

087100 – DOOR HARDWARE

Cornell’s Design and Construction Standards provide mandatory design constraints and acceptable or required products for all construction at Cornell University. These standards are provided to aid the design professional in the development of contract documents and are not intended to be used verbatim as a contract specification nor replace the work and best judgement of the design professional. Any deviation from the Design and Construction standards shall only be permitted with approval of the University Engineer.

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

- 1. Door hardware and electrified access control materials.

B. RELATED DOCUMENTS

- 1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- 2. CU Standard 281316 - Electronic Safety and Security Systems

1.02 SUBMITTALS

A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.

B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

- 1. **Format:** Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."
- 2. **Organization:** Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.

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3. Content: Include the following information:
 - a. Type, style, function, size, label, hand, and finish of each door hardware item.
 - b. Manufacturer of each item.
 - c. Fastenings and other pertinent information.
 - d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
 - e. Explanation of abbreviations, symbols, and codes contained in schedule.
 - f. Mounting locations for door hardware.
 - g. Door and frame sizes and materials.
 - h. Warranty information for each product.

4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.

C. Shop Drawings: Details of electrified access control hardware indicating the following:

1. For every hardware set that includes electronic hardware a “Theory of Operation” shall be provided

2. Wiring Diagrams: Upon receipt of approved schedules, submit detailed system wiring diagrams for power, signaling, monitoring, communication, and control of the access control system electrified hardware. Differentiate between manufacturer-installed and field-installed wiring. Include the following:
 - a. Elevation diagram of each unique access controlled opening showing location and interconnection of major system components with respect to their placement in the respective door openings.
 - b. Complete (risers, point-to-point) access control system block wiring diagrams.
 - c. Wiring instructions for each electronic component scheduled herein.

3. Electrical Coordination: Coordinate with related sections the voltages and wiring details required at electrically controlled and operated hardware openings.

1.03 WARRANTY

- A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under

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other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

- B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:
 - 1. Structural failures including excessive deflection, cracking, or breakage.
 - 2. Faulty operation of the hardware.
 - 3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - 4. Electrical component defects and failures within the systems operation.
- C. Standard Warranty Period: One year from date of Substantial Completion, unless otherwise indicated.
- D. Special Warranty Periods:
 - 1. Ten years for mortise locks and latches.
 - 2. Five years for exit hardware.
 - 3. Ten years for manual surface door closers.
 - 4. Two years for electromechanical door hardware.

1.04 MAINTENANCE SERVICE

- A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.
- B. Continuing Service: Beginning at Substantial Completion, and running concurrent with the specified warranty period, provide continuous (6) months full maintenance including repair and replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper door opening operation. Provide parts and supplies as used in the manufacture and installation of original products.

PART 2 - PRODUCTS

2.01 HANGING DEVICES

- A. Hinges: ANSI/BHMA A156.1 certified butt hinges
 - 1. Quantity: Provide the following hinge quantity, unless otherwise indicated:

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- a. Three Hinges: For doors with heights 61 to 90 inches.
 - b. Plus one hinge for every 30 inches of door height greater than 90 inches.
2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:
- a. Widths up to 3'0": 4-1/2" standard or heavy weight as specified.
 - b. Widths from 3'1" to 4'0": 5" standard or heavy weight as specified.
3. Hinge Options: Comply with the following where indicated in the Hardware Sets or on Drawings:
- a. Non-removable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed for all out-swinging lockable doors.
4. Acceptable Manufacturers:
- a. Bommer Industries (BO).
 - b. Hager Companies (HA).
 - c. McKinney Products (MK). **PREFERRED BRAND**

B. Continuous Geared Hinges: ANSI/BHMA A156.26 certified continuous geared hinge with minimum 0.120-inch thick extruded 6060 T6 aluminum alloy hinge leaves and a minimum overall width of 4 inches. Hinges are non-handed, reversible and fabricated to template screw locations. Provide concealed flush mount (with or without inset), full surface, or half surface, in standard and heavy-duty models, as specified in the Hardware Sets. Concealed continuous hinges to be U.L. listed for use on up to and including 90 minute rated door installations and U.L. listed for windstorm components where applicable. Factory cut hinges for door size and provide with removable service power transfer panel where indicated at electrified openings.

