty from date of manufacture for insulating glass units.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

.1 Subject to compliance with specifications the following primary glass manufacturers are acceptable:

.1 PPG Industries.

.2 Guardian Industries.

.3 Saint-Gobain.

.4 Or approved alternative.

2.2 FABRICATORS

.1 Subject to compliance with specifications the following fabricators are acceptable:

.1 Garibaldi Glass 8183 Wiggins St, Burnaby, BC V3N 0C4 www.garibaldiglass.com. T: 604 420 4527, 1- 800 665 3787.

.2 Vitrum Glass Group, Vitrum Industries Ltd. 9739 201 Street Langley, BC V1M 3E7 www.vitrum.ca. T: 604.882.3513.

2.3 GLASS

.1 Glass Products General: Products shall comply with ANSI/ASTM/CGSB Standards and requirements.

.2 Glass 1 (GL-1): Safety (Tempered) Glass: Tempered; Class B, float or plate glass, clear; conforming to CAN/CGSB 12.11, minimum thickness as indicated or as required by Code.

.3 Glass 2 (GL-2): Polished Wired Glass: Type 1 (polished both sides); Style 3 (square wire mesh); conforming to CAN/CGSB 12.11. Thickness: 6 mm (1/4 in.).

.4 Glass 3 (GL-3): Float Glass: Type Architectural glazing quality, conforming to CAN/CGSB 12.3 / ASTM C1036, minimum thickness as indicated or as required by Code.

.5 Glass 4 (GL-4): Safety (Tempered, Laminated) Glass: Type 1, tempered laminated; [Class B], float or plate glass, conforming to CAN/CGSB 12.1, minimum thickness as indicated or as required by Code. [Thickness: 6 mm (1/4 in.)] .

Note to Specifier: Fabricated glass (holes, notches, cut-outs) and large panels typically require a minimum of 0.060 PVB interlayer, for other applications 0.030 may be suitable and in some applications 0.090 will be required, check with fabricator to determine suitability of the product.

.1 Interlayer: 0.030 mm thick, 'SonicGuard™' by Vitrum Industries, or approved alternative.

2.4 SINGLE GLAZED UNITS

.1 Single Glazed Units: 6 mm clear tempered glass, for replacement of glass in interior partitions and windows. Frosted where indicated.

2.5 INSULATED GLASS UNITS

.1 Insulated Glass Units: Conforming to CAN/CGSB 12.8/ASTM E 2190; certified through the Insulating Glass Manufacturer's Association of Canada (IGMAC), with dual seal type edge construction to maintain a hermetic seal. Provide tempered or laminated glass in sealed units where required by code or other applicable standards.

.2 Sealed Unit Type 1: Double Glazed – Clear Glass.

.1 Exterior lite:

.1 Glass Type: Tempered.

.2 Thickness: 6 mm (1/4 in).

.3 Glass Substrate: Clear, match Consultant's sample.

.4 Low E coating: As specified below, on No. 2 [No. 3] surface.

.2 Air Space: 13 mm (1/2 in.) argon filled [air filled].

.3 Interior lite:

.1 Glass Type: Tempered.

.2 Thickness: 6 mm (0.25 in.). Colour: Clear.

.3 Sealed Unit Type 2: Triple Glazed:

.1 Exterior lite:

.1 Glass Type: Tempered.

.2 Thickness: 6 mm (1/4 in).

.3 Glass Substrate: Clear, match Consultant's sample.

.4 Low E coating: As specified below, on No. 2 surface.

.2 Air Space: 13 mm (1/2 in.) argon filled [air filled].

.3 Middle lite:

.1 Glass Type: Annealed/Float.

.2 Thickness: 4 mm (0.16 in.).

.3 Glass Substrate: Clear, match Consultant's sample.

.4 Low E coating: As specified below, on No. 3 surface.

.4 Air Space: 13 mm (1/2 in.) air filled.

.5 Interior lite:

.1 Glass Type: Tempered.

.2 Thickness: 4 mm (0.16 in.).

.3 Glass Substrate: Clear, match Consultant's sample.

.4 Low E coating: As specified below, on No. 2 surface.

2.6 SEALS

.1 Primary Seal: Polyisobutylene. The target width of the primary seal shall be 3.97 mm (5/32 in.). There shall be no voids or skips in the primary seal. Color: black.

.2 Secondary seal: Silicone or polysulphide, minimum thickness 1.59 mm (1/16 in.). Color: black.

.3 Sealed Unit Tolerances:

.1 Double glazed insulating unit: overall unit thickness tolerance measured 150 mm (6 in.) down and 25 mm (1 in.) in from the outside corner shall be -1.59 mm (-1/16 in.) / +0.79 mm (+1/32 in.) for a 25 mm (1 in.) Units constructed with patterned or laminated glass shall be +/- 1/16 in. (1.59 mm).

