

1.0 **GENERAL**

1.1 **Related Work and UBC Guidelines**

- .1 Division 03 and relevant TG sections therein
- .2 Division 04 and relevant TG sections therein
- .3 Division 06 and relevant TG sections therein
- .4 Division 07 and relevant TG sections therein
- .5 Section 08 and relevant TG sections therein
- .6 Division 09 and relevant sections therein
- .7 Divisions 20, 22, 23, 25, 26, 27 and 28
- .8 UBC LEED Implementation Guide
- .9 UBC Energy Modelling Guidelines
- .10 Owner's Project Requirements
- .11 UBC Bird-Friendly Design Guidelines
- .12 UBC Resilience-Based Design Guide for Nonstructural Systems

1.2 **Related External Documents**

1. Latest edition of the British Columbia Building Code (BCBC).
2. CAN/CSA-A440.2-09/A440.3-09 - Fenestration energy performance/User guide to CSA A440.2-09, Fenestration energy performance.
3. CAN/CSA-A440.4 "Window and Door Installation"

1.3 **Description**

1. General design and performance requirements for doors, windows and curtainwall systems.

1.4 **Coordination**

1. In instances where conflicts are found between these guidelines and provincial regulations or codes, please notify the UBCV Technical Review Team Architect or UBCO Facilities Management.
2. These guidelines are intended to be read by design consultants and their content integrated into construction drawings and specifications. Construction documents are not to reference the technical guidelines directly.
3. The Coordinating Registered Professional (CRP) is required to coordinate these requirements with other disciplines.
4. Input from a Building Envelope (BE) consultant is required in the design development process. The BE consultant is to review all BE details, and review comments are to be incorporated prior to tender and Building Permit issuances.
5. Input from the structural consultant is required during the design process. The structural consultant is to review and provide all base building structural requirements.
6. Provide window, curtain wall and door hardware schedules for review by UBC Access and Security and Locksmith Shop prior to tender and Building Permit.

1.5 **Submittals**

- .1 Refer to specific submittal requirements in sections 08 11 00 Metal Doors and Frames, 08 41 13 aluminum-Framed Entrances and Storefronts, 08 44 13 Glazed aluminum Curtain Walls and 08 50 00 Windows.

2.0 **DESIGN AND PERFORMANCE REQUIREMENTS**

2.1 **Design Requirements – Windows and Curtain Wall Systems**

- .1 All seals between frame and glazing to be made with compressed gaskets.
- .2 Frames to be glazed with internal or external removable stops or using tamper proof fasteners where security is required. Glazing to be designed to enable glass replacement without deconstruction of adjoining assemblies.

- .3 Window and curtain wall installations need to accommodate building movements including inter-storey drift during seismic loading.
- .4 Sound transmission ratings for windows to be selected based upon Acoustical Report where available for a project. For learning spaces acoustical requirements, refer to Section 10 00 10 Special Room Requirements.
- .5 While operable windows are encouraged, operable windows are not to be provided in laboratories or spaces where pressure differentials need to be maintained. This will allow negative pressures to be maintained relative to adjacent spaces and to prevent draft conditions.
- .6 Windows in laboratory spaces to be openable only with a controlled tool, for use only in the event of a mechanical system shut-down/failure.
- .7 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. Proprietary hardware should not be provided.
- .8 Frames need to be supplied with receiving surfaces for sealing to air and vapour barrier materials, insulation, and cladding of exterior wall assemblies.
- .9 Coordinate fritting requirements with the UBC Brid-friendly Design Guidelines. Frit placement within insulated glazed units should not conflict with the low-e coating location as per Section 08 80 00 Glazing.
- .10 Make provision for window washing on the exterior with the use of a genie lift or boom lift. Coordinate sidewalk width, manlift and other smaller vehicular loading requirements on sidewalks with the civil engineer, after consultation with the UBCV Technical Review Team Architect or UBCO Facilities Management.

2.2 Design Requirements – Doors

This Section applies to doors in Sections 08 11 00 Metal Doors and Frames, 08 41 13 Aluminum-Framed Entrances and Storefronts and 08 44 13 Glazed Aluminum Curtain Walls.

- .1 Water tightness rating for exterior exposed doors to be selected based upon exposure to elements related to location on the facade and site conditions per AAMA/WDMS/CSA 101/I.S.2/ A440-17.
- .2 Maximum exterior and interior door height to be 2,134 mm (7'-0"). Door above this height will require a variance.
- .3 Exterior doors:
 - .1 Install all exterior doors not able to meet required water tightness performance in protected locations 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 Where fire-rated doors are required, use hollow metal, thermally broken doors. At other locations, it is acceptable to use wide stile thermally broken aluminum doors or fiberglass doors with pressed metal frames.
- .6 All doors with glazed assemblies (floor to door height or floor to ceiling height) to be tempered glass.
- .7 Where panels of vision or opaque glass is located in a required fire separation, use fire-rated safety glass such as Firelite, not wired glass.
- .8 Use of floor checks, pivots, concealed closers and/or concealed panic devices is not permitted. Coordinate with Section 08 71 00 Door Hardware.
- .9 Glazed doors must have stiles and rails. Refer to Section 08 11 00 Metal Doors and Frames.
- .10 Frameless glass doors are not recommended for use. Maintenance considerations are to be evaluated when proposing the use of frameless glass doors.
- .11 Service room door swings should be as noted in Sections 10 00 10 Special Room Requirements, 20 00 05 Mechanical – General Requirements and 27 05 05 Communications Rooms Design Guidelines. Acoustic seal to be provided for doors to these rooms.
- .12 Any exterior or interior vestibule doors that swing over walk-off mats must have sufficient clearance underneath to clear the mats without having to make special provisions in the mats such as cutaways.
- .13 Door sub sill pans need to be integrated with terminations of roofing membranes.
- .14 Check roof overflow scuppers for height relative to door sills at roof level. Overflow scuppers should be below door threshold waterproofing height.
- .15 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.

2.3 Performance Requirements

- 1. Refer to individual sections in Division 8.

3.0 MATERIALS

- 1. Refer to individual sections in Division 8.

*****END OF SECTION*****

1.0 **GENERAL**

1.1 **Related Work and UBC Guidelines**

- .1 Section 03 33 00 Architectural Concrete
- .2 Section 07 00 10 Building Envelope – General Requirements
- .3 Section 07 25 00 Weather Barriers
- .4 Section 07 40 00 Cladding
- .5 Section 08 00 10 Openings – General Requirements
- .6 Section 09 90 00 Painting and Coating
- .7 Divisions 26 and 28
- .8 Section 27 05 05 Communication Rooms Design Guidelines

1.2 **Related External Documents**

1. Latest edition of the British Columbia Building Code (BCBC), 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.

1.3 **Description**

1. Section includes hollow metal doors (HMD), insulated metal doors (IMD) and pressed steel frames (PSF).

1.4 **Coordination**

1. The Guidelines apply to all work completed within buildings on both the UBC Vancouver and UBC Okanagan campuses unless stated otherwise.
2. In instances where conflicts are found between these guidelines and provincial regulations or codes, please notify the UBCV Technical Review Team Architect or UBCO Facilities Management.
3. These guidelines are intended to be read by design consultants and their content integrated into construction drawings and specifications. Construction documents are not to reference the technical guidelines directly.
4. The Coordinating Registered Professional (CRP) is required to coordinate these requirements with other disciplines.
5. Provide door and door hardware schedules for review by UBC Access and Security and Locksmith Shop prior to tender and Building Permit.
6. Genie or manlift access requirements will need to be coordinated if only providing single exterior doors due to security reasons. Review with UBC Access and Security.

1.5 **Submittals**

1. Design phase:
 - .1 Submit required documents to consultants in accordance with Section 013300 Submittal Procedures
 - .2 For Construction Office projects only, provide paint colour samples for review.
2. Handover – O&M submittals:
 - .1 Provide final reviewed door shop drawings and colour specifications for painted doors.
 - .2 Provide door hardware list and location.
 - .3 Provide manufacturer installation instructions and test data, for fire rated doors.

