

5.5 Doors & Hardware

5.5.1 Doors

5.5.1.1 Requirements for all Doors

General

1. See also Section 5.6 Glazing Systems.
2. Input from Building Envelope Professional required at early stage in design development if proposed design impacts exterior envelope of building.
3. Doors shall comply with all applicable requirements in Section 5.4 - Mandatory Provisions and Section 5.5 - Prescriptive Building Envelope Option of ANSI/ASHRAE/IESNA Standard 90.1-2010.
4. Water tightness rating for exposed doors to be selected based upon exposure to elements related to location on the façade and site conditions.
5. Exposed doors and frames to be designed according to rain screen principles incorporating air seals at a protected location in the assembly, and drained and ventilated compartments behind the exterior weather seals.
6. Frames to be glazed with internal removable stops or using tamper proof fasteners where security is required.
7. Door sills need to be integrated with terminations of roofing membranes.
8. Check scuppers for height relative to door sills.
9. Frames need to be supplied with receiving surfaces for sealing to air and vapour barrier materials, insulation, and cladding in the wall assembly.
10. Wherever suitable, use hollow metal doors in lieu of wood doors.
11. Wide stile glazed aluminum doors in aluminum frames or hollow metal doors in pressed metal frames are preferable. Wood doors and mineral core doors are acceptable under some circumstances but not recommended for maintenance.
12. For security purposes doors should be single. Avoid double doors whenever possible where security is a requirement; provide key removable center mullions at double doors where extra width is required such as for moving equipment, supplies, etc. All exterior exit doors (with panic hardware or "pass out" locksets) must be singles within their own frames.
13. The University requires that all doors with glazed assemblies (floor to door height, or ceiling) be tempered glass. Wired glass is not acceptable except where used in a required fire separation.
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 except with written approval from FM&D.
16. All doors to have 125 mm (5") x 45 mm (1 3/4") wide stiles minimum in order to accept surface mounted panic hardware and "pass-out" locksets. Doors to have 250 mm (10") top rail and 300 mm (12") centre and bottom rail. No deviations to this Standard are permitted without written permission from FM (Lock Shop).
17. Doors to swing out for all Service Rooms and wherever possible provide an acoustic seal.
18. Standard and minimum door size shall be 915 x 2134 x 44 (3'-0" x 7'-0" x 1 3/4").
19. Maximum door height: 2440 mm (8'-0").
20. At glazed screens and sidelights, provide 150 mm (6") high base to protect against damage from floor cleaning equipment, etc.
21. Provide one additional copy of product data and full sized printed shop drawings to FM&D (Lock Shop).
22. Any variance from these minimum standards must be approved in writing from FM&D.
23. All exterior and inner vestibule doors to be weatherstripped.
24. All exterior doors to have aluminum thresholds set in bed of mastic and screwed to substrate.
25. Tempered glazing required throughout.
26. Exterior frames to be thermally broken.
27. Exit and vestibule doors should be painted a contrasting color to walls and a different color than any other door in the same area. If contrast is not desired by design team, present rationale in writing to FM&D.
28. All doors and frames must be rigidly anchored and fastened.
29. Caulk perimeter of frame to adjacent substrate - see Section 5.7, Exterior Sealants.
30. All doors, frames and glazing to be thoroughly cleaned prior to turnover.
31. Overhead stops are to be used only when standard stops are not feasible.
32. Life Cycle Costing: 100-Year for exterior, 25-Year for interiors.

Materials

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. Corrosion protection considered to be suitable for aluminum frame material consist of class II anodizing (18micron) or PPG Duranar, two coat polyurethane paint or better 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.

Warranty

1. In the event of an emergency failure of any products, materials, or systems during the warranty period, and the issuer of the warranty is unable to or chooses not to respond to a request by the University of Calgary for immediate emergency repair/replacement of the affected items, then the University of Calgary may recover from the issuer of the warranty all costs incurred by the university for the immediate repair/replacement required.

