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1.0 GENERAL

1.1 General Note

.1 Input from Building Envelope Professional required at early stage in design development.
.2 Production of a competent air barrier requires integration of the line of air tightness into early design decisions.

1.2 Performance Standards

.1 CAN/CSA-A440.2-09/A440.3-09 - Fenestration energy performance/User guide to CSA A440.2-09, Fenestration energy performance.
.2 NFRC 100 - 2010, Procedure for Determining Fenestration Product U-factors.
.4 CAN/CSA-A440.4 "Window and Door Installation".

1.3 Windows – General

This Section applies to all Glass and Glazing included in Sections: 08 41 13 Aluminum-Framed Entrances and Storefronts, 08 50 00 Windows, 08 80 00 Glazing, and 08 44 13 Glazed Aluminum Curtain Walls.

.1 Systems to utilize exterior rain screen deterrents, interior air seal barriers, and cavities pressure equalized to the exterior to minimize water infiltration into the internal areas of the system, assembled and installed to provide control and drainage to the exterior of any water which enters the pressure equalized cavities.

.2 All seals between frame and glazing to be made with compressed gaskets.

.3 Frames to be glazed with internal removable stops or using tamper proof fasteners where security is required.

.4 Window installations need to accommodate building movements including inter-storey drift during seismic loading.

.5 Air infiltration/exfiltration level:

.1 A3 level for operable products (0.5 l/sm2) and Fixed level for non-operable products (0.2 l/sm2) all measured at 75Pa.

.6 Water tightness rating for windows to be selected based upon exposure to elements related to location on the façade and site conditions.

.7 Sound attenuation ratings for windows to be selected based upon interior requirements.

.8 Thermal transmission and shading coefficient for windows and doors to be selected in coordination with mechanical consultant.

.1 Buildings designed to ASHRAE 90.1-2010: Provide overall U-values and SHGC that are lower than prescriptive values for Zone 4 buildings.
.1 Non-metal framing $U_{SI} \leq 2.3 \ W/m^2\cdot K$.
.2 Metal curtainwall / window wall $U_{SI} \leq 2.8$.
.3 Metal windows, operable for fixed, and non-entrance doors: $U_{SI} \leq 3.1$.
.4 Overall SHGC $\leq 0.40$. 
.2 Buildings designed to 2011 NECB: provide overall U-values that are lower than prescriptive values for Zone 4: \( U_{\text{SI}} \leq 2.4 \text{ W/m}^2\text{K}. \)

.9 Operable windows to be included for ventilation and occupant comfort where noise and mechanical ventilation concerns do not preclude this.

.10 Operable windows are not to be installed in laboratories or spaces where pressure differentials need to be maintained in order to allow negative pressures to be maintained relative to adjacent spaces and to prevent draft conditions.

.11 Make provision for window washing and other maintenance access to both sides of glazing units, including in atrium spaces. Access by man lift is preferred.

.12 Hardware and seals of operable units should be designed so that hardware can be adjusted and seals maintained or replaced over the life of the window to maintain air and weather tightness.

.13 Frames need to be supplied with receiving surfaces for sealing to air and vapour barrier materials, insulation, and cladding in the wall assembly.

.14 Exterior sills and flashings to be installed with a definite outward slope (15° degrees or more).

.15 Designers should consider UBC’s [Bird Friendly Design Guidelines for Buildings](#) early in project design.

.16 *If designing full height glazing, provide guard redundancy.*

### 1.4 Windows - Materials

This Section applies to all Glass and glazing included in Sections: 08 41 13 Aluminum-Framed Entrances and Storefronts, 08 50 00 Windows, 08 80 00 Glazing, and 08 44 13 Glazed Aluminum Curtain Walls.

.1 Glazing units to have a 10-Year warranty.

.2 Frame materials to be selected for a minimum 30-Year service life.

.3 Suitable frame materials include thermally broken aluminum.

.4 Where permitted by code fiberglass windows may be specified provided they meet a minimum performance class and grade of CW 45 in accordance with NAFS.

.5 In a non-academic building of less than 3 stories in height, and where permitted by building code, AAMA 303 certified PVC compounds windows may be considered provided they meet a minimum performance class and grade of CW 45 in accordance with NAFS. PVC windows to be white or light colours only.

.6 Frame coating: Aluminum AAMA 2603 for interior coatings, AAMA 2604 for exterior coatings in high traffic areas (entrances) for greater abrasion resistance, AAMA 2605 for exterior exposed coated surfaces. Anodized finishes to conform to AAMA 611 or AAMA 612 (clear coated anodized finish).

.7 All materials should be shop fabricated and finished with no field cutting of materials allowed.
.8 Non-metal and non-wood windows to meet a minimum performance class of NAFS CW class.

.9 Sill accessories and flashing material shall be connected with waterproof joints or shall be underlain with continuous secondary waterproofing. Joints shall remain waterproof while accommodating thermal movement for the life of the installation.

.10 All windows to be installed over a waterproofed sub sill pan that covers the entire underside of the window up to the air seal line.

1.5 Doors – General

This Section applies to all Doors included in Sections: 08 11 00 Metal Doors and Frames, 08 41 13 Aluminum-Framed Entrances and Storefronts, 08 50 00 Windows, 08 80 00 Glazing, and 08 44 13 Glazed Aluminum Curtain Walls.

.1 Doors not designed to be weathertight should be protected from inclement weather by canopies or by other means.

.2 Water tightness rating for exposed doors to be selected based upon exposure to elements related to location on the façade and site conditions.

.3 Exposed doors and frames:

.1 Install all doors under the cover of an overhang with an overhang ratio (horizontal projection of overhang to overhang to height above door sill) appropriate for the door type. All measurements are taken from the exterior edge of the door threshold.

.2 Overhang projection outward from plane of door:

.1 Out-swing door: ......................... 1:4 min
.2 Sliding door: ......................... 1:4 min
.3 In-swing: ................. 1:2 min
.4 Double swing: ......................... 1:2 min
.5 Double slider: ......................... 1:2 min
.6 Wood door: ......................... 1:2 min
.7 Outswing Press steel door: ........... 1:2 min

.3 Overhang projection to jamb in plane of door 1:4 minimum.

.4 Any door with less than a 1:2 overhang ratio (Out-swing door and sliding doors in table above) must also meet the minimum water penetration test resistance requirements for windows located in the wall at that location, and be verified through field testing.

.5 Exceptions to the above rules may also be made for outward opening or sliding doors that can resist water penetration in the lab and in the field at pressures in excess of 500 Pa with multi point locking system.

.4 Frames to be glazed with internal removable stops or using tamper proof fasteners where security is required.
.5 Door sub sill pans need to be integrated with terminations of roofing membranes.

.6 Check scuppers for height relative to door sills.

.7 Frames need to be sealed to air and vapour barrier materials, insulation, and cladding in the wall assembly.