2.0 DESIGN AND PERFORMANCE REQUIREMENTS

2.1 Design Requirements

- .1 Standard and minimum door size shall be 915 mm wide x 2,134 mm high x 44 mm thick (3'-0" x 7'-0" x 1 3/4").
- .2 Maximum door height: 2,134 mm (7'-0"). A variance will need to be granted for over-height doors.
- .3 All materials should be shop fabricated and finished, with no field cutting of materials allowed.
- .4 Glazed doors must have stiles and rails. No glazed doors with only top and bottom rails or patch hardware. Stile width of glazed doors shall be 127 mm (5") x 45mm (1 3/4") minimum to accept surface-mounted panic hardware and mortise locksets.
- .5 Doors must have mid-rails if equipped with panic hardware and exit devices.
- .6 Avoid exterior double doors where security is a requirement. Exterior exit doors with panic hardware or 'pass out' locksets must be singles with in their own frames.
- .7 Provide lockable removable mullions at double doors where extra width is required such as for genie or manlift access into the interior, moving equipment and supplies, etc.
- .8 [Where](#) single entrance doors [are ganged together](#), in such instances, ensure width of doors can accommodate the passage of a genie or manlift access into the interior, moving equipment and supplies, etc.
- .9 Frames to be fully-welded. A variance will need to be granted for knock-down frames.
- .10 For security reasons from within a building, provide for EXIT alarms on certain Exit-Only doors.
- .11 Provide electrical pathways to mid hinge, strike and header of frames for future electrification of openings. Must include pull string to each pathway
- .12 Provide back boxes for electrical wire or conduits.
- .13 [Standard procedures to be followed for concealed door frames within the drywall assembly such as EzyJamb door frames are as follows:](#)
 - .1 [Concealed door frames shall not be used for exterior doors.](#)
 - .2 [As cracks develop quite often on drywall assembly over the door frames, use concealed door frames for rooms that do not require frequent usage. Since wear and tear on the drywall installation is minimized, this in turn reduces cracking.](#)
 - .3 [Door type and height should be considered when considering the use of concealed door frames. Follow manufacturer's installation requirements for jamb installation, fastening and hinge type.](#)

2.2 Performance Requirements

- .1 Doors shall be designed to have a 25-year service life.

3.0 MATERIALS

3.1 Product Selection

- .1 Interior Doors: [shall be](#) 18 gauge (1.2 mm), galv. to ZF075 wiped zinc coating, honeycomb structural core.
- .2 Exterior Doors: shall be 18 gauge ([1.2 mm](#)), galv. to Z275 (G90) zinc coating, insulated polyurethane insulation core.
- .3 Interior Frames: shall be 16 gauge ([1.6 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.
- .5 Finishes: All new doors scheduled to be painted are to be hollow metal. Finish paint coat must be applied before final hardware install.

END OF SECTION

1.0 **GENERAL**

1.1 **Related Work and UBC Guidelines**

- .1 Section 08 11 00 Metal Doors and Frames
- .2 Section 08 71 00 Door Hardware
- .3 Section 09 21 16 Gypsum Board Assemblies
- .4 Divisions 26 and 28
- .5 Section 27 05 05 Communication Rooms Design Guidelines

1.2 **Related External Documents**

1. Latest edition of the British Columbia Building Code (BCBC), including accessibility requirements.
2. CAN/CSA-0132.2 Wood Doors.
3. CAN 3-0188.1 Particle Cores.
4. WDMA I.S.6A-13 - Industry Standard for Interior Architectural Stile and Rail Doors.
5. NFPA 80 for installation of fire-rated doors and frames.

1.3 **Description**

1. Work includes interior wood doors.

1.4 **Coordination**

1. The Guidelines apply to all work completed within buildings on both UBC Vancouver and UBC Okanagan campuses unless stated otherwise.
2. In instances where conflicts are found between these guidelines and provincial regulations or codes, please notify the UBCV Technical Review Team Architect or UBCO Facilities Management.
3. These guidelines are intended to be read by design consultants and their content integrated into construction drawings and specifications. Construction documents are not to reference the technical guidelines directly.
4. The Coordinating Registered Professional (CRP) is required to coordinate these requirements with other disciplines.
5. This section applies to interior wood doors only. Exterior wood doors are not allowed on UBC's campuses.
6. Provide door and door hardware schedules for review by UBC Access and Security and Locksmith Shop at the Construction Documents phase, prior to tender and Building Permit.
7. If only providing single doors into learning spaces, CRP to coordinate manlift/genie lift access requirements with the Facilities Technical Review team.

1.5 **Submittals**

1. Design phase:
 - .1 Submit required documents to consultants in accordance with Section 013300 Submittal Procedures
 - .2 For Construction Office projects only, provide a list of all proposed materials for review and color samples for selection plus final approval. Submit 8"x12" top corner sample of each type of door proposed for acceptance of construction and veneer.
2. Handover – O&M submittals:
 - .1 Provide a list of installed door types and color samples.
 - .2 Provide final reviewed shop drawings.
 - .3 Provide manufacturer installation instructions and test data, for fire rated doors.

1.2 **Quality Control and Assurance**

- .1 Quality Assurance
 - .1 Comply with WDMA I.S.6A-13 - Industry Standard for Interior Architectural Stile and Rail Doors.
- .2 Quality Control
 - .1 CRP to ensure function and performance are clearly defined based on use.

2.0 DESIGN AND PERFORMANCE REQUIREMENTS

2.1 Design Requirements

- .1 Standard and minimum door size: 915 mm wide x 2,134 mm high x 44 mm thick (3'-0" x 7'-0" x 1 ¾").
- .2 Maximum door height: 2,134 mm (7'-0"). A variance will need to be granted for over-height doors.
- .3 All doors to be solid core.
- .4 Wood door with a mineral core are only acceptable for use where an interior fire-rated door is required.
- .5 Provide solid wood backing for all hardware installation.
- .6 Seal hinge gains, top and bottom of doors before installation.
- .7 Glazed doors shall have stile width of 127 mm (5") minimum for hardware installation.
- .8 Avoid adhesives, preservatives, hardeners, and synthesizing agents and finish coatings that contain formaldehyde and high V.O.C. content.
- .9 Where lightweight interior doors are required, fiberglass doors may be used. Doors are to have a minimum exterior wall thickness of 2 mm, and to have a structurally solid and integrated frame.

2.2 Performance Requirements

- .1 Performance duty level to be as per current edition of the North American architectural Woodwork Standards (NAAWS). Architect to ensure the appropriate duty level is specified for the intended usage.

3.0 MATERIALS

3.1 Product Selection

- .1 Endangered wood species must not be used in the manufacturing of wood doors.
Acceptable species:
 - .1 Veneer shall be Birch, Oak, or Maple.
 - .2 Trim shall be Birch, Oak or maple.

END OF SECTION

1.0 **GENERAL**

1.1 **Related Work and UBC Guidelines**

- .1 Section 07 00 10 Building Envelope – General Requirements
- .2 Section 07 25 00 Weather Barriers
- .3 Section 07 40 00 Cladding
- .4 Section 08 00 10 Openings – General Requirements
- .5 Section 08 44 13 Glazed Aluminum Curtain Wall
- .6 Section 08 80 00 Glazing
- .7 Divisions 26, 27 and 28
- .8 UBC LEED Implementation Guide
- .9 UBC Energy Modelling Guidelines
- .10 Owner's Project Requirements
- .11 UBC Resilience-Based Design Guide for Nonstructural Systems

1.2 **Related External Documents**

1. Latest edition of the British Columbia Building Code (BCBC) including accessibility requirements.
2. CAN/CSA-A440.2 "Fenestration Energy Performance"
3. CAN/CSA-A440.4 "Window and Door Installation".
4. NFRC 100 "Procedure for Determining Fenestration Product U-Factors"
5. AAMA 501 "Methods for Tests for Exterior Walls"
6. ASTM E283, "Test Method for Rate of Air Leakage through Exterior Windows, Curtain Walls and Doors."
7. ASTM E330, "Structural Performance of Exterior Windows, Curtain walls and Doors by Uniform Static Air Pressure Difference."
8. ASTM E331, "Test Method for Water Penetration of Exterior Windows, Curtain Walls and Doors by Uniform Static Air Pressure Differential."
9. ASTM-E1105 "Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Curtain Walls and Doors by Uniform or Cyclic Static Air Pressure Difference."