1. Acceptable Manufacturers:
- a. Bommer Industries (BO).
 - b. Hager Companies (HA). **PREFERRED BRAND**
 - c. Pemko Manufacturing (PE).

2.02 POWER TRANSFER DEVICES

A. Electrified Quick Connect Transfer Hinges: Provide electrified transfer hinges with Molex™ standardized plug connectors and sufficient number of concealed wires (up to 12) to accommodate the electrified functions specified in the Door Hardware Sets. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Wire nut connections are not acceptable.

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1. Acceptable Manufacturers:

- a. McKinney Products (MK) - QC (# wires) Option. **FOR RETROFIT APPLICATIONS ONLY.**

B. Concealed Quick Connect Electric Power Transfers: Provide concealed wiring pathway housing mortised into the door and frame for low voltage electrified door hardware. Furnish with Molex™ standardized plug connectors and sufficient number of concealed wires (up to 12) to accommodate the electrified functions specified in the Door Hardware Sets. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Wire nut connections are not acceptable.

1. Acceptable Manufacturers:

- a. Securitron (SU) - EL-CEPT Series.

C. Electric Door Hardware Cords: Provide electric transfer wiring harnesses with standardized plug connectors to accommodate up to twelve (12) wires. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Provide sufficient number of concealed wires to accommodate electric function of specified hardware. Provide a connector for through-door electronic locking devices and from hinge to junction box above the opening. Wire nut connections are not acceptable. Determine the length required for each electrified hardware component for the door type, size and construction, minimum of two per electrified opening.

1. Acceptable Manufacturers:

- a. McKinney Products (MK) – QC-C Series. Provide 6” QC-C006P on frame side.

2. Provide one each of the following tools as part of the base bid contract:

- a. McKinney Products (MK) - Electrical Connecting Kit: QC-R001.
- b. McKinney Products (MK) - Connector Hand Tool: QC-R003.

2.03 DOOR OPERATING TRIM

A. Flush Bolts and Surface Bolts: ANSI/BHMA A156.3 and A156.16, Grade 1, certified automatic, self-latching, and manual flush bolts and surface bolts. Manual flush bolts to be furnished with top rod of sufficient length to allow bolt location approximately six feet from the floor. Furnish dust proof strikes for bottom bolts. Surface bolts to be minimum 8” in length and U.L. listed for labeled fire doors and U.L. listed for windstorm components where applicable. Provide related accessories (mounting brackets, strikes, coordinators, etc.) as required for appropriate installation and operation.

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1. Acceptable Manufacturers:
 - a. Burns Manufacturing (BU).
 - b. Door Controls International (DC).
 - c. Rockwood Manufacturing (RO).
 - d. Trimco (TC).

2.04 CYLINDERS AND KEYING

- A. General: Cylinder manufacturer to have minimum (10) years’ experience designing secured master key systems and have on record a published security keying system policy.
- B. Source Limitations: Obtain each type of keyed cylinder and keys from the same source manufacturer as locksets and exit devices, unless otherwise indicated.
 1. Acceptable Manufacturers:
 - a. Sargent Manufacturing (SA).
 - b. Best (BE) **Engineering Quad only**
- C. Cylinders: Original manufacturer cylinders complying with the following:
 1. Mortise Type: Threaded cylinders with rings and straight- or clover-type cam.
 2. Rim Type: Cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
 3. Bored-Lock Type: Cylinders with tailpieces to suit locks.
 4. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.
 5. Keyway: Match Facility Restricted Keyway.
- D. Keying System: Each type of lock and cylinders to be factory keyed. Conduct specified "Keying Conference" to define and document keying system instructions and requirements. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner. Incorporate decisions made in keying conference, and as follows:
 1. Existing System: Master key or grand master key locks to Owner's existing system.
- E. Key Quantity: Provide the following minimum number of keys:
 1. Top Master Key: One (1)
 2. Change Keys per Cylinder: Two (2)
 3. Master Keys (per Master Key Group): Two (2)
 4. Grand Master Keys (per Grand Master Key Group): Two (2)
 5. Construction Keys (where required): Ten (10)