5.5.1.2 Steel Doors & Frames**General Requirements**

1. Standard warranty is acceptable.
2. Preferred (acceptable) product or material to come from manufacturer that is Canadian based.
3. Frame anchors and connections to be rigidly secured to adjacent construction. Use drilled inserts and bolts to fasten floor anchors to floor - power actuated fasteners are not permitted.
4. Finish:
 - a. New doors to receive shop applied finish. Ensure doors are protected during transport.
 - b. Existing doors may receive site applied refinishing. Ensure measures are undertaken to eliminate overspray and impact on building occupants.
 - c. See also section 5.3, Interior & Exterior Painting. If powder-coated finishes are to be considered, ensure that adequate UV protection is incorporated to allow the finish to meet the required life expectancy. No site modifications to the doors are permitted other than the addition of finish hardware.

Prescriptive Requirements

1. Door faces: 1.6 mm (16 ga.) base thickness steel. Provide continuous weld to all seams.
2. Door Frames, Glazed Screens, & Transoms: 1.6 mm (16 ga.) thick base steel for interior frames, 2.0 mm (14 ga.) thick base steel for exterior frames and openings over 1220 mm (4'-0") in unsupported width.
3. Guard boxes: minimum 0.8 mm (22 ga.) thick base steel.
4. Hinge, strike, closer, etc, reinforcing (door and frame): minimum 6.0 mm (1/4") thick base steel. Reinforcement for hinges shall be full length.
5. Glazing stops: minimum 1 mm (20 ga.) base thickness sheet steel, tamper-proof.
6. Floor anchors, channel spreaders and wall anchors: minimum 1.6 mm (16 ga.) base thickness steel.
7. Door clearances: top, strike and hinge - 3mm (1/4"); bottom (undercut) 10mm (3/8") from top of finished flooring, maximum 16mm (5/8") or as required by NFPA 80.
8. All exterior doors to be insulated. Provide sealed metal or vinyl top caps for all exterior doors.
9. "Knock-down" frames are not acceptable.

5.5.1.3 Aluminium Doors & Frames**General Requirements**

1. Warranty: three (3) years material and labour, five (5) years on sealed glazing units.
2. All exterior/entrance Aluminium doors as well as other doors deemed to be high use (at discretion of FM&D) are to be Special Lite SL-15 non-insulclad only. Install is to be done by factory qualified technicians to ensure full 10 year warranty is supported by manufacturer.
3. Other Aluminum doors are to be heavy duty rated with preferred vendors : Kawneer, Commercial Aluminum. Proposed alternates to be reviewed and approved in writing by FM&D prior to incorporation into drawings.
4. Colour: Clear or medium bronze hard anodized finish only.

Prescriptive Requirements

1. Hardware – see also section 5.5.2, Hardware:
 - a. Butts: 115mm x 115mm clear finish Stanley CB1900 N.R.P.
 - b. Closers: Corbin DC 6210m54 689 Series. All door closers should be mounted top jamb or regular and must be through bolted at contact points on door.
 - c. Exit Devices: Von Duprin 98 and 99 Series

- i. Cylinder dogging only.
 - ii. Vertical rod devices are to be avoided and may only be used with written permission from FMD (Lock Shop).
 - iii. No concealed rods, surface mount only.
 - iv. Pulls: Von Duprin 98L-DT. Use 98L or 98-NL where cylinder is scheduled. Full length pulls or D-Pulls are to be installed only with written permission from FMD
- d. Steel reinforcement
- i. Steel reinforcement to meet current, relevant CSA standard.
 - ii. Provide in all doors and frames as follows:

Hardware	Thickness
Butts	6.0mm (door and frame, full length)
Locks	2.0mm
Closers	6.0mm (door and frame)
Push pulls	3.5mm
Flush bolts	2.0mm