1.3 **Description**

1. Section includes exterior aluminum storefront framing systems and entrance doors.
2. Only use storefront in protected areas under overhangs or canopies or in the interior. In all other exterior locations, a curtain wall system is required.

1.4 **Coordination**

1. The Guidelines apply to all work completed within buildings on both UBC Vancouver and UBC Okanagan campuses unless stated otherwise.
2. In instances where conflicts are found between these guidelines and provincial regulations or codes, please notify the UBCV Technical Review Team Architect or UBCO Facilities Management.
3. These guidelines are intended to be read by design consultants and their content integrated into construction drawings and specifications. Construction documents are not to reference the technical guidelines directly.
4. The Coordinating Registered Professional (CRP) is required to coordinate these requirements with other disciplines, including:
 - .1 Building Envelope Consultant.
 - .2 Code Consultant.
 - .3 Structural Consultant
 - .4 Energy Modeler

1.5 Submittals

- .1 Submit required documents to consultants in accordance with Section 013300 Submittal Procedures
- .2 O&M Submittals
 - .1 Manufacturers Safety Data sheet (MSD) for all toxic or potentially toxic materials.
 - .2 Environmental Product Declaration (EPD)
 - .3 .
- .3 Shop drawings (including all enclosure interface details) sealed and signed by a professional engineer registered in the Province of BC.
- .4 Manufacturer performance test data to confirm performance criteria.
- .5 Maintenance Data
 - .1 As-installed hardware.
 - .2 Source for replacement parts.
 - .3 Maintenance instructions
- .6 Warranties as per 1.6.3.

1.6 Quality Control and Assurance

- .1 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 and Letters of Assurance.
 - .2 Costs to be included in the contract price.
- .2 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 where required.
 - .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.
 - .5 When entrance system is in well protected locations, water testing is not necessary.
- .3 Warranties
 - .1 Manufacturer shall review, verify and provide written acceptance to verify compliance for installation and provide warranty as follows:
 - .2 2-year parts and labour warranty.
 - .3 5-year water penetration.
 - .4 10-year insulated glazing unit (IGU or sealed unit) warranty

2.0 DESIGN AND PERFORMANCE REQUIREMENTS

2.1 Design Requirements

- .1 Due to extensive failures of face-sealed storefront glazing on exposed walls of many of UBC's recent projects, storefront glazing will be used for interior applications only. Self-draining curtain wall systems shall be selected for installation within exterior walls.
- .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. Pass test at minimum 500 Pa.
 - .2 Glazing as part of curtain-wall system to conform to NAFS, including the following ratings:
 - .1 Water Tightness: Pass minimum 500 Pa test pressure

- .2 Air Infiltration: Air infiltration/exfiltration levels to be A3 for operable products 0.5 L/sm² and fixed 0.2 L/sm² at 75Pa.
- .2 The overall thermal transmittance of fenestration and doors shall be determined for the reference sizes listed in accordance with:
 - .1 CSAA440.2/A440.3, "Fenestration energy performance/User guide to CSA A440.2:19, Fenestration energy performance
 - .2 NFRC100, "Procedure for Determining Fenestration Product U-factors.
 - .3 The minimum overall thermal transmittance U-Factor shall be 1.9 W/m²K
 - .4 Wind Load Resistance shall meet ASTM E330
 - .5 Resistance to Forced Entry shall be F20 (windows reachable from grade).
 - .6 Hardware to include multi-point locking with centre locking handle.
- .3 System to utilize exterior rain screen deterrents, interior air seal barriers, and pressure-equalized cavities to minimize water infiltration into the internal areas of the system, while providing moisture control and drainage to the exterior.
- .4 Structural Design:
 - .1 Curtain wall assemblies to support design loads and accommodate structural deflection, long term creep movements and drift as shown on the structural drawings without stress on glass or reduction in performance, or other detrimental effects caused by structural movement.
 - .5 Operable windows which are within 3.6 m (12') from grade to meet ASTM F 588 Grade 20 minimum for forced entry resistance.
 - .6 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.
 - .7 Fasteners
 - .1 Exposed fasteners and anchors: aluminum, 300 series stainless steel,
 - .2 Concealed fasteners and anchors: aluminum, or 300 series stainless steel.
 - .3 Concealed anchors: aluminum, or carbon steel painted after fabrication with zinc chromate or other primers not containing lead.
 - .8 Use of floor checks, pivots, concealed closers, in-floor power operators and/or concealed exit devices is not permitted.
 - .9 Install overhead stops, wall stops, or floor stops where required to prevent damage from door contacting wall, another door, and provide controlled swing/stop.

2.2 Performance Requirements

- .1 Life Expectancy: 25-Year for exterior installations, 25-Year for interior installations.
- .2 For security reasons from within a building, EXIT alarms may be required on certain Exit-Only doors.

3.0 MATERIALS

3.1 Product Selection

- .1 Preferred Systems:
 - .1 Framing shall be Kawneer 1600UT curtain wall or Kawneer AA 6400 -refer to sections 08 44 13 and 08 50 00
 - .2 Kawneer 451 storefront section approved equivalent is acceptable when not used for environmental separation of the building envelope.
 - .3 Doors: Kawneer 350T/ 500T Insulpour medium/ wide stile (or equivalent), maximum height 2,134 mm (7'-0"), maximum width 1,220 mm (4'-0").

3.2 Finishes

- .1 Finishing products:
 - .1 Light and Neutral Colours: Thermosetting fluropolymer two coat meeting the requirements of AAMA 2604.
 - .2 Dark Exterior colours: Thermosetting enamel coating or thermosetting fluoropolymer two coat meeting the requirements of AAMA 2605.
 - .3 Clear anodized coating to conform to AAMA Class II.
 - .4 Champagne, bronze or black coloured anodized coating to conform to AAMA Class I.

*****END OF SECTION*****

1.0 **GENERAL**

1.1 **Related Work and UBC Guidelines**

- .1 Section 07 00 10 Building Envelope – General Requirements
- .2 Section 07 25 00 Weather Barriers
- .3 Section 07 40 00 Cladding
- .4 Section 08 00 10 Openings – General Requirements
- .5 Section 084433 Sloped Curtain Wall Glazing
- .6 Section 08 80 00 Glazing
- .7 Division 28 for Access and Security requirements
- .8 UBC LEED Implementation Guide
- .9 UBC Energy Modelling Guidelines
- .10 Owner's Project Requirements
- .11 UBC Resilience-Based Design Guide for Nonstructural Systems

1.2 **Related External Documents**

1. Latest edition of the British Columbia Building Code (BCBC) including accessibility requirements.
2. CAN/CSA-A440.2 "Fenestration Energy Performance"
3. CAN/CSA-A440.4 "Window and Door Installation".
4. AAMA/ WDMA/ CSA 101/ I.S.2/ A440-17.
5. NFRC 100 "Procedure for Determining Fenestration Product U-Factors"
6. AAMA 501 "Methods for Tests for Exterior Walls"
7. ASTM E283, "Test Method for Rate of Air Leakage through Exterior Windows, Curtain Walls and Doors."
8. ASTM E330, "Structural Performance of Exterior Windows, Curtain walls and Doors by Uniform Static Air Pressure Difference."
9. ASTM E331, "Test Method for Water Penetration of Exterior Windows, Curtain Walls and Doors by Uniform Static Air Pressure Differential."
10. ASTM-E1105 "Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Curtain Walls and Doors by Uniform or Cyclic Static Air Pressure Difference."