.2 Up to a maximum of 3/32 in.of the spacer bar may be visible above the primary seal.

2.7 SPACERS

Note TO SPECIFIER: For aesthetic reasons use of black primary and secondary sealants is highly recommended, with a black anodized aluminum spacer or black Vitrum UltraBar™ Plus.

.1 Spacer Bars: black anodized aluminum of rigid construction, filled with molecular sieve desiccant and have four (4) continuous bent corners with one (1) or more straight connectors.

.2 Spacer Type 1: Manufacturer's standard aluminum spacer with mill finish as used in system's energy modeling. Colour/Finish: anodized black.

.3 Spacer Type 2: Vitrum Ultrabar™, manufacturer's standard warm edge black spacer, or approved alternative.

.4 Spacer Type 3: Structural Sealant Glazing (SSG): anodized black aluminum spacer black Ultra Bar Plus spacer, with a black primary sealant and black secondary silicone.

2.8 COATED VISION GLASS, LOW E COATINGS, SILICONE COATINGS

.1 Coatings shall comply with ASTM C 1376 Standard for Pyrolitic and Vacuum Deposition Coatings on Glass.

.2 Coated products to be magnetically sputtered vacuum deposition (MSVD) unless specified otherwise.

.3 Low E Coating Type 1: Solar Ban 60 by PPG, or approved alternative.

2.9 PRIVACY FILM

.1 Privacy Film: 3M Matte Film, or approved alternative. Not to be applied to sealed units.

2.10 FABRICATION

.1 Glass Fabrication.

.2 Laminated Glass products to be fabricated in an autoclave. Product shall follow ASTM Standards.

.3 Edge Deletion: When low-e coating or Opaci Coat are used within an insulating glass unit, coating shall be edge deleted to completely seal the coating within the unit. The edge deletion shall be uniform in appearance (visually straight) and remove >95% of the coating.

2.11 TOLERANCES

.1 Tempered Glass Fabrication Tolerances.

.1 Glass to be annealed, heat-strengthened, fully tempered or heat soaked and fully tempered as required to meet all applicable codes and/or thermal stress and wind loads.

.2 Heat Treated Glass to be horizontally processed with inherent roll wave distortion pattern parallel to the bottom edge of the glass.

.3 Maximum bow and warp 1/32 in. per lineal foot (0.79 mm)

Note to Specifier: Not all fabricators can meet the roller wave +/- 100 milidipter. If tight tolerances on fabrication are not required delete the next sentence.

.4 Each lite of coated, tinted and reflective glass to have a maximum peak to valley roller wave +/- 100md (millidiopter) over 95% of the glass surface.

.2 Insulated Glass Units - Fabrication Tolerances.

.1 Gaps or skips between primary and secondary sealant are permitted to a maximum width of 1.59 mm (1/16 in.) by a maximum length of 51 mm (2 in.) with gaps separated by at least 457mm (18 in.).

.2 Ensure lites are separated by a desiccant filled spacer bar with bent corners and straight key joints, providing a hermetically sealed and dehydrated space.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verify that openings for glazing are correctly sized, within tolerances specified, and that required face and edge clearances have been met.

.2 Verify that a functioning weep system is present.

.3 Correct unsatisfactory conditions.

3.2 PREPARATION

.1 Clean and prepare glazing channels and other framing members to receive glass.

.2 Remove coatings and other harmful materials that will prevent glass and glazing installation from complying with the specified performance criteria.

.3 Ensure outside air temperature and forecasted temperature is within glass manufactures installation limits.

3.3 INSTALLATION

.1 Install products in accordance with glass manufacturer's recommendations, and reviewed Shop Drawings.

.2 Install glass, sealants, gaskets and other glazing materials, in accordance with recommendations and guidelines in the GANA Glazing Manual, unless indicated otherwise.

.3 Set glass lites in each series with uniform pattern, draw, bow and similar characteristics.

.4 Protect glass from contaminating substances that are a result of construction operations, such as weld spatter, fireproofing and plaster.

3.4 PROTECTION AND CLEANING

.1 Protect glass and glazing products during storage and installation in accordance with manufacturer’s recommendations.

.2 Clean excess sealant or compound from glass and framing members immediately after application using solvents or cleaners recommended by manufacturers.

.3 Clean Glass according to: GANA Glass Information Bulletin GANA 01-0300 – Proper Procedures for Cleaning Architectural Glass Products.

.4 Do not use scrapers, razor blades or other metal tools to clean glass.

END OF SECTION