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- F. Construction Keying: Provide construction master keyed cylinders or temporary keyed construction cores where specified. (Typically exterior doors, doors in construction barriers, office suite doors to corridor, etc.) Provide construction master keys in quantity as required by project Contractor. Replace construction cores with permanent cores. Furnish permanent cores for installation as directed under specified "Keying Conference".
- G. Key Registration List: Provide keying transcript list to Owner's representative in the proper format for importing into key control software.
- H. Key Control Cabinet: Provide a key control system including envelopes, labels, and tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet. Key control cabinet shall have expansion capacity of 150% of the number of locks required for the project.
 - 1. Acceptable Manufacturers:
 - a. Lund Equipment (LU).
 - b. MMF Industries (MM).
 - c. Telkee (TK).

2.05 MECHANICAL LOCKS AND LATCHING DEVICES

- A. Mortise Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.13, Series 1000, Operational Grade 1 certified mortise locksets furnished in the functions as specified in the Hardware Sets. Locksets to be manufactured with a corrosion resistant, stamped 12 gauge minimum formed steel case and be field-reversible for handing without disassembly of the lock body. Lockset trim (including knobs, levers, escutcheons, roses) to be the product of a single manufacturer. Furnish with standard 2 3/4" backset, 3/4" throw anti-friction stainless steel latchbolt, and a full 1" throw stainless steel bolt for deadbolt functions.
 - 1. Acceptable Manufacturers:
 - a. Sargent Manufacturing (SA) – 8200 Series.
- B. Lock Trim Design: Sargent LNL.

2.06 INTEGRATED WIEGAND OUTPUT LOCKING DEVICES – MULTI-CLASS READER

- A. Integrated Wiegand Output Multi-Class Mortise Locks: Wiegand output ANSI A156.13, Grade 1, mortise lockset with integrated card reader, request-to-exit signaling, door position status switch, and latchbolt monitoring in one complete unit. Hard wired,

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solenoid driven locking/unlocking control of the lever handle trim, 3/4" deadlocking anti-friction latch, and 1" case-hardened steel deadbolt. Lock is U.L listed and labeled for use on up to 3-hour fire rated openings. Available with or without keyed high security cylinder override.

1. Open architecture, hard-wired platform supports centralized control of locking units with new or existing Wiegand compatible access control systems. Latchbolt monitoring and door position switch act in conjunction to report door-in-frame (DPS) and door latched (door closed and latched) conditions.
2. Integrated reader supports the following credentials:
 - a. 125kHz proximity credentials: HID, AWID, Indala, and EM4102.
 - b. 13.56 MHz proximity credentials: HID iClass, HID iClass SE, SE for MIFARE Classic, DESFire EV1.
3. 12VDC external power supply required for reader and lock, with optional 24VDC lock solenoid. Fail safe or fail secure options.
4. Energy Efficient Design: Provide lock bodies, which have a holding current draw of 15mA maximum, and can operate on either 12 or 24 volts. Locks are to be field configurable for fail safe or fail secure operation.
5. Installation requires only one cable run from the lock to the access control panel without requirements for additional proprietary lock panel interface boards or modules.
6. Installation to include manufacturer's access control panel interface board or module where required for Wiegand output protocol.
 - a. Acceptable Manufacturers:
 - 1) Sargent Manufacturing (SA) – M1 8200 Series.

2.07 LOCK AND LATCH STRIKES

- A. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:
 1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
 2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
 3. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.
- B. Standards: Comply with the following:
 1. Strikes for Mortise Locks and Latches: BHMA A156.13.
 2. Strikes for Bored Locks and Latches: BHMA A156.2.
 3. Strikes for Auxiliary Deadlocks: BHMA A156.5.
 4. Dustproof Strikes: BHMA A156.16.

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2.08 ELECTRIC STRIKES

(THE USE OF ELECTRIC STRIKES ARE NOT ALLOWED UNLESS APPROVAL IS GRANTED BY THE UNIVERSITY LOCKSMITH (607-255-4753) and CUPD Access Control Program (607-255-4393)

A. Standard Electric Strikes: Heavy duty, cylindrical and mortise lock electric strikes conforming to ANSI/BHMA A156.31, Grade 1, UL listed for both Burglary Resistance and for use on fire rated door assemblies. Stainless steel construction with dual interlocking plunger design tested to exceed 3000 lbs. of static strength and 350 ft-lbs. of dynamic strength. Strikes tested for a minimum 1 million operating cycles. Provide strikes with 12 or 24 VDC capability and supplied standard as fail-secure unless otherwise specified. Option available for latchbolt and latchbolt strike monitoring indicating both the position of the latchbolt and locked condition of the strike.