1.3 **Description**

1. Work includes exterior aluminum curtain wall framing system complete with doors and windows within the system.

1.4 **Coordination**

1. The Guidelines apply to all work completed within buildings on both UBC Vancouver and UBC Okanagan campuses unless stated otherwise.
2. In instances where conflicts are found between these guidelines and provincial regulations or codes, please notify the UBCV Technical Review Team Architect or UBCO Facilities Management.
3. These guidelines are intended to be read by design consultants and their content integrated into construction drawings and specifications. Construction documents are not to reference the technical guidelines directly.
4. The Coordinating Registered Professional (CRP) is required to coordinate these requirements with other disciplines, including:
 1. Building Envelope Consultant.
 2. Code Consultant.
 3. Structural Consultant
 4. Energy Modeler

1.5 **Submittals**

- .1 Submit required documents to consultants in accordance with Section 013300 Submittal Procedures

- .2 O&M Submittals
 - 1. Manufacturers Safety Data sheet (MSD) for all toxic or potentially toxic materials.
 - 2. Environmental Product Declaration (EPD)
- .3 Shop drawings (*including all enclosure interface details*) sealed and signed by a professional Engineer registered in the Province of British Columbia.
- .4 Manufacturer performance test data to confirm performance criteria.
- .5 Maintenance Data
 - 1. As-installed hardware.
 - 2. Source for replacement parts.
 - 3. Maintenance instructions
- .6 Warranty information as per 1.6.5.

1.6 Quality Control and Assurance

- .1 Installer Qualifications: Installer must have successfully installed the same or similar systems required for the project and other projects of similar size and scope.
- .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 and to provide a Letter of Assurance. 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.
 - .2 Initial field test at any given location shall be paid by UBC. Number of test locations to be confirmed by the project design team and 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.
- .4 Mock-up test procedures
 - .1 On major new projects and renewals utilizing a customized curtain wall system curtain wall subcontractor is required to arrange for a representative performance mock-up (PMU) 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 Manufacturer shall review, verify and provide written acceptance to verify compliance for installation and provide warranty as follows:
 - .2 2-year parts and labour warranty.
 - .3 5-year water penetration.
 - .4 10-year sealed unit warranty

2.0 DESIGN AND PERFORMANCE REQUIREMENTS

2.1 Design Requirements – Vertical Curtain Wall System

- .1 Requirements are applicable to exterior aluminum curtain wall type framing system including doors and windows within the system.
- .2 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.

- .3 In addition to any other applicable codes, standards and project requirements, exterior systems to meet or exceed the following minimum requirements:
 - .1 Environmental Separation
 - .1 Rating for windows to be selected based upon exposure to elements related to location on the façade and site conditions. Use the CSA A440 S1 Canadian supplement to AAMA/WDMA/CSA 101/I.S.2/ A440. Pass test at minimum 500 Pa.
 - .2 Glazing as part of curtain-wall system to conform to the following ratings:
 - .1 Water Tightness: Pass minimum 500 Pa test pressure
 - .2 Air Infiltration: Air infiltration/exfiltration levels to be A3 for operable products 0.5 L/sm² and fixed 0.2 L/sm² at 75Pa.
 - .2 The overall thermal transmittance of fenestration and doors shall be determined for the reference sizes listed in accordance with:
 - .1 CSAA440.2/A440.3, "Fenestration energy performance/User guide to CSA A440.2:19, Fenestration energy performance
 - .2 NFRC100, "Procedure for Determining Fenestration Product U-factors.
 - .3 The minimum overall thermal transmittance U-Factor shall be 1.9 W/m²K
 - .4 Wind Load Resistance shall meet ASTM E330.
 - .5 Resistance to Forced Entry shall be F20 (windows reachable from grade).
 - .6 Hardware to include multi-point locking with centre locking handle
 - .2 Engineering Design
 - .2 Wind Loads: Assemblies shall be reinforced where required, capable of withstanding local positive and negative wind pressures.
 - .3 Minimum 25 psf (1.2 kPa) inward and 25 psf (1.2 kPa) outward acting normal to the plane of the wall.
 - .4 Based on CAN3-S157 and allowable deflection of 1/175.
 - .3 Systems to utilize exterior rain screen deterrents, interior air seal barriers, and pressure-equalized cavities to minimize water infiltration into the internal areas of the system, while providing moisture control and drainage to the exterior.
 - .4 Curtain wall assemblies to support design loads and accommodate structural deflection, long term creep movements and drift as shown on the structural drawings without stress on glass or reduction in performance, or other detrimental effects caused by structural movement.
 - .5 Operable windows which are within 3.6 m (12') from grade to meet ASTM F 588 Grade 20 minimum for forced entry resistance.
 - .6 Fasteners:
 - .2 Exposed fasteners and anchors: aluminum, 300 series stainless steel, or nickel-plated brass.
 - .3 Concealed fasteners and anchors: aluminum, cadmium plated steel, zinc plated steel, or stainless steel.
 - .4 Concealed anchors: aluminum, or carbon steel painted after fabrication with zinc chromate or other primers not containing lead.
 - .7 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.
 - .8 [Window actuator systems shall not be tied to the fire alarm system as per TG section 28 31 00.](#)

2.2 Performance Requirements

- .1 Service Life Expectancy: 25-years.
- .2 For security reasons from within a building, EXIT alarms may be required on certain Exit-Only doors.

3.0 **MATERIALS**

3.1 **Product Selection**

- .1 Components
 - .1 Kawneer 1600 UT
Or equivalent as approved by consultant. Provide a variance request for review and approval if proposing an equivalent. The variance request should note all design and performance evaluations made.
- .2 Door
 - .1 Refer to Section 08 41 13 Aluminum-Framed Entrance and Storefronts.
- .3 Operable Vents
 - .1 Kawneer Glassvent UT
Or equivalent as approved by consultant. Provide a variance request for review and approval if proposing an equivalent. The variance request should note all design and performance evaluations made.
- .4 Finishes
 - .1 Finishing products:
 - .2 Light and Neutral Colours: Thermosetting fluoropolymer two coat meeting the requirements of AAMA 2604.
 - .3 Dark Exterior Colours: Thermosetting enamel coating or thermosetting fluoropolymer two coat meeting the requirements of AAMA 2605.
 - .4 Clear anodized coating, AAMA Class II.
 - .5 Champagne, bronze or black coloured anodized coating to conform to AAMA Class I

END OF SECTION

1.0 **GENERAL**

1.1 **Related Work and UBC Guidelines**

- .1 Section 07 00 10 Building Envelope – General Requirements
- .2 Section 07 25 00 Weather Barriers
- .3 Section 07 40 00 Cladding
- .4 Section 08 00 10 Openings – General Requirements
- .5 Section 084413 Aluminum Curtain Wall
- .6 Section 08 80 00 Glazing
- .7 Division 28 for Access and Security requirements
- .8 UBC LEED Implementation Guide
- .9 UBC Energy Modelling Guidelines
- .10 Owner's Project Requirements
- .11 UBC Resilience-Based Design Guide for Nonstructural Systems

1.2 **Related External Documents**

1. Latest edition of the British Columbia Building Code (BCBC) including accessibility requirements.
2. CAN/CSA-A440.2 "Fenestration Energy Performance"
3. CAN/CSA-A440.4 "Window and Door Installation". AAMA/ WDMA/ CSA 101/ I.S.2/ A440-17
4. CAN/CGSB-12.20 "Structural Design of Glass for Buildings."
5. NFRC 100 "Procedure for Determining Fenestration Product U-Factors"
6. AAMA 501.2 Quality Assurance and Water Field Check of Installed Storefronts, Curtain Walls and Sloped Glazing Systems
7. "ASTM E283, "Test Method for Rate of Air Leakage through Exterior Windows, Curtain Walls and Doors."
8. ASTM E330, "Structural Performance of Exterior Windows, Curtain walls and Doors by Uniform Static Air Pressure Difference."
9. ASTM E331, "Test Method for Water Penetration of Exterior Windows, Curtain Walls and Doors by Uniform Static Air Pressure Differential."
10. ASTM-E1105 "Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Curtain Walls and Doors by Uniform or Cyclic Static Air Pressure Difference."

1.3 **Description**

- .1 Section includes aluminum-framed glazed skylights.

1.4 **Coordination**

1. The Guidelines apply to all work completed within buildings on both UBC Vancouver and UBC Okanagan campuses unless stated otherwise.
2. In instances where conflicts are found between these guidelines and provincial regulations or codes, please notify the UBCV Transition Team Architect or UBCO Facilities Management.
3. These guidelines are intended to be read by design consultants and their content integrated into construction drawings and specifications. Construction documents are not to reference the technical guidelines directly.
4. The Coordinating Registered Professional (CRP) is required to coordinate these requirements with other disciplines, including:
 1. Building Envelope Consultant.
 2. Code Consultant.
 3. Structural Consultant
 4. Energy Modeler

1.5 **Submittals**

- .1 Submit required documents to consultants in accordance with Section 013300 Submittal Procedures

- .2 O&M Submittals
 - 1. Manufacturers Safety Data sheet (MSD) for all toxic or potentially toxic materials.
 - 2. Environmental Product Declaration (EPD)
- .3 Shop drawings (including all enclosure interface details) sealed and signed by a professional Engineer.
- .4 Manufacturer performance test data to confirm performance criteria.
- .5 Maintenance Data
 - 1. As-installed hardware.
 - 2. Source for replacement parts.
 - 3. Maintenance instructions

1.6 Quality Control and Assurance

- .1 Installer Qualifications: Installer must have successfully installed the same or similar systems required for the project and other projects of similar size and scope.
- .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 and to provide a Letter of Assurance. 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.
 - .2 Initial field test at any given location shall be paid by UBC. Number of test locations to be confirmed by the project design team and UBC. Cost of re-testing to verify corrected work shall be paid by Contractor.
 - .3 Contractor is responsible to ensure adequate power and water supply .
 - .4 Water testing to AAMA 501.2. Field water tests of Sloped Glazing Systems.
 - .5
- .4 Mock-up test procedures
 - .1 On major new projects and renewals utilizing a customized sloped glazing system, curtain wall subcontractor is required to arrange for a representative performance mock-up (PMU) to be tested in an accredited lab. Test procedures to include the following:
 - .2 Preload, static pressure air infiltration, static pressure water infiltration, dynamic pressure water infiltration, structural service loads, condensation Resistance / thermal cycling, structural ultimate loads.
- .5 Warranties
 - .1 Manufacturer shall review, verify and provide written acceptance to verify compliance for installation and provide warranty as follows:
 - .2 2-year parts and labour warranty.
 - .3 5-year water penetration.
 - .4 10-year sealed unit warranty

2.0 DESIGN AND PERFORMANCE REQUIREMENTS

2.1 Design Requirements – Sloped Curtain Wall Glazing System

- .1 The aluminum framed curtain wall skylight shall be stick-built, exterior glazed two-sided pressure cap system.
- .2 Use SSG system with no pressure cap on purlins to reduce trapped water.
- .3 Minimum slope 20 degrees, maximum slope 45 degrees.
- .4 Refer to Section 08 80 00 Glazing for skylight glazing design and performance requirements.

- .5 Provide rainscreen extrusions designed to control water that penetrates past the exterior glazing seal. All functions, overlaps and joints must allow water to flow freely. All materials are to be installed in a shingled fashion without water ponding over any sealed joints.
- .6 Provide an effective air barrier at the shoulder of the system.
- .7 Provide continuous air barrier around the perimeter of the frame.
- .8 Provide drainage of curtain wall skylight to the exterior or the exterior wall rainscreen.
- .9 Any moisture in the curtain wall skylight is to be wept to the exterior without compromising the air barrier of the system.
- .10 T-bar skylight – not allowed over occupied space requiring environmental separation, however can be used as an exterior canopy system.
- .11 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.
- .12 Environmental Separation
 - .1 Glazing as part of curtain-wall system to conform to NAFS, including the following ratings:
 - .1 Water Tightness: Pass minimum 700 Pa test pressure
 - .2 Air Infiltration: Air infiltration/exfiltration levels to be A3 for operable products 0.5 L/sm² and fixed 0.2 L/sm² at 75Pa.
 - .2 The overall thermal transmittance of fenestration and doors shall be determined for the reference sizes listed in accordance with:
 - .1 CSAA440.2/A440.3, "Fenestration energy performance/User guide to CSA A440.2:19, Fenestration energy performance
 - .2 NFRC100, "Procedure for Determining Fenestration Product U-factors.
 - .3 The minimum overall thermal transmittance U-Factor shall be 1.9 W/m²K
 - .3 Wind Load Resistance shall meet ASTM E330
- .13 Structural Design
 - .1 Curtain wall assemblies to support design loads and accommodate structural deflection, long term creep movements and drift as shown on the structural drawings without stress on glass or reduction in performance, or other detrimental effects caused by structural movement.
 - .2 Wind Loads: Assemblies shall be reinforced where required, capable of withstanding local positive and negative wind pressures.
 - .1 Minimum 40 psf (1.9 kPa) inward and 40 psf (1.9 kPa) outward acting normal to the plane of the wall.
 - .2 Based on CAN3-S157 and allowable deflection of 1/175.
- .14 Fasteners:
 - .1 Exposed fasteners and anchors: aluminum, 300 series stainless steel
 - .2 Concealed fasteners and anchors: aluminum, stainless steel.
 - .3 Concealed anchors: aluminum, or carbon steel painted after fabrication with zinc chromate or other primers not containing lead.

2.2 Performance Requirements

- .1 Service Life Expectancy: 25+/-years

3.0 MATERIALS

3.1 Product Selection

- .1 Pressure Plate Skylight System
 - .1 Kawneer 2000 Skylight
 - .2 Columbia Glazing Systems - SPM Series
Or equivalent as approved by consultant. Provide a variance request for review and approval if proposing an equivalent. The variance request should note all design and performance evaluations made.

- .2 Finishes
 - .1 Light and Neutral Colours: Thermosetting fluoropolymer two coat meeting the requirements of AAMA 2604.
 - .2 Dark Exterior Colours: Thermosetting enamel coating or thermosetting fluoropolymer two coat meeting the requirements of AAMA 2605.
 - .3 Clear anodized coating, AAMA Class II.
 - .4 Champagne, bronze or black coloured anodized coating to conform to AAMA Class I.

*****END OF SECTION*****

1.0 **GENERAL**

1.1 **Related UBC Guidelines**

- .1 Section 07 00 10 Building Envelope – General Requirements
- .2 Section 07 25 00 Weather Barriers
- .3 Section 0740 00 Cladding
- .4 Section 08 00 10 Openings – General Requirements
- .5 Section 08 80 00 Glazing
- .6 UBC LEED Implementation Guide
- .7 UBC Energy Modelling Guidelines
- .8 Owner's Project Requirements
- .9 UBC Resilience-Based Design Guide for Nonstructural Systems

1.2 **Related External Documents**

1. Latest edition of the British Columbia Building Code (BCBC) including accessibility requirements.
2. AAMA/WDMA/CSA 101/I.S.2/A440-17, NAFS—North American Fenestration Standard/Specification for windows, doors and skylights (NAFS-08).
3. CSA A440S1-09, Canadian Supplement to AAMA/WDMA/CSA 101/I.S.2/A440-17, NAFS – North American Fenestration Standard/Specification for Windows, Doors, and Skylights.

1.3 **Description**

1. Section includes exterior aluminum and fibreglass fixed and operable windows.

1.4 **Coordination**

1. The Guidelines apply to all work completed within buildings on both UBC Vancouver and UBC Okanagan campuses unless stated otherwise.
2. In instances where conflicts are found between these guidelines and provincial regulations or codes, please notify the UBCV Technical Review Team Architect or UBCO Facilities Management.
3. These guidelines are intended to be read by design consultants and their content integrated into construction drawings and specifications. Construction documents are not to reference the technical guidelines directly.
4. The Coordinating Registered Professional (CRP) is required to coordinate these requirements with other disciplines, including:
 - .1 Building Envelope Consultant.
 - .2 Electrical Consultant.
 - .3 UBC IT Services, including security requirements.
 - .4 Energy Modeler.

1.5 **Submittals**

- .1 Submit required documents to consultants in accordance with Section 013300 Submittal Procedures
- .2 O&M Submittals
 - .1 Manufacturers Safety Data sheet (MSD) for all toxic or potentially toxic materials.
 - .2 Environmental Product Declaration (EPD)
- .3 Shop drawings (*including all enclosure interface details*) sealed and signed by a professional engineer registered in the Province of British Columbia
- .4 Manufacturer performance test data to confirm performance criteria.
- .5 Maintenance Data
 - .1 As-installed hardware.
 - .2 Source for replacement parts.
 - .3 Maintenance instructions

1.6 Quality Control and Assurance

- .1 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 and to submit a Letter of Assurance. Costs to be included in the contract price.
- .2 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 where required.
 - .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 DESIGN AND PERFORMANCE REQUIREMENTS

2.1 Design Requirements

- .1 Requirements are applicable to exterior aluminum and fiberglass fixed and operable window framing systems. Window systems to incorporate a thermal break.
- .2 In addition to any other applicable codes, standards and project requirements, exterior systems to meet or exceed the following minimum requirements:
- .3 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.
- .4 Structural Design
 - .1 Curtain wall assemblies to support design loads and accommodate structural deflection, long term creep movements and drift as shown on the structural drawings without stress on glass or reduction in performance, or other detrimental effects caused by structural movement.
- .5 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 Window actuator systems shall not be tied to the fire alarm system as per TG section 28 31 00.

2.2 Performance Requirements

- .1 Products shall conform to Performance Class CW PG40 on the basis of prior testing..
- .2 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. Pass at minimum 390 Pa test pressure.
- .3 Air infiltration/exfiltration levels to be A3 for operable products 0.5 L/sm² and fixed 0.2 L/sm² at 75Pa.
- .4 The overall thermal transmittance of fenestration and doors shall be determined for the reference sizes listed in accordance with:
 - .1 CSAA440.2/A440.3, "Fenestration energy performance/User guide to CSA A440.2:19, Fenestration energy performance

- .2 NFRC100, "Procedure for Determining Fenestration Product U-factors.
- .3 The minimum overall thermal transmittance U-Factor shall be 1.9 W/m²K.
- .5 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.
- .6 Windows in laboratory spaces to be openable only with a controlled tool, for use only in the event of mechanical system shut-down/failure.
- .7 Design Service Life Expectancy: 50-year for exterior, 25-year for interiors

3.0 MATERIALS

3.1 Product Selection

- .1 Kawneer "AA 6400" or equivalent for aluminum window systems.
- .2 Cascadia Universal Series or equivalent for fiberglass windows.
- .3 Provide a variance request for review and approval if proposing an equivalent. The variance request should note all design and performance evaluations made.
- .4 PVC or vinyl-framed window systems are not acceptable for the academic and core components of mixed-use buildings.

3.2 Finishes

- .1 Finishing products (aluminum):
 - .1 Light and neutral Colours: Thermosetting enamel coating or thermosetting fluoropolymer two coat meeting the requirements of AAMA 2604.
 - .2 Dark Exterior Colours: Thermosetting enamel coating or thermosetting fluoropolymer two coat meeting the requirements of AAMA 2605.
 - .3 Clear anodized coating, AAMA Class II.
- .2 Finishing products (fibreglass):
 - .1 Fibreglass window finishes to meet AAMA 625 - Performance Requirements and Test Procedures for Superior Performance Organic Coatings on Fiber Reinforced Thermoset Profiles.

END OF SECTION

1.0 **GENERAL**

1.1 **Related Work and UBC Guidelines**

- .1 Section 08 00 10 Openings – General Requirements
- .2 Section 08 11 00 Metal Doors and Frames
- .3 Section 08 14 00 Wood Doors
- .4 Section 08 41 13 Aluminum Framed Entrances and Storefronts
- .5 Section 08 44 13 Glazed Aluminum Curtain Walls
- .6 Section 10 20 00 Interior Specialties
- .7 Division 26
- .8 Section 28 05 00 Electronic Security Systems: General Standards
- .9 Section 28 13 00 Access Control

1.2 **Related External Documents**

1. Canadian Steel Door and Frame Manufacturers' Association (CSDFMA).
2. American National Standards Institute (ANSI) / Builders Hardware Manufacturers Association (BHMA).

1.3 **Description**

1. Section includes door hardware including electrified hardware.

1.4 **Coordination**

1. The Guidelines apply to all work completed within buildings on both UBC Vancouver and UBC Okanagan campuses unless stated otherwise.
2. In instances where conflicts are found between these guidelines and provincial regulations or codes, please notify the UBCV Technical Review Team Architect.
3. These guidelines are intended to be read by design consultants and their content integrated into construction drawings and specifications. Construction documents are not to reference the technical guidelines directly.
4. The Coordinating Registered Professional (CRP) is required to coordinate these requirements with other disciplines.
5. In addition to coordination with the electrical consultant, the CRP is to coordinate door hardware (including electrified hardware) requirements with the following:
 - .1 Architectural Hardware Consultant (AHC)
 - .2 UBC Information Technology (UBC IT)
 - .3 UBC Access Services & Locksmith Shop
 - .4 UBC Technical Review Team Electrical Engineer

1.5 **Submittals**

- .1 Submittals – Design phase
 - .1 Provide the door and door hardware schedule for keying and hardware review and approval by UBC Access Services (including the Locksmith Shop).
 - .2 A separate and detailed Keying Schedule to be submitted which indicates each lock/core, hardware heading and door number—allow sufficient type line spacing to allow UBC to insert keying information after each lock or cylinder.
 - .3 A review package complete with a detailed Sequence of Operation for the electrified hardware, riser diagram, point to point wiring schematic and plan depicting the layout is to be provided by the AHC for acceptance by UBC Access Services, Locksmith Shop, UBC Technical Review Team Electrical Engineer prior to finalizing the hardware schedule. This package shall include functions of the Access Control system, any fire alarm activated hardware, accessibility functions, tie-ins to the ventilation system etc.
 - .4 Flag for review any specialty hardware required by the project.
 - .5 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.

- .2 Submittals Review – Construction phase
 - .1 Submit shop drawings and hardware schedule to UBC Access Services and Locksmith Shop for review.
 - .2 Sequence of Operation is to be submitted for review by UBC Access Services and Locksmith Shop.
 - .3 Requests for product substitutions must be made to the UBC Project Manager prior to closing of the tender submission for review by the AHC and UBC Access Services.
 - .4 UBC Project Manager to facilitate and ensure final keyway selection and detailed keying is determined between the user group, Locksmith Shop and Abloy Canada Ltd.
 - .5 Permanent lock cylinders shall be keyed according to UBC requirements.
- .3 Submittals Review – Occupancy and Handover phases.
 - .1 Provide formal and proper training to UBC Access Services and Locksmith Shop staff for the new equipment provided which should include: sequence of operation, troubleshooting, maintenance manual review, preventative maintenance requirements, and critical parts list.
 - .2 A testing and commissioning schedule is required for all electrified hardware.
 - .3 Provide a commissioning certificate for the purpose of identifying the start of the warranty period.
 - .4 Provide details of the manufacturer's extended warranties for UBC's Access Services team review.
 - .5 As-built and record drawings are required including the door hardware system wiring diagram, shop drawings or cut sheets of the electrified door hardware components, equipment and sensors, supplier and installer contact information, and warranty information for the installer and extended manufacturer warranties. This should be a dedicated section in the architectural section of the Operations & Maintenance Manual required at the time of building handover to UBC Facilities.