5.5.1.4 Wood Doors

General Requirements

1. Warranty: Two (2) years material and labour.
2. Avoid adhesives, preservatives, hardeners, and synthesizing agents and finish coatings that contain formaldehyde and high V.O.C. content. Wood door selection must be reviewed with FM&D before specifying.
3. Veneer shall be Birch, Oak, Poplar, Red Gum or Maple.
4. Trim shall be Birch, Oak.
5. All wood veneer to be painted or stained.
6. Seal top and bottom of doors after undercutting (where necessary) but prior to hanging. Unsealed doors will be rejected.
7. Provide 3mm clearance on wood doors at jambs and head and 10mm at threshold unless otherwise directed.
8. Bevel latch side of doors allowing for swing clearance.
9. The harvesting of some species of wood is an environmental threat in certain areas of the world. The use of endangered wood species in millwork, casework and furniture products must not be used. Confirm the source of all woods used. Information is available in publications such as Environment by Design and The Environmental Resource Guide of the American Institute of Architects, as well as other sources.

Prescriptive Requirements

1. Preferred product or material:
 - a. Non-rated doors:
 - i. Particle board core made of wood chips bonded by synthetic resin, density to meet or exceed 448 kg/cu.m (28 lbs/cu. ft) to current relevant CSA Standard.
 - ii. Stiles and edge pieces not less than 50mm.
 - iii. Face: White birch veneer.
 - iv. Edge detail: AWMAC edge detail #3, white birch, one piece with no finger joints.
 - v. Glazing Stops: White Birch.
 - vi. Cut outs: openings for door lights shall not exceed 40% of the door area or half of the door height. No opening shall be closer than 150mm to any door edge or to the cut out for lockset.
2. Fire rated labeled doors: construct using a homogenous incombustible mineral core and edges to the door manufacturer's specifications for their labeled fire doors. Match edges to face veneer.

Hardware

1. Install finish hardware on wood doors using templates provided by hardware manufacturers/suppliers. Fit accurately, using full complement of screws and draw up tight.
2. Use minimum 38 mm (1 1/2") # 12 screws to secure butts to door.

5.5.1.5 Automatic Entrance Door Operators

General Requirements

1. Warranty: One (1) year parts and labour.
2. Activating devices to be push buttons, wall, frame or guard rail mounted on interior and wall or guard rail mounted on exterior. Push button plate to be minimum 100mm diameter and engraved with the standard handicap symbol.
3. Guard rails to be provided at the swing side of the door. Rails constructed of 13mm x 40mm solid curved aluminum bar, intermediate divider rail and base rail. Provide tubular section to house push button wiring as required. Rail design to be reviewed by FM&D.
4. Review locations of guard rails, push buttons and other hardware with FM&D prior to finalizing drawings.

5. All equipment shall be capable of operating within temperature ranges of -35 degrees Celsius and +70 degrees Celsius in all climate conditions.
6. The system shall provide pedestrian safety in compliance with relevant current ANSI standard, namely ANSI A156.10-1985.
7. Finish colour shall match that of the adjacent aluminum doors and frames.
8. Provide all necessary backing plates and/or brackets to mount operator on inside frame of door. Operator shall not decrease the required headroom of door opening.

Prescriptive Requirements

1. Include electro-mechanical balanced door operating equipment and all controls:
 - a. Preferred (acceptable) product: automatic swing door operating mechanism and actuation devices as manufactured Stanley or Hunter...
 - b. All interconnected wiring between electrified locking devices, operators, panic hardware, key switches (where specified), and push buttons as part of this package.
 - c. Possible alternates: Electro-mechanical balanced door operating equipment manufactured by LCN or Gyro TechAlternate. Alternate selections to be reviewed and accepted in writing by FM&D.
 - d. In new applications when doors need to be secured whenever possible outer handicap button should be connected to the DSX Card Access system to ensure space is properly secured.
 - e. Do not specify electro/hydraulic units.
2. Hardware to be ULC labeled where required. Provide the following hardware & controls:
 - a. Exit devices on Exterior Building entrance doors should be Von Duprin 98/99 Series QEL Quiet electric latch retraction.
 - b. Electric strikes: HES 9500 series for Rim exit devices, Von Duprin, 6200 series for mortise lock applications.
 - c. Magnetic locks: Schlage 350+, Securitron Model 62.
 - d. Exit devices (panic bars): Von Duprin 98 or 99 Series.
 - e. Radio controls: Stanley Multi-code, 3090 receiver and 3089 or 24971 mini transmitter.
 - f. Thresholds: K.N. Crowder CT series, size as scheduled.
 - g. Key switches: momentary contact.
 - h. If radio receiver will not function correctly in the housing, provide a separate housing of suitable construction.