1. Acceptable Manufacturers:

- a. HES (HS) – 1006 Series x faceplate.
- b. Approved Equal

B. Surface Mounted Rim Electric Strikes: Surface mounted rim exit device electric strikes conforming to ANSI/BHMA A156.31, Grade 1, and UL Listed for both Burglary Resistance and for use on fire rated door assemblies. Construction includes internally mounted solenoid with two heavy-duty, stainless steel locking mechanisms operating independently to provide tamper resistance. Strikes tested for a minimum of 500,000 operating cycles. Provide strikes with 12 or 24 VDC capability supplied standard as fail-secure unless otherwise specified. Option available for latchbolt and latchbolt strike monitoring indicating both the position of the latchbolt and locked condition of the strike. Strike requires no cutting to the jamb prior to installation.

1. Acceptable Manufacturers:

- a. HES (HS) - 9500/9600 Series.
- b. Approved Equal

C. Provide electric strikes with in-line power controller and surge suppressor by the same manufacturer as the strike with the combined products having a five year warranty.

2.09 CONVENTIONAL EXIT DEVICES

(THE USE OF VERTICAL ROD EXITS ARE NOT ALLOWED UNLESS APPROVAL IS GRANTED BY THE UNIVERSITY LOCKSMITH (607-255-4753)

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- A. General Requirements: All exit devices specified herein shall meet or exceed the following criteria:
1. At doors not requiring a fire rating, provide devices complying with NFPA 101 and listed and labeled for "Panic Hardware" according to UL305. Provide proper fasteners as required by manufacturer including sex nuts and bolts at openings specified in the Hardware Sets.
 2. Where exit devices are required on fire rated doors, provide devices complying with NFPA 80 and with UL labeling indicating "Fire Exit Hardware". Provide devices with the proper fasteners for installation as tested and listed by UL. Consult manufacturer's catalog and template book for specific requirements.
 3. Except on fire rated doors and doors with access control, provide exit devices keyed cylinder dogging.
 4. Flush End Caps: Provide heavy weight impact resistant flush end caps made of architectural metal in the same finish as the devices as in the Hardware Sets. Plastic end caps will not be acceptable.
 5. Lever Operating Trim: Where exit devices require lever trim, furnish manufacturer's heavy-duty trim with cold forged escutcheons, beveled edges, and threaded studs for through bolts.
 - a. Lock Trim Design: As indicated in Hardware Sets, provide finishes and designs to match that of the specified locksets.
 - b. Where function of exit device requires a cylinder, provide keyed cylinder (Rim or Mortise) as required.
 6. Vertical Rod Exit Devices: Provide and install interior surface and concealed vertical rod exit devices as Less Bottom Rod (LBR) unless otherwise indicated.
 7. Narrow Stile Applications: At doors constructed with narrow stiles, or as specified in Hardware Sets, provide devices designed for maximum 2" wide stiles.
 8. Dummy Push Bar: Nonfunctioning push bar matching functional push bar.
 9. Rail Sizing: Provide exit device rails factory sized for proper door width application.
 10. Through Bolt Installation: For exit devices and trim as indicated in Door Hardware Sets.

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B. Conventional Push Rail Exit Devices (Heavy Duty): ANSI/BHMA A156.3, Grade 1 certified panic and fire exit hardware devices furnished in the functions specified in the Hardware Sets. Acceptable Manufacturers:

1. Sargent Manufacturing (SA) - 80 Series. **PREFERRED BRAND**
2. Stanley Precision (PR) - Apex 2000 Series.
3. Von Duprin (VD) - 35A/98 XP Series.

C. Tube Steel Removable Mullions: ANSI/BHMA A156.3 removable steel mullions with malleable-iron top and bottom retainers and a primed paint finish. Provide keyed removable feature, stabilizers, and mounting brackets as required.

1. Acceptable