1.6 Quality Control and Assurance

- .1 Quality Assurance
 - .1 AHC to prepare detailed schedule of hardware and review for field compliance.
 - .2 A hardware schedule to be prepared and hardware 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.

1.7 Warranty Requirements

- .1 Manufacturers' warranties shall be from the date of Substantial Completion.
- .2 The following minimum warranty periods are required:
 - .1 Installation labour warranty: **1.5** years from Substantial Completion to allow time for building occupant fit out, and occupant general use to identify defects. Hardware defects usually become visible after 12 months of operation.
 - .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

2.0 **DESIGN AND PERFORMANCE REQUIREMENTS**

2.1 **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 (AHC) with a minimum of five (5) years of experience in the design of electrified hardware systems solutions.
- .2 Access systems and hardware must be scalable for future changes and additions. Provide a design solution which meets the project requirements and has the ability to meet the long-term requirements in accordance with Sections 28 05 00 and 28 13 00.
- .3 Provide submittals for review at various project phases noted in paragraph 1.6 of this section.
- .4 Exterior doors are subject to very high usage, inclement weather, wind driven rain, ice buildup, building air pressure, temperature fluctuations, and wind forces. The CRP must ensure that all exterior door hardware is selected to accommodate these variable conditions and be corrosion resistant. For aluminum framed entrances and curtain wall systems that incorporate doors, the CRP is to coordinate with suppliers of these systems to ensure that the factory supplied door hardware is appropriate.
- .5 Door pivots are not acceptable.
- .6 Avoid offset pulls due to maintenance problems resulting from torsion forces. If unavoidable, offset pulls must be through bolted.
- .7 Keyed cylinder dogging is required on all panic devices unless prohibited by code.
- .8 Keyed entry cylinders required on all doors equipped with card readers.
- .9 Each building requires a key and card tube deposit. (See 3. Materials below).
- .10 Spring loaded hinges are not to be used.
- .11 Kick plates are to be installed on all high traffic or high usage doors and service doors. . Coordinate with Section 10 20 00 Interior Specialties, item 5.0.
- .12 Where door closers are required by code, surface mounted door closers shall be used.
- .13 Where magnetic hold opens are used, surface-mounted hold-opens are to be used.

2.2 **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 CRP must ensure that the tender documents clearly identify the contractor’s scope of work, and what work will be performed by UBC Access Services.
- .3 The 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 26 pathways.
- .5 Standard Metal, Aluminum & Wood Doors: Top of door shall be prepped as such to allow for UBC Access Services 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.

2.3 Performance Requirements/Standards

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

3.0 MATERIALS

3.1 Product Selection

- .1 Materials
 - .1 Lock Cylinders
 - .1 Abloy of Canada Cylinders – no substitutions allowed.
 - .2 Hinges
 - .1 Stanley/ Monthard/ Hager/ McKinney.
 - .3 Pivots – (Only if needed as this is not UBC preferred hardware).
 - .1 Dorma.
 - .2 Yale - Corbin (Rixson).
 - .4 Door Stops, Swing Stops, and Holders
 - .1 Rixson/ Dorma/ Hagar/ Gallery/ Ives/ Glynn – Johnson/ Rockwood.
 - .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 Vandguard
 - .3 Sargent 10 line
 - .4 LSDA-800 series Grade 2 levers.
 - .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.
 - .2 Record-8100 Series and Record-Simple Swing units.
 - .3 No substitutions allowed.
- .15 Automatic Door Opener Push Plates
 - .1 Camden or BEA.
 - .2 36" tall vertical actuation bar, high and low push plate.
 - .3 Hardwired with 'push to open' text.
- .16 Push Plates, Pulls and Protective Plates
 - .1 Trimco/CBH/Gallery.
- .17 Thresholds and Weather-Stripping
 - .1 Pemko/Crowder/Zero.
- .18 Station Controls and Key Switches
 - .1 Von Duprin/ LCN/ RCI/ Securitron
 - .2 Camden CM-1030-7224 SPDT with red & green LED
- .19 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
- .20 Electrified Strikes
 - .1 HES/ RCI/ Adams Rite
- .21 Transfer Hinges –12 wire standard
 - .1 McKinney with electro lynx, Stanley, Hager
- .22 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)
- .23 Wireless Electrified 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
- .24 Electrified Exit Devices
 - .1 Corbin/ Sargent / Von Duprin (QEL series)
 - .2 Electrified dogging required unless prohibited by code.
- .25 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.
 - .3 Concealed hold-opens within door closers are not acceptable.
 - .4 Coordinate location of surface-mounted hold-opens with the supplier to ensure sufficient wall and floor clearances are maintained.
- .26 Electrified Lock Boxes
 - .1 ProxSafe flex key management system
- .27 Electrified Hardware Communications Equipment Infrastructure
 - .1 Supplied and installed by UBC Access and Security Services.
 - .2 Contractor to supply and install power, pathways, and cabling as indicated on the drawings.
 - .3 Open source communication protocol only.
- .28 Request to Exit Device

- .1 Supplied and installed by UBC Access and Security Services where not integrated into the lockset.
- .29 Card Strikes / FOB Readers
 - .1 Supplied and installed by UBC Access and Security Services where not integrated into the lockset.
 - .2 Contractor to supply and install pathway installation only as indicated on drawings.
 - .3 I-Class compatible
- .30 Fire Department Key and Card Tube Deposit Lockbox.
 - .1 All new buildings to have a tube-shaped Fire Department lockbox installed close to the main entrance. The lockbox lid is to be installed flush with the exterior wall surface.
 - .2 Lockboxes shall be cored into concrete, installed horizontally and epoxied into place. A free-standing externally-located square-faced concrete post can be used if there is no adequate location on the exterior wall surface.
 - .3 Construction of key-deposit housing to be steel.
 - .4 Cylinder housing to be hardened steel.
 - .5 Sleeve size to be: 180 mm long x 63 mm diameter or 7 inches long x 2.5 inches diameter.
 - .6 Manufacturer to be Abloy Key and Card Tube Deposit Lockbox – Abloy Protec.
- .2 Finish
 - .1 Brushed stainless steel.

4.0 **EXECUTION**

4.1 **Prescriptive Requirements**

- .1 Only UBC's Locksmith 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's 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 on a Construction Office project. For new projects and renovations, if the Contractor has pre-ordered and supplied keyed-alike construction cylinders, the UBC Locksmith Shop shall return construction cylinders to the Contractor at the time of the permanent cylinder installation.
- .4 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).
- .5 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.

5.0 LESSONS LEARNED AND COMMON MISSES ON UBC PROJECTS

Items in this section are lessons learned, and may be code or industry best practices which have been missed on past projects. If not applicable to a project, a variance is not required.

- .1 Requests for having black hardware finish will not be accepted as confirmed by the Locksmith Shop, UBC Access Services - the reason being that there have been instances where a dark brown finish (likely an oil-rubbed bronze finish) has been used on campus, and which looks really bad after only a few years of installation. The finish starts coming off after repeated use and becomes even worse for door pulls.
- .2 Our review indicates that no matter how the hardware has been finished, whether electroplated, oxidized or powder coated, the black or dark bronze colour will fade over time if not properly maintained. There are a number of long-term issues that were identified as follows:
 - .1 The black or dark bronze finish is prone to damage if not handled carefully during installation and the level of damage increases when in use.
 - .2 When it comes to replacement, lead time for the standard hardware finish is 1-2 weeks, and for the black hardware is approx. 12 weeks as this finish type is not a stock item.
 - .3 It will also show up dust more and therefore need to be cleaned regularly.
 - .4 All core buildings on campus have the same level of maintenance, so an increased level of care for the hardware would not be possible for any particular project.