5.5.2 Hardware

5.5.2.1 General Requirements

1. Standard door hardware finish for all installations shall be clear (626, US10B, etc.) for all components. Where alternate finishes are proposed, prior approval from FM&D (Lock Shop) is required.
2. All Finish Hardware to conform to A.N.S. I. standard dimensions.
3. Samples:
 - a. As requested by the Owner/Consultant, a returnable sample of each item of proposed hardware is to be submitted for approval not later than ten (10) days after requested. Samples are to be properly tagged, indicating name of supplier, name of manufacturer, item number, and intended function and location. Installed item must equal approved samples in all respects.
 - b. The hardware schedule shall also incorporate detailed keying. Exact keying shall be the responsibility of the owners, working in conjunction with the hardware supplier/consultant.
 - c. Provide "as-installed" hardware list, including name of supplier, to FM&D (Lock Shop) for review prior to substantial performance of the contract. Turn over accepted copies to FM&D (Lock Shop) in lieu of insertion into maintenance manuals.
4. Templates are to be supplied by the hardware supplier to all trades requiring them. Supply one additional copy of templates for use by FM&D (Lock Shop).
5. Guarantee: All Finish Hardware shall be guaranteed against any defects in the design, materials, finish, function, and workmanship. The guarantee is to be by the hardware manufacturer with a written certification from certified date of substantial performance as follows:
 - a. All Finish Hardware with the exception of door closers, exit devices, and butt hinges for a period of two (2) years.
 - b. Door closers for a period of ten (10) years.
 - c. Exit devices for a period of three (3) years.
 - d. Butt hinges shall carry a lifetime guarantee.
6. Any defects shall be made good by the manufacturer at no additional cost to the owner.

5.5.2.2 Prescriptive Requirements

1. The enclosed list of manufacturers and products are considered approved for projects at the UofC. No variations from the listed items will be permitted without written approval from FM&D (Lock Shop).

2. Frame manufacturer shall allow for maximum swing of doors when templating for closers. On pairs of doors RH Leaf in the direction of exit travel shall be active unless otherwise noted for security installations.
3. Use one manufacturer's product only for all similar items.
4. Approved Manufacturers and Products:

Item	Manufacturer	Details
Hinges	Stanley	<ul style="list-style-type: none"> • 4 ½" x 4 ½" NRP, • life time guarantee, • 626D finish, 5-knuckle concealed bearing, • Grade to suit Frequency of door use
Locks/Latches	Schlage	<ul style="list-style-type: none"> • Mortise L series, • 03B Lever, • 626 finish, • L9010-Passage Latch, • L9070-Classroom Lock' • L9080-Storeroom Lock, • L9456-Corridor Lock
Electric Strikes	Von Duprin HES	<ul style="list-style-type: none"> • 6210 series (metal frame) 630 finish, 24 Volts • 6211 WF series (Wood) 630 finish, 24 Volts • 9600 630 finish for Rim exit device applications
Magnetic Locks	Schlage Securitron	<ul style="list-style-type: none"> • 350+ (single) 628 finish • 352+ (double) 628 finish • Model 62 626 finish <p>Note:</p> <ul style="list-style-type: none"> • U of C preference is electronic strikes. Magnetic locks to be used only in exceptional applications, and only with the written consent of FM&D (Key Shop)
Request to exit devices	Von Duprin	<ul style="list-style-type: none"> • TBSK 350 626 finish • RX98 NL function 626 finish
Electric Hold Open/Closer	LCN	<ul style="list-style-type: none"> • 4040SE x 24VDC
Closers	Corbin/ Russwin	<ul style="list-style-type: none"> • DC 6210m54 689 series <p>Note: All closers to meet Handicapped requirements; Parallel arm mount not accepted; ULC labelling required for fire rated doors; Thru bolts, 3/8", ¼ 20NC for all wood and hollow metal doors;</p>
Exit Devices	Von Duprin	<ul style="list-style-type: none"> • 98 Rim series only • U of C preference is Rim style exit devices. Vertical Rod Devices to be used only in exceptional applications and only with the written consent of FM&D (Lock Shop) • Exit devices on Exterior entrance doors to be Von Duprin 98/99 QEL.