.8 Wherever required for fire rating, use hollow metal thermally broken doors. At all other locations use thermally broken aluminum door or fiberglass.

.9 Wide stile glazed thermally broken aluminum doors in aluminum frames or fiberglass doors in pressed metal frames are preferable.

.10 Wood doors with a mineral core are acceptable under some circumstances but not recommended for maintenance.

.11 For security purposes doors should be single. All exterior exit doors (with panic hardware or "pass out" locksets) must be singles within their own frames. Where wider openings are required for movement of equipment, supplies, etc., provide removable center mullions.

.12 The University requires that all doors with glazed assemblies (floor to door height, or ceiling) be tempered glass.

.13 Where vision glass is located in a required fire separation use Firelite and not wired glass.

.14 Provide minimum 150 mm (6") high base to all sidelights to provide adequate protection to glazing from floor washers, polishers and vacuum machines.

.15 Use of floor checks, pivots, concealed closers and/or concealed panic devices is not permitted.

.16 Door stiles of glazed doors must be 127 mm (5") x 45 mm (1 3/4") minimum in order to accept surface mounted panic hardware and mortise locksets. Glass doors are not recommended.

.17 Doors to swing out for all Service Rooms and provide an acoustic seal.

.18 Any exterior or vestibule doors that swing over walk off mats must have sufficient clearance underneath to accommodate the mats without having to make special provisions in the mats such as cutaways.

1.6 Doors - Materials

This Section applies to all Doors included in Sections: 08 11 00 Metal Doors and Frames, 08 41 13 Aluminum-Framed Entrances and Storefronts, 08 50 00 Windows, 08 80 00 Glazing, and 08 44 13 Glazed Aluminum Curtain Walls.

.1 Materials to be selected for a 30-Year service life.

.2 Corrosion protection considered suitable for steel materials consists of Z275 galvanizing and painting.

.3 Aluminum frame coating: AAMA 2604 for exterior coatings in high traffic areas (entrances) for greater abrasion resistance, AAMA 2605 for exterior exposed coated surfaces. Anodized finishes to conform to AAMA 611 or AAMA 612 (clear coated anodized finish).
.4 All materials should be shop fabricated and finished, with no field cutting of materials allowed.

.5 PVC doors to have a minimum exterior wall thickness of 2 mm, and to have internal steel reinforcing in every member.

.6 Sill accessories and flashing material shall be connected with waterproof joints or shall be under laid with continuous secondary waterproofing. Joints shall remain waterproof while accommodating thermal movement for the life of the installation.

***END OF SECTION***
1.0 GENERAL

1.1 Related UBC Guidelines

.1 Section 07 00 10 Building Envelope – General Requirements
.2 Section 08 00 10 Openings – General Requirements
.3 Division 27 (Section 27 05 05 Communication Rooms Design Guidelines, 2.0, 2.7)

1.2 Co-ordination Requirements

.1 Coordinate Exterior Door Design with Building Envelope Consultant.
.2 Coordinate design with Division 26 - Electrical Consultant.
.3 Coordinate design with UBC Information Technology (IT).
.4 Coordinate design with UBC Secure Access.

1.3 Description

.1 Hollow metal doors (HMD), insulated metal doors (IMD), and pressed steel frames (PSF) and glazed screens.

1.4 Performance Standards

.1 BC Building Code, including Accessibility requirements.
.2 Canadian Steel Door Manufacturers Association (CSDMA), Recommended Specifications for Commercial Steel Doors and Frames.
.3 Fire-Rated Door Assemblies: CAN/ULC-S104-10 - Standard Method for Fire Tests of Door Assemblies; CAN/ULC-S105-09 - Standard Specification for Fire Door Frames Meeting the Performance Required by CAN4-S104; labeled and listed by ULC, cUL, Warnock Hersey, or other testing agency.
.4 NFPA 80 for installation of fire rated doors and frames.
.5 Doors shall be designed to have a 25-Year service life.

1.5 Submittals

.1 Shop drawings shall be submitted for doors.

2.0 MATERIALS

2.1 Prescriptive Requirements

.1 Materials
.1 Interior Doors: 18 gauge (1.2 mm), galv. to ZF075 wiped zinc coating, honeycomb structural core.
.2 Exterior Doors shall be 18 gauge (1.3 mm), galv. to Z275 (G90) zinc coating, insulated polyurethane insulation core.
.3 Interior Frames shall be 16 gauge (1.5 mm), galv. to ZF075 wiped zinc coating; galvanizing on anchors to match frames.
.4 Exterior Frames shall be 16 gauge (1.6 mm), galv. to Z275 (G90) zinc coating, galvanizing on anchors to match frames.
Components

Design aspects

1. Standard and minimum door size shall be 915 mm x 2,134 mm x 44 mm (3'-0" x 7'-0" x 1 3/4").
2. Maximum door height: 2,134 mm (7'-0").
3. Glazed doors shall provide stile width 152 mm (6") typical, 127 mm (5") minimum.
4. Avoid double doors whenever possible where security is a requirement; provide lockable removable mullions at double doors where extra width is required such as for moving equipment, supplies, etc.
5. At glazed screens and sidelights shall provide 152 mm (6") high base to protect against damage from floor cleaning equipment, etc.
6. Provide electrical pathways to mid hinge, strike and header of frames for future electrification of openings. Must include pull string to each pathway.
7. Glazed doors must have styles and rails. No glazed doors with only top and bottom rails or patch hardware.
8. Doors must have mid-rails if equipped with exit devices.

Provide back boxes.

Finishes

1. All new doors scheduled to be painted are to be hollow metal. Finish paint coat must be applied before final hardware install.

Fabrication

1. Frames to be fully-welded (knock-down frames are acceptable only by special UBC approval).

Coordination

1. For security reasons from within a building, EXIT alarms may be required on certain Exit-Only doors.

***END OF SECTION***
1.0 GENERAL

1.1 Related UBC Guidelines

1.1.1 Section 07 00 10 Building Envelope – General Requirements
1.1.2 Section 08 00 10 Openings – General Requirements
1.1.3 Division 27 (Section 27 05 05 Communication Rooms Design Guidelines, 2.0, 2.7)

1.2 Co-ordination Requirements

1.2.1 Coordinate Exterior Door Design with Building Envelope Consultant.
1.2.2 Coordinate design with Division 16 - Electrical Consultant.
1.2.3 Coordinate design with UBC Information Technology (IT).
1.2.4 Coordinate design with UBC Secure Access.

1.3 Performance Requirements

1.3.2 CAN/CSA-0132.2 Wood Doors.
1.3.3 CAN 3-0188.1 Particle Cores.
1.3.4 Wherever suitable, use hollow metal doors in lieu of wood doors.
1.3.5 In buildings of 3 stories or less, exterior wood doors to be installed under the cover of an overhang with a minimum 1:2 overhang ratio.
1.3.6 Exterior wood doors must be pre-hung and conform to minimum NAFS performance requirements:
   1. Class R
   2. Performance Grade 40 (includes air, water and structural)
   3. Hardware – corrosion resistance, multi-point for doors over 80”
1.3.7 In the case that Site built exterior wood doors are required, they must be field tested for water infiltration to ASTM E1105 at 300 Pa without water infiltration and have the following:
   1. Drip flashing at head
   2. Open out
   3. Interior perimeter air seal rubber gasket at head, jamb and sill
   4. Step threshold with integral bulb gasket at sill
   5. Weather resistant astragal to be provided at meeting rails of a pair of door leafs
   6. Exterior door sweep gasket at sill
   7. Hardware – corrosion resistance, multi-point for doors over 80”

1.4 Quality Control and Assurance

1.4.1 Submittals
   1. Provide a list of all proposed materials for review, and color samples for selection plus for final approval.
   2. Submit shop drawings.
   3. Provide manufacturer installation instructions and test data, for fire rated doors.
   4. Submit 8”x12” top corner sample of each type of door proposed for acceptance of construction and veneer.
.2 Quality Assurance
   .1 Follow AWMAC Quality Assurance Program. All doors to have an AWMAC guarantee and follow the AWMAC Inspection and Guarantee Program.

.3 Quality Control
   .1 Trade contractor shall be a member of AWMAC – BC.
   .2 All work to be inspected both at the plant and on site by approved/appointed Inspection Agency, acceptable to the Consultant and AWMAC, and paid by the Trade Contractor.
   .3 An AWMAC appointed inspector to review and approve all shop drawings and inspect all work at both the plant and the site.

2.0 MATERIALS

2.1 Performance Requirements
   .1 Environmental – Source
      .1 Endangered wood species must not be used in the manufacturing of wood doors. Recommended species:
         .1 Veneer shall be Birch, Oak, or Maple.
         .2 Trim shall be Birch, Oak or maple.
   .2 Manufacture
      .1 Avoid adhesives, preservatives, hardeners, and synthesizing agents and finish coatings that contain formaldehyde and high V.O.C. content.

2.2 Prescriptive Requirements
   .1 Materials
      .1 Wood doors with a mineral core are not recommended for maintenance reasons but are acceptable under some circumstance.
   .2 Components
      .1 Standard and minimum door size: 915 mm x 2,134 mm x 44 mm (3'-0" x 7'-0" x 1 ¾").
      .2 Maximum door height: 2,438 mm (8'-0").
      .3 Glazed doors shall have stile width of 152 mm (6") typical, 127 mm (5") minimum.
   .3 Provide solid wood backing for all hardware installation.
   .4 Fabrication
      .1 All doors to be solid core.
   .5 Execution
      .1 Seal hinge gains, top and bottom of doors before installation.

***END OF SECTION***
1.0 GENERAL

1.1 Related UBC Guidelines

.1 Section 07 00 10 Building Envelope – General Requirements
.2 Section 08 00 10 Openings – General Requirements

1.2 Co-ordination Requirements

.1 Coordinate design with Building Envelope Consultant.
.2 Coordinate design with Division 26 Electrical Consultant.
.3 Coordinate design with Divisions 27 and 28 IT Services and Secure Access requirements.

1.3 Description

.1 Exterior aluminum type framing systems: Only use storefront in protected areas under overhangs or canopies. In all other locations curtain wall is required.

1.4 Performance Standards

.1 ASTM E283, “test method for rate of air leakage through exterior windows, curtain walls and doors.”

.2 ASTM E330, “structural performance of exterior windows, curtain walls and doors by uniform static air pressure difference.”

.3 ASTM E331, “test method for water penetration of exterior windows, curtain walls and doors by uniform static air pressure differential.”

1.5 Performance Requirements

.1 Due to extensive failures of face-sealed storefront glazing on exposed walls of many of UBC recent buildings, it is strongly recommended that storefront glazing to only be designed for walls having overhangs that will keep the walls dry under normal light-breeze weather conditions. Self-draining curtain wall systems be selected for installation on exposed walls with no overhangs.

.2 In addition to any other applicable Codes, Standards and Project Requirements, exterior systems to meet or exceed the following minimum requirements.

.3 Environmental Separation

.1 Water Tightness rating for windows to be selected based upon exposure to elements related to location on the façade and site conditions. Use the NAFS Canadian supplement.

.2 Air Infiltration to be determined in accordance with the requirements in ASHRAE 90.1 2010 paragraph 5.4.3.2

.4 Framing systems to be thermally broken.

.5 Engineering Design

.1 Wind Loads: assemblies, reinforced where required, capable of withstanding local positive and negative wind pressures.

.1 Minimum 25 psf (1.2 kPa) inward and 25 psf (1.2 kPa) outward acting normal to the plane of the wall.
.2 Based on CAN3-S157 and allowable deflection of 1/175.

.2 System to provide for expansion and contraction within system components caused by a cycling temperature range of 100 degrees C over a 12 hour period without causing detrimental effect to system components.

.3 The system capable of withstanding a metal surface temperature range of 180° F (100° C) without buckling, failure of joint seals, undue stress on structural elements, damaging loads on fasteners, reduction of performance, stress on glass, or other detrimental effects.

.4 Assemblies to support design loads and accommodate structural deflection and long term creep movements and drift as shown on the Structural Drawings without stress on glass, buckling, failure of joint seals, undue stress on structural elements, damaging loads on fasteners, reduction of performance, or other detrimental effects caused by structural movement.

.5 The connection of the storefront framing to the structure of the building to be detailed in such a way that only horizontal and vertical forces are transmitted. No bending moments to be applied by the storefront to the structure or structural support.

.6 Operable windows which are within 3.6 m (12’) from grade to meet ASTM F 588 Grade 20 minimum for forced entry resistance.

.7 Fasteners
   .1 Exposed fasteners and anchors: aluminum, 300 series stainless steel, or nickel-plated brass.
   .2 Concealed fasteners and anchors: aluminum, cadmium plated steel, zinc plated steel, or stainless steel.
   .3 Concealed anchors: aluminum, or carbon steel painted after fabrication with zinc chromate or other primers not containing lead.

.6 Environmental
   .1 Life Expectancy: 50-Year for exterior, 25-Year for interiors.

.7 Coordination
   .1 For security reasons from within a building, EXIT alarms may be required on certain Exit-Only doors.

1.6 Quality Control and Assurance

.1 Submittals
   .1 Shop drawings (including all enclosure interface details) sealed and signed by Engineer.
   .2 Manufacturer to submit performance test data to confirm performance criteria.
   .3 Submit Hardware Schedule; refer to Section 08 71 00 Door Hardware.
   .4 Submit samples, including finishes for selection.
   .5 Submit Maintenance Data
      .1 As-installed hardware schedule and installation instructions.
      .2 Source for replacement parts.
      .3 Maintenance instructions.
.2 Quality Assurance
   .1 All structural performance requirements of this section including anchorage and
       fasteners to be designed and certified by a professional engineer registered in the
       Province of British Columbia, to also carry out periodic site reviews during construction
       and at completion, and submit reports and letters of assurances for professional
       design, field review and building code and project criteria compliance.
   .2 Costs to be included in the contract price.

.3 Quality Control
   .1 UBC will appoint and pay for an independent inspection agency to conduct field
       testing for water penetration, air leakage and pressure equalization.
   .2 Initial field test at any given location shall be paid by UBC. Cost of re-testing to verify
       corrected work shall be paid by Contractor
   .3 Contractor is responsible to provide test chambers and ensure adequate power and
       water supply.
   .4 Water testing to ASTM E.1105 and air leakage testing at NAFS test pressure.

.4 Warranties
   .1 5-Year

2.0 MATERIALS

2.1 Prescriptive Requirements

   .1 Materials
   .1 Preferred Systems:
      .1 Framing shall be Kawneer 1600 curtain wall or equivalent
      .2 Kawneer 451T storefront section or approved equivalent is acceptable in
         protected locations only.
      .3 Doors: Kawneer 500 wide stile (or equivalent), maximum height 2,134 mm (7'-
         0'”), maximum width 1,220 mm (4'-0’”).
   .2 Use of floor checks, pivots, concealed closers, in-floor power operators and/or
      concealed exit devices is not permitted.
   .3 Install overhead stops, wall stops, or floor stops where required to prevent damage
      from door contacting wall, another door, and provide controlled swing/stop.

   .2 Finishes
   .1 Finishing products:
      .1 Thermosetting enamel coating meeting the requirements of AAMA 603.8:
      .2 Thermosetting fluopolymer two coat meeting the requirements of AAMA 605.2:
      .3 Clear anodized coating to conform to AAMA Class II.
      .4 Champagne, bronze or black coloured anodized coating to conform to AAMA
         Class I.

   .3 Execution
   .1 Before Installation
      .1 At exterior locations, ensure that a waterproofed sill pan membrane (or
         equivalent) is installed to drain to exterior, over the entire perimeter of the
         opening over which the framing system is to be installed.

***END OF SECTION***
1.0 GENERAL

1.1 Related UBC Guidelines

.1 Section 07 00 10 Building Envelope – General Requirements
.2 Section 08 00 10 Openings – General Requirements

1.2 Co-ordination Requirements

.1 Coordinate design with Building Envelope Consultant.
.2 Coordinate design with Division 26 Electrical Consultant.
.3 Coordinate design with Divisions 27 and 28 IT Services, including for Secure Access requirements.

1.3 Description

.1 Exterior aluminum curtain wall type framing system; doors and windows within system.
.2 Use Kawneer 1600 UT as base of design for curtainwall that is fully exposed to the elements.

1.4 Performance Standards

.1 BC Building Code, including Accessibility requirements.
.2 CAN/CSA-A440.2 "Energy Evaluation of Windows and Doors."
.3 CAN/CSA-A440.4 "Window and Door Installation."
.4 ASTM E283, "Test Method for Rate of Air Leakage through Exterior Windows, Curtain Walls and Doors."
.5 ASTM E330, "Structural Performance of Exterior Windows, Curtain walls and Doors by Uniform Static Air Pressure Difference."
.6 ASTM E331, "Test Method for Water Penetration of Exterior Windows, Curtain Walls and Doors by Uniform Static Air Pressure Differential."

1.5 System Selection

.1 It is requested that self-draining curtain wall systems be selected for installation on exposed walls with no overhangs. Particular attention should be given to the storm-facing east and south-facing walls.

1.6 Performance Requirements

.1 Vertical Glazing

.1 In addition to any other applicable Codes, Standards and Project Requirements, exterior systems to meet or exceed the following minimum requirements:

.2 Environmental Separation

.1 Water Tightness rating for windows to be selected based upon exposure to elements related to location on the façade and site conditions. Use the NAFS Canadian supplement

.2 Air Infiltration to be determined in accordance with the requirements in ASHRAE 90.1 2010 paragraph 5.4.3.2

.3 Operable Windows as part of curtain-wall system to conform to NAFS, including the following ratings:
.1 Water Tightness: see 1.6.1.1.1 above.
.2 Air Infiltration: see 1.6.1.1.2 above.
.3 Wind Load Resistance shall meet ASTM E330
.4 Resistance to Forced Entry shall be F20 (windows reachable from grade).
.5 Hardware to include multi-point locking with centre locking handle

Systems to utilize exterior rain screen deterrents, interior air seal barriers, and cavities pressure equalized to the exterior to minimize water infiltration into the internal areas of the system, assembled and installed to provide control and drainage to the exterior of any water which enters the pressure equalized cavities.

.4 Exterior systems to incorporate a thermal break.

.5 Engineering Design

.1 Wind Loads: Assemblies shall be reinforced where required, capable of withstand ing local positive and negative wind pressures.
  .1 Minimum 25 psf (1.2 kPa) inward and 25 psf (1.2 kPa) outward acting normal to the plane of the wall.
  .2 Based on CAN3-S157 and allowable deflection of 1/175.

.2 System to provide for expansion and contraction within system components caused by a cycling temperature range of 100 degrees C over a 12 hour period without causing detrimental effect to system components.

.3 The system capable of withstanding a metal surface temperature range of 180° F (100° C) without buckling, failure of joint seals, undue stress on structural elements, damaging loads on fasteners, reduction of performance, stress on glass, or other detrimental effects.

.4 Assemblies to support design loads and accommodate structural deflection and long term creep movements and drift as shown on the Structural Drawings without stress on glass, buckling, failure of joint seals, undue stress on structural elements, damaging loads on fasteners, reduction of performance, or other detrimental effects caused by structural movement.

.5 The connection of the curtain wall to the structure of the building to be detailed in such a way that only horizontal and vertical forces are transmitted. No bending moments to be applied by the curtain wall to the structure or structural support.

.6 Operable windows which are within 3.6 m (12’) from grade to meet ASTM F 588 Grade 20 minimum for forced entry resistance.

.7 Fasteners:
  .1 Exposed fasteners and anchors: aluminum, 300 series stainless steel, or nickel-plated brass.
  .2 Concealed fasteners and anchors: aluminum, cadmium plated steel, zinc plated steel, or stainless steel.
  .3 Concealed anchors: aluminum, or carbon steel painted after fabrication with zinc chromate or other primers not containing lead.
.6 Environmental

.1 Service Life Expectancy: 50-Year for exterior, 25-Year for interiors

.7 Coordination

.1 For security reasons from within a building, EXIT alarms may be required on certain Exit-Only doors.

.2 Skylights and Glass Roofs Over Conditioned Space

.1 Use SSG system with no cap on purlins.

.2 Rain screen rafters and purlin gutter system.

.3 Minimum slope 20 degrees, maximum slope 45 degrees.

.4 Integral purlin to rafter condensation gutter with water tight evaporation tray along skylight sill.

.5 Glazing to be double glazed heat strengthened glass. Inboard pane to be laminated glass with a minimum PVB film thickness of 1.5 mm.

.6 Basis of design: Kawneer 2000 series.

.7 T-bar skylight – not allowed over habitable space, however can be used as canopy over exterior space.

1.7 Quality Control and Assurance

.1 Submittals

.1 Shop drawings sealed and signed by Engineer see 1.7.2.1.

.2 Shop drawings to be submitted to UBC records.

.3 Manufacturer performance test data to confirm performance criteria.

.4 Samples, including finishes for selection.

.2 Quality Assurance

.1 All structural performance requirements of this section including anchorage and fasteners to be designed and certified by a professional engineer registered in the Province of British Columbia, to also carry out periodic site reviews during construction and at completion, and submit reports and letters of assurances for professional design, field review and building code and project criteria compliance. Costs to be included in the contract price.

.2 Laboratory testing: Curtain wall manufacturer to provide as a minimum a certified copy of test report verifying compliance with the project specifications.

.3 Quality Control

.1 UBC will appoint and pay for an independent inspection agency to conduct field testing for water penetration, air leakage and pressure equalization.

.2 Initial field test at any given location shall be paid by UBC. Cost of re-testing to verify corrected work shall be paid by Contractor.
.3 Contractor is responsible to provide test chambers and ensure adequate power and water supply.

.4 Mock-up test procedures

.1 On major project, curtain wall subcontractor is required to arrange for a representative mock-up to be tested in an accredited lab. Test procedures to include the following:

.1 Preload, static pressure air infiltration, static pressure water infiltration, dynamic pressure water infiltration, structural service loads, inter-story drift test, inter-story vertical movement, condensation Resistance / thermal cycling, structural ultimate loads.

.5 Warranties

.1 5-Year.

2.0 MATERIALS

2.7 Prescriptive Requirements

.5 Components

.1 Preferred framing type shall be Kawneer 1600 UT (or equivalent).

.6 Door

.1 Refer to Section 08 41 13 Aluminum-Framed Entrance and Storefronts.

.7 Finishes

.1 Finishing products:

.2 Thermosetting enamel coating meeting the requirements of AAMA 603.8:

.3 Thermosetting fluopolymer two coat meeting the requirements of AAMA 605.2:

.4 Clear anodized coating, AAMA Class II.

.8 Execution

.1 Before installation

.2 At exterior locations, ensure that a peel and stick air barrier membrane (or equivalent) is installed to drain to exterior, over the entire perimeter of the opening over which the framing system is to be installed.

***END OF SECTION***
1.0 **GENERAL**

1.1 Related UBC Guidelines

.1 Section 07 00 10 Building Envelope – General Requirements
.2 Section 08 00 10 Openings – General Requirements

1.2 Co-ordination Requirements

.1 Coordinate design with Building Envelope Consultant.

1.3 Description

.1 Exterior Aluminum fixed and operable window framing system.

1.4 Performance Standards

.1 BC Building Code, including accessibility requirements.
.2 AAMA/WDMA/CSA 101/I.S.2/A440-08, NAFS—North American Fenestration Standard/Specification for windows, doors and skylights (NAFS-08)

1.5 Performance Requirements

.1 In addition to any other applicable codes, standards and project requirements, exterior systems to meet or exceed the following minimum requirements.

.2 Environmental Separation

.1 Products shall conform to Performance Class CW PG40 on the basis of prior testing. Required Water Penetration Test Pressure to be determined using CSA A440S1 methods and rounded up to nearest NAFS water penetration resistance test pressure, and specified in Pascals separately from Performance Grade. Air infiltration/exfiltration levels to be A3 for operable products and Fixed for non-operable products.

.2 Windows reachable from grade to have a forced entry resistance of ASTM F 588 Grade 20. This is greater than the minimum NAFS requirement of Grade 10.

.3 Window systems to incorporate a thermal break.

.3 Engineering Design

.1 Wind Loads: design assemblies to withstand local positive and negative wind pressures.
   .1 Minimum 25 psf (1.2 kPa) inward and 25 psf (1.2 kPa) outward acting normal to the plane of the wall.
   .2 As required to meet project structural design criteria.
   .3 As required to meet the requirement of BC Building Code.
   .4 Based on CAN3-S157 and allowable deflection of 1/175.

.2 Seismic design to meet all of the requirements for:
   .1 BC building code latest edition.
.3 System to provide for expansion and contraction within system components caused by a cycling temperature range of 100 degrees C over a 12 hour period without causing detrimental effect to system components.

.4 The system capable of withstanding a metal surface temperature range of 180° F (100° C) without buckling, failure of joint seals, undue stress on structural elements, damaging loads on fasteners, reduction of performance, stress on glass, or other detrimental effects.

.5 Assemblies to support design loads and accommodate structural deflection and long term creep movements and drift as shown on the Structural Drawings without stress on glass, buckling, failure of joint seals, undue stress on structural elements, damaging loads on fasteners, reduction of performance, or other detrimental effects caused by structural movement.

.6 The connection of the window framing to the structure of the building to be detailed in such a way that only horizontal and vertical forces are transmitted. No bending moments to be applied by the window to the structure or structural support.

.7 Fasteners
  .1 Exposed fasteners and anchors: aluminum, 300 series stainless steel, or nickel-plated brass.
  .2 Concealed fasteners and anchors: aluminum, cadmium plated steel, zinc plated steel, or stainless steel.
  .3 Concealed anchors: aluminum, or carbon steel painted after fabrication with zinc chromate or other primers not containing lead.

.4 Environmental
  .1 Service Life Expectancy: 50-Year for exterior, 25-Year for interiors

1.6 Quality Control and Assurance

.1 Submittals
  .1 Shop drawings (including all enclosure interface details) sealed and signed by Engineer see 1.6.2.1.
  .2 Manufacturer performance test data to confirm performance criteria.
  .3 Samples, including finishes for selection.
  .4 Maintenance Data
    .1 As-installed hardware.
    .2 Source for replacement parts.
    .3 Maintenance instructions.

.2 Quality Assurance
  .1 All structural performance requirements of this section including anchorage and fasteners to be designed and certified by a professional engineer registered in the province of British Columbia, to also carry out periodic site reviews during construction and at completion, and submit reports and letters of assurances for professional design, field review and building code and project criteria compliance. Costs to be included in the contract price.
.3 Quality Control
   .1 UBC will appoint and pay for an independent inspection agency to conduct field
testing for water penetration, air leakage and pressure equalization.
   .2 Initial field test at any given location shall be paid by UBC. Cost of re-testing to verify
corrected work shall be paid by Contractor.
   .3 Contractor is responsible to provide test chambers and ensure adequate power and
water supply.
   .4 Water testing to ASTM E.1105 and air leakage testing at NAFS test pressure.

2.0 MATERIALS
2.1 Prescriptive Requirements
   .1 Windows in Laboratory spaces to be open-able only with a controlled tool, for use only in the
   event of Mechanical System shut-down/failure.
   .2 Components
      .1 Preference shall be Kawneer "Isoport 516" or equivalent.
      .2 Where permitted by code fiberglass windows are permitted
      .3 Windows manufactured of PVC are not acceptable for academic uses.
   .3 Finishes
      .1 Finishing products (aluminum):
         .1 Thermosetting enamel coating meeting the requirements of AAMA 603.8:
         .2 Thermosetting fluopolymer two coat meeting the requirements of AAMA 605.2:
         .3 Clear anodized coating, AAMA Class II.
   .4 Execution
      .1 Before installation ensure that a waterproofed sill pan membrane (or equivalent) is
installed to drain to exterior, over the entire perimeter of the opening over which the
framing system is to be installed.

***END OF SECTION***
1.0 GENERAL

1.1 Related UBC Guidelines

.1 Division 26
.2 Division 28
.3 Section 08 00 10 Openings – General Requirements
.4 Section 28 05 00 Access Services: General Standards
.5 Section 28 13 00 Access Control

1.2 Coordination Requirements

.1 Electrical Consultant (EC)
.2 Architectural Hardware Consultant (AHC)
.3 UBC Information Technology (UBC IT)
.4 UBC Access Services (Locksmith Shop inclusive)
.5 Architectural Consultant (AC)
.6 UBC Building Operations Electrical Technical Support

1.3 Description

.1 Door hardware including electrified hardware.

1.4 Performance Standards

.1 CSA for Heavy Duty.
.2 All hardware to be Grade 1.

1.5 Design Requirements

.1 Buildings are to be designed with card access in general accordance with Sections 28 05 00 and 28 13 00. The design team must employ an Architectural Hardware Consultant (EHC) with a minimum of five (5) years of experience in the design of electrified hardware systems solutions.

.2 Access Services systems and hardware must be scalable for future changes and additions. Provide a design solution which meets the immediate project requirements and has the ability to meet the long term requirements in accordance with Sections 28 05 00 and 28 13 00.

.3 The access control design requirements are defined by the Technical Guidelines and the project specific requirements provided by UBC Access Services and the Project Manager, but the door hardware design and compatibility of function are the responsibility of the AC and the AHC.

.4 A package complete with a detailed Sequence of Operation for the electrified hardware, Riser Diagram, Point to Point Wiring Schematic and Plan depicting layout is to be provided by the AHC for acceptance by the Project Manager, UBC Locksmith Shop, UBC Access Services, UBC Building Operations Electrical Technical Support and Technical Services prior to finalizing the hardware schedule. This package shall include the function of the Access Control system, any fire alarm activated hardware, handicap access functions, tie in to the ventilation system etc.

.5 Exterior doors are subject to very high usage, inclement weather, wind driven rain, ice buildup, building air pressure, temperature fluctuations, and wind forces. The Designer must
ensure that all exterior door hardware is selected to accommodate these variable conditions and be corrosion resistant. The Designer is responsible to coordinate with the door suppliers that provide hardware with their doors to ensure that the factory supplied hardware is appropriate.

.6 Door numbering for the hardware schedules must be coordinated with the final design drawings to ensure that the final door hardware schedules match the architectural room and door numbering system. The coordination must be made early in the design process to ensure that UBC can program internal documentation for keys, access control, etc. that will match the record drawings.

.7 Door pivots are not acceptable.

.8 Avoid offset pulls due to maintenance problems resulting from torsion forces. If unavoidable, offset pulls must be through bolted.

.9 Keyed cylinder dogging is required on all panic devices unless prohibited by code.

.10 Keyed entry cylinders required on all doors equipped with Card Readers.

.11 Each building requires a Key and card Tube Deposit. (See 3. Materials below).

.12 No spring loaded hinges to be used.

.13 Kick plates are to be installed on all high use facilities.

.14 Where door closers are required by code surface mounted door closers shall be used.

1.6 Quality Control and Assurance

.1 Submittals

.1 Submit shop drawings to UBC Access Services (Locksmith Shop inclusive) for review. Hardware schedule to be in accordance with the DHI technical publication “Sequence and format for the hardware schedule”.

.2 Door schedule.

.3 The detailed keying schedule shall be completed by the owner.

.4 Sequence of Operation is to be submitted for review by UBC Access Services (Locksmith Shop inclusive).

.5 Testing and Commissioning schedule is required for all electrified hardware.

.6 As-Built drawings are required including the door hardware system wiring diagram, shop drawings of the electrified door hardware components, supplier and installer contact information, and warranty information for the installer and extended manufacturer warranties. This should be a dedicated section of the Architectural Building Operations Manual required at the time of building turnover to UBC Building Operations.

.7 Requests for product substitutions must be made to the UBC Project Manager prior to closing of the Contract tender submission for review by the AHC and UBC Building Operations.
.2 Quality Assurance
   .1 AHC to prepare detailed schedule of hardware and review for field compliance.
   .2 A hardware schedule to be prepared and hardware to be procured from a source of supply approved by the Consultant. Supplier to be a British Columbia distributor who is authorized by the manufacturer of the equipment. Supplier to employ one or more Architectural Hardware Consultants (AHC) who are in good standing with the Door and Hardware Institute (DHI) — the AHC must be responsible for the complete hardware subcontracts.

2.0 MATERIALS

2.1 Prescriptive Requirements
   .1 UBC Facilities require specific lock cylinders; which are currently Abloy.
   .2 Materials
      .1 Lock Cylinders
         .1 Abloy of Canada Cylinders – no substitutions allowed.
      .2 Hinges
         .1 Stanley/ Monthard/ Hager/ McKinney.
      .3 Pivots – (Not UBC preferred hardware).
         .1 Dorma.
         .2 Yale - Corbin (Rixson).
      .4 Door Stops, Swing Stops, and Holders
         .2 Install overhead stops, wall stops, or floor stops where required to prevent damage from door contacting a wall or another door; and provide controlled swing/stop.
      .5 Flush Bolts
         .1 Trimco/ Ives/ Glynn-Johnson/ Gallery/ Rockwood.
         .2 Automatic flush bolts are not to be used due to maintenance problems.
      .6 Mortise Locks and Trim
         .1 Corbin ML2000 series with LWA lever.
         .2 Schlage L9000 series with 03B lever.
         .3 Sargent 8200 series with LNJ lever.
      .7 Cylindrical Locks
         .1 Corbin CL3300 series
         .2 Schlage ND series with Vandlguard
         .3 Sargent 10 line
      .8 Push Button Code Locks
         .1 Schlage CO 100 x less cylinder x KP x 626
         .2 Sargent KP Series
.9 Alarm Locks
  .1 Stand alone systems: Detex EAX500 or Alarm Lock Pilfergard PG21
  .2 Panic Bar Style (must re-latch): Sargent, Von Duprin, Corbin, Alarm Lock, Detex

.10 Dead Bolt Locks
  .1 Mortise: Corbin DL4000 series, Sargent 4800 series, Schlage L600 series.
  .2 Cylindrical: ILCO 4514.25.1.04.04.5

.11 Magnetic Locks
  .1 Magnetic locks are not acceptable and should only be used when required by code.
  .2 Securitron M Series (if required)

.12 Exit Devices
  .1 Von Duprin 98XP and 99XP series, and 33A series.
  .2 Sargent 8000 series.
  .3 Corbin ED5000 series

.13 Door Closers
  .1 LCN 4040XP Series x 689 finish.
  .2 Sargent 351
  .3 Corbin 6200 / Norton 7700
  .4 Floor closers are "not" acceptable at UBC.

.14 Power Operators and Electrified Closers
  .1 LCN 4630/4640 Series - "Auto Equalizer" x 689 finish. No substitutions allowed.

.15 Push Plates, Pulls and Protective Plates
  .1 Trimco/CBH/Gallery.

.16 Thresholds and Weather-Stripping
  .1 Pemko/Crowder/Zero.

.17 Station Controls and Key Switches
  .1 Von Duprin/ LCN/ RCI/ Securitron
  .2 Camden CM-1030-7224 SPDT with red & green LED

.18 Power Supplies,
  .1 Use power supplies to match manufacturers’ equipment when required.
  .2 Power supplies require battery backup.
  .3 Locknetic / Folger-Adams, Securitron, Von Duprin, Yale / Corbin

.19 Electrified Strikes
  .1 HES/ RCI/ Von Duprin 6100 & 6200 series

.20 Transfer Hinges – 12 wire standard
  .1 McKinney with electro lynx, Stanley, Hager

.21 Hard Wired Electrified Locksets
  .1 Manufacturers: Schlage, Corbin, Sargent [Manufacturers are currently under review]
  .2 Integral magnetic position indicator.
  .3 Handle integrated request to exit function
.4 Integrated card / FOB reader (I-Class compatible)

.22 Wireless Electrictrified Locksets
   .1 [Manufacturers are currently under review]
   .2 Non-proprietary battery supply only
   .3 Minimum 50,000 cycles per battery supply
   .4 Hard-wired power source option preferred
   .5 Dedicated Wireless network hardware or encrypted Wi-Fi

.23 Electrified Exit Devices
   .1 Corbin / Sargent / Von Duprin (QEL series)
   .2 Electrified dogging required unless prohibited by code.

.24 Electrified Hold Open Devices
   .1 Simplex RSG series or Edwards 1500 series.
   .2 Install hold open devices for fire separation doors in corridors and other high use areas where occupants will likely use door stops to hold the doors open, thereby compromising the fire rating of the opening.

.25 Electrified Lock Boxes
   .1 ProxSafe flex key management system

.26 Electrified Hardware Communications Equipment Infrastructure
   .1 Supplied and installed by UBC Access Services.
   .2 Contractor to supply and install power, pathways, and cabling as indicated on the drawings.
   .3 Open source communication protocol only.

.27 Request to Exit Device
   .1 Supplied and installed by UBC Access Services where not integrated into the lockset.

.28 Card Strikes / FOB Readers
   .1 Supplied and installed by UBC Access Services where not integrated into the lockset.
   .2 Contractor to supply and install pathway installation only as indicated on drawings.
   .3 I-Class compatible

.29 Key and Card Tube Deposit Lockbox – Abloy # 6047 (See .6 "Execution", below...).
   .1 All new buildings to have a tube-shaped Fire Department lockbox installed so that the exterior surface of the lid is mounted flush with the exterior wall surface by the main address entrance.
   .2 Construction of key-deposit housing to be steel.
   .3 Construction of cylinder housing to be hardened steel.
   .4 Sleeve size to be: 180 mm long x 63 mm diameter or 7 inches long x 2.5 inches diameter.
   .5 Manufacturer to be Abloy Key and Card Tube Deposit Lockbox – Abloy # 6047.

.3 Electrified Hardware
   .1 Electrified hardware is an evolving technology which requires close coordination with Divisions 26 and 28. Please review Divisions 26 and 28 for further specifics regarding their respective components relating to electronic access equipment and standards.
.2 Division 28 includes diagrams showing “typical door installations”, the associated equipment, and a responsibility matrix indicating who is responsible for the various components of the installation. The Architectural Consultant must ensure that the tender documents clearly identify the contractors work, and what work will be performed by UBC Access Services.

.3 AHC is to coordinate with UBC Access Services to identify pathway installation requirements for their equipment installation.

.4 Standard Pressed Steel & Aluminum Frames: Through hole for Door Contact (DC) shall be 25mm (1”) diameter and 38mm (1 ½”) minimum depth. Through hole for Power Transfer Hinge (PTH) shall be 13mm (1/2”) in diameter and 38mm (1 ½”) minimum depth. Both DC and PTH holes shall allow for concealed, non-abrasive pathways clear of frame fill materials from said device to Div 16 pathways.

.5 Standard Metal, Aluminum & Wood Doors: Top of door shall be prepped as such to allow for UBC SA installation of 25 mm (1") wide by 38mm (1 ½") deep magnet assembly without affecting door rating. Pathway (wire chase) within the door for Electrified Hardware shall be 13mm (1/2”) cored hole and shall allow for concealed, non-abrasive pathway clear of door fill material, from the PTH to the electrified lockset device, without affecting the door rating. Wire chase shall allow for free and easy removal and reinstallation of cable without affecting door structure.

.4 Finishes

.1 Brushed stainless steel.

.5 Fabrication

.1 The hardware schedule to be submitted to the Project Manager for keying and hardware approval before ordering materials.

.2 A separate Keying Schedule to be submitted which indicates each lock/core, hardware heading and door number—allow sufficient type line spacing to allow the Owner (UBC) to insert keying information after each lock or cylinder.

.3 Final keyway selection and detailed keying will be determined between the Owner/User, Locksmith Shop, UBC Project Manager, and Abloy Canada Ltd.

.4 Permanent lock cylinders shall be keyed according to UBC requirements. Keying details shall be determined between the User, UBC Locksmith Shop and Abloy Canada Ltd.

2.2 Warranty Requirements

.1 Manufacturers’ warranties shall be from the date of occupancy by the owner.

.2 The following minimum warranty periods are required:

.1 Installation labour warranty: years from Substantial Performance to allow time for building occupant fit out, and occupant general use to identify defects.
.2 Door closers: 10 years.
.3 Exit Devices: 5 years.
.4 Mortise Locksets: 10 years.
.5 Cylindrical Locksets: 7 years.
.6 Power door operators: 2 years on electronics, 5 years on mechanical components.
.7 Electrified Locksets: 2 years on electronics, 5 years on mechanical components.
.8 Other electrified hardware components: 3 years.
.9 Other mechanical hardware: 5 years

3.0 EXECUTION

3.1 Prescriptive Requirements

.1 Only UBC Locksmith’s Shop shall install permanent cylinders to ensure precise coordination of lock cylinder locations with the User’s requirements.

.2 All locks and cylinders shall be supplied with temporary construction cylinders. The Contractor is to supply and install temporary construction cylinders complete with keys for all construction locks; until UBC Locksmiths’ Shop can supply and install permanent cylinders on the UBC key system. This will ensure that equipment and furniture is secured behind a locked door at all times.

.3 Temporary construction cylinders shall be returned to the distributor. If the Contractor has pre-ordered and supplied keyed-alike construction cylinders, the UBC Locksmiths’ Shop shall return construction cylinders to the Contractor at the time of the permanent cylinder installation.

.4 Fire Department Abloy Tube Lockboxes shall be cored into concrete, installed horizontally and epoxied into place. Consider also a free-standing externally-located square-faced concrete post, if there is no adequate location on the building.

.5 The Division 08 Subcontractor is responsible for the installation of all door hardware, electrified door hardware control panels, power supplies, low voltage cables, and low voltage raceways. The Division 08 subcontractor is also responsible for all 110 volt supply raceways, wiring, and dedicated circuit breakers unless they are specifically indicated on the electrical design drawings as being done by Division 26 (example: power supply required as part of a design build electrified door hardware system installation).

.6 All electrified openings must have a dedicated power supply circuit, and the circuit number shall be identified on the door hardware power supply and as-built drawings.

3.2 Turnover

.1 Provide formal and proper training to UBC Access Services (Locksmith Shop inclusive) staff for the new equipment provided including: sequence of operation, troubleshooting, maintenance manual review, preventative maintenance requirements, and critical parts list.

.2 Provide a commissioning certificate for the purpose of identifying the start of the warranty period.

.3 Provide details of the Manufacturer’s extended warranties.

.4 Provide As-Built drawings for all electrified door hardware and shop drawings / cut sheets for all equipment and sensors that have been installed.

***END OF SECTION***
1.0 GENERAL

1.1 Related UBC Guidelines

.1 Section 07 00 10 Building Envelope – General Requirements
.2 Section 08 00 10 Openings – General Requirements

1.2 Co-ordination Requirements

.1 Coordinate design with Building Envelope Consultant.

1.3 Description

.1 Glass and Glazing.

1.4 Performance Standards

.1 MNECB Model National Energy Code for Buildings, typically using values for "Natural Gas".
.2 ANSI/ASHRAE 90.1.
.3 CAN/CGSB-12 Series Standards: glass types; performance.
.4 CAN/CGSB-12.20: Structural Design for Buildings.
.5 IGMAC Insulating Glass Manufacturers of Canada guidelines.
.8 British Columbia Energy Efficiency Act.

1.5 Quality Control and Assurance

1.1 Submittals

.1 Shop drawings sealed and signed by Engineer see 1.5.3.3.
.2 Samples if other than clear glass.
.3 Performance data.
.4 Maintenance and cleaning procedures.

1.2 Quality Assurance

.1 Work shall be performed by a qualified glazing contractor with minimum five (5) years experience, with adequate facilities and skilled personnel suitable for this work.

1.3 Quality Control

.1 Drawings indicate minimum thicknesses and requirements.

.2 Final thickness, safety glazing, heat strengthening, and other performance requirements to meet Code and Standards, Project Criteria, and required structural performance are the responsibility of the Contractor based on location and intended use.

.3 Structural performance requirements of exterior glazing, as well as that for exterior and interior Structural Glazing including anchorage and fasteners, to be designed and certified by a Professional Engineer registered in the Province of British Columbia, who is to also carry out periodic site reviews during construction and at completion, and submit reports and Letters of Assurances for Professional Design, Field Review and Building Code and Project Criteria Compliance.
.4 Provide guard redundancy when designing full height glazing.

.5 Costs to be included in the contract price.

.4 Warranties
   .1 10-Year for sealed units.

2.0 MATERIALS

2.1 Materials
   .1 Locally produced materials should be used whenever possible.
   .2 Manufacturer of IGU, must be IGMA certified.
   .3 Glass spacer type: thermally improved as required to meet specified energy performance
      requirements. Non-thermally broken aluminum spacers shall not be used.
   .4 Installation of glazing to conform with IGMA TM-3000-90, TB-3001 and TM-1300
   .5 List allowable glass types with applications (no tempered glass on buildings except where
      required to be safety glass in doors and sidelights):
         .1 Exterior glazing, simple building form and small units – Annealed or Heat Strengthened
            Glass.
         .2 Exterior glazing, complex building or solar shades or reflective glass or large units - Heat
            Strengthened Glass to reduce risk of breakage due to thermal stress.
         .3 Exterior glazing, all buildings- low e on surface 2.
         .4 Exterior glazing- appropriate bird friendly design including glass fritting or film application
         .5 Spandrel glass - Heat Strengthened Glass.
         .6 Handrail, skylight, canopy and overhead glass – Heat strengthened laminated (minimum
            PVB interlayer 1.5mm).
         .7 Safety glass in doors and sidelights: tempered.
         .8 Safety glass in fire rated doors and sidelights: non-wired fire rated glass (non-wired).
         .9 Clearstory and atrium vertical glazing over occupied space: heat strengthened laminated
            glass with a minimum 1.5 mm PVB interlayer.
         .10 Heat soak testing required to reduce nickel sulphide impurities.

2.2 Components
   .1 Exterior glazing minimum shall be insulated sealed double glazing units. Component design
      to maximize energy performance as established by the Project Criteria, including orientation
      and expected functional use of space in which glazing occurs.
   .2 Use wired glass only where required for fire rating.

2.3 Finishes
   .1 Any staining of glass or other surfaces by alkaline materials is cause for rejection.

2.4 Replacement Glass
   .1 Consideration to be given to the availability of replacement glass.
2.5 Glass Cleaning Access

.1 Consideration to be given to access for glass cleaning including the structural capacity of floors to support appropriate man-lifts and/or the use of monorail systems.

***END OF SECTION***