*****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 Section 0841 13 Aluminum Entrances and Storefronts
- .4 Section 08 44 14 Glazed Aluminum Curtain Wall
- .5 Section 08 50 00 Windows
- .6 UBC Bird Friendly Design Guidelines
- .7 UBC LEED Implementation Guide
- .8 UBC Energy Modelling Guidelines
- .9 Owner's Project Requirements
- .10 UBC Resilience-Based Design Guide for Nonstructural Systems

1.2 **Related External Documents**

1. Latest edition of the British Columbia Building Code (BCBC).
2. British Columbia Energy Efficiency Act.
3. National Energy Code for Buildings (NECB).
4. ANSI/ASHRAE 90.1.
5. CAN/CGSB-12 Series Standards: glass types; performance.
6. CAN/CGSB-12.20: Structural Design for Buildings.
7. IGMAC Insulating Glass Manufacturers of Canada guidelines.
8. IGMA TM-3000-90, TB-3001 and TM-1300 guidelines.
9. Glazing Contractors' Association of British Columbia (GCABC) Manual.
10. ANSI/ASTM E330, Test Method for Structural Performance of Exterior Windows, Curtainwalls and Doors by Uniform Static Air Pressure Difference.

1.3 **Description**

1. Section includes glass and glazing.

1.4 **Coordination**

1. The Guidelines apply to all work completed within buildings on both UBC Vancouver and UBC Okanagan campuses unless stated otherwise.
2. In instances where conflicts are found between these guidelines and provincial regulations or codes, please notify the UBCV Technical Review Team Architect or UBCO Facilities Management.
3. These guidelines are intended to be read by design consultants and their content integrated into construction drawings and specifications. Construction documents are not to reference the technical guidelines directly.
4. The Coordinating Registered Professional (CRP) is required to coordinate these requirements with other disciplines, including:
 - .1 Building Envelope Consultant.
 - .2 Code Consultant.
 - .3 Energy Modeler.

1.5 **Submittals**

- .1 Submittal required documents to consultants in accordance with Section 013300 Submittal Procedures
- .2 O&M Submittals
 - .1 Manufacturers Safety Data sheet (MSD) for all toxic or potentially toxic materials.
 - .2 Environmental Product Declaration (EPD)
- .3 Shop drawings (including all enclosure interface details) sealed and signed by a professional Engineer registered in the Province of British Columbia.
- .4 Manufacturer performance test data to confirm performance criteria.

- .5 Maintenance Data
 - .1 As-installed hardware.
 - .2 Source for replacement parts.
 - .3 Maintenance instructions
- .6 Warranties
 - .1 10-year warranty for IGU's.

1.6 Quality Control and Assurance

- .1 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.
- .2 Quality Control
 - .1 Drawings indicate minimum thicknesses and other requirements such as coatings, tempering and other requirements
 - .2 Final thickness, safety glazing, heat strengthening, and other performance requirements to meet codes and standards, Owner's Project Requirements, 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 exterior and interior structural glazing including anchorage and fasteners, to be designed and certified by a Professional Structural Engineer registered in the Province of British Columbia who is to also submit a Letter of Assurance.

2.0 DESIGN AND PERFORMANCE REQUIREMENTS

2.1 Design Requirements

- .1 Exterior glazing at a minimum shall be insulated sealed double-glazed units to meet as a minimum to meet fenestration overall thermal transmittance 1.9 W/m²K. Design to maximize energy performance as established by the Owners Project Requirements (OPR), including orientation and expected functional use of space where installed.
- .2 Consideration to be given to access for glass cleaning including the structural capacity of floors to support appropriate man-lifts. The use of monorail systems for interior glass cleaning is not allowed.
- .3 For design of interior full-height glazing with butt-glazed joints near an interior walking surface, ensure the deflection is not thicker than the thickness of the glass. This eliminates the possibility of someone leaning against the glass panels and causing it to deflect and preventing movement of glazing panels.

2.2 Performance Requirements

- .1 The overall thermal transmittance of fenestration and doors shall be determined for the reference sizes listed in accordance with:
 - .1 CSAA440.2/A440.3, "Fenestration energy performance/User guide to CSA A440.2:19, Fenestration energy performance,"
 - .2 NFRC100, "Procedure for Determining Fenestration Product U-factors."
- .2 The overall thermal transmittance of fenestration and doors that are not within the scope of the standards listed shall be determined from:
 - .1 Calculations carried out using the procedures described in the "ASHRAE Handbook – Fundamentals," or
 - .2 laboratory tests performed in accordance with ASTM C1363, "Standard Test Method for Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus," using an indoor air temperature of 21±1°C and an outdoor air temperature of -18±1°C measured at the mid-height of the fenestration or door.
- .3 Any staining of glass or other surfaces by alkaline materials prior to installation will be cause for rejection.

- .4 Installation of glazing to conform with IGMA TM-3000-90, TB-3001 and TM-1300.

3.0 **MATERIALS**

3.1 **Product Selection**

- .1 Locally produced materials should be used whenever possible. Consideration to be given to the local availability of replacement glass when specifying glazing.
- .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 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, solar shading, reflective glass, large glazing units - heat strengthened glass to reduce risk of breakage due to thermal stress.
 - .3 Exterior glazing -all buildings- low-E coating on #2 surface of the insulated glazing unit (IGU). If triple-glazed units are considered for use on a project, project team to consult with the UBCV Technical Review Team Architect/UBCO Facilities Management and the C&CP Green Buildings Manager and to confirm final location of low-e coating and ceramic fritting. A variance will need to be granted if the low e-coating is in a different location from the #2 surface.
 - .4 Exterior glazing- appropriate bird friendly design includes ceramic fritting. Acid-etched glass applications would need to be reviewed at the design stage. Consult with the UBC Technical Team Architect if acid-etched glass is proposed. Film application is not acceptable since the IGU warranty is voided as per current industry standards.
 - .5 Spandrel glass - heat strengthened glass.
 - .6 Skylight, canopy and overhead glass – fully tempered, laminated (minimum PVB interlayer 1.5mm).
 - .7 Skylight glazing - glazing to be minimum double-glazed heat strengthened glass. Inboard pane to be laminated glass with a minimum PVB film thickness of 1.5 mm. Insulated glass units to have a soft coat metallic low-e coating on surface #2. Low-e coating shall have edge deletion with warm edge spacer and argon- filled.
 - .8 Guardrail glass - Heat-strengthened and laminated glass or tempered and laminated glass.
 - .9 Safety glass in doors and sidelights: fully tempered.
 - .10 Safety glass in fire rated doors and sidelights and in all applications subject to human impact: non-wired fire-rated tempered glass or intumescent glass. Fire-rated glass installations to be certified and permanently labelled by the manufacturer.
 - .11 Clearstory and atrium vertical glazing over occupied space: heat strengthened laminated glass with a minimum 1.5 mm PVB interlayer.
 - .12 Heat soak testing required to reduce nickel sulphide impurities in spandrel glass or IGUs where heat development is a concern.
- .5 Any staining of glass or other surfaces by alkaline materials is cause for rejection.

4.0 **LESSONS LEARNED AND COMMON MISSES ON UBC PROJECTS**

Items in this section are lessons learned, and may be code or industry best practices which have been missed on past projects. If not applicable to a project, a variance is not required.

- .1 Item 2.1.3 notes that interior full-height, butt-jointed glazing should have restricted deflection. This requirement has come about due to complaints from user groups in buildings with examples of full-height glazing installations in research labs and boardrooms. Users have complained about the movement noted in the glass and as a consequence not feeling safe when walking past such glass walls. It is not possible to address this issue during the O&M phase without removal and replacement of the glass walls. Design teams are to ensure that glazing specifications and shop drawings adequately address this issue.

*****END OF SECTION*****