Item	Manufacturer	Details
		Note: Cylinder dogging standard; Key removable mullion and rim devices for pairs of doors; No concealed vertical rod devices; No mortise exit devices; ULC labelling required for fire rated doors; All vertical rod installation shall be complete with top and bottom RG-27 vertical rod and latch guard; Schlage Quad/Primus keying, 20-057 IC Rim cylinder only;
Security Exit Devices		<ul style="list-style-type: none"> Security exit design and hardware specification will be based on the safety and security requirements for each individual situation. Requires direct involvement and written consent of FM&D (Lock Shop)
Current Transfer	Von Duprin	<ul style="list-style-type: none"> EPT-10 Note: No electric hinges; No external wire loops.
Door Pulls/ Push & Kick Plates	Standard Metal Hager CBH	Note: All flatware to be 1.6 mm, bevelled 4 sides, countersunk with stainless steel screws unless otherwise specified; All pulls to be through bolt mounted unless otherwise specified; All kick plates, armour plates, mop plates to be undersized in width to suit all hardware, door and frame clearances. Heights as listed by door schedule or as listed in the Hardware Schedule. Provide flat sheet kick plates for steel doors, full wrap-around for wood doors.
Stops/Holders	Standard Metal Hager IVES	Note: Floor stops only, no overhead stops.
Co-ordinators	Standard Metal IVES Hager CBH	
Flush Bolts	Glynn Johnson IVES	
Track Hardware Thresholds Seals Astragals	K.N. Crowder Pemko K.N. Crowder Anemostat	Note: ULC Fire/Sound/Smoke Labels to be attached where required; All door seals shall be fitted and adjusted to make continuous contact with door or floor; Exterior thresholds shall be set in solid mastic and secured with countersunk stainless steel screws and metal shields every 6" (150 mm), maximum 2" (50 mm) from ends.
Sliding door locks	Adams Rite	2331 626 Finish

Item	Manufacturer	Details
		Note: Any other sliding door locking hardware to be approved by FMD (Lock Shop)
Stand alone push button locks	Schlage	CO-100-MS Series

5.5.2.3 Keying

1. Schlage Quad/Primus is the University of Calgary dedicated key system and shall be used on all projects. Exact keying shall be the responsibility of FM&D (Lock Shop) working in conjunction with the consultant/hardware supplier.
 - a. All permanent mortise, rim and lock cylinders to be Schlage Quad/Primus.
 - b. All Rim cylinders to be Schlage Quad/Primus 20-057 or 20-757 IC Rim cylinder.
 - c. Supply:
 - i. 2x Keys per cylinder;
 - ii. Visual keying - keys only, not cylinders.
 - iii. All keys to be stamped "DO NOT DUPLICATE"
 - iv. All cylinders to be construction keyed or Zero Bitted and shipped directly to the FM&D (Lock Shop).
 - v. All keys to be shipped directly to the FM&D (Lock Shop).
2. Cylinder installation shall be by the University of Calgary.
3. Use through bolts on panic hardware mounted to wood doors.
4. Where hardware is provided for fire rated doors and frames, the hardware shall be labelled showing the appropriate rating.



Revision History

Revision Date	Version	Description
Feb 2019	1.0	Baseline version
August 9, 2023	1.0	Added Revision History table to end of document and reset to Version 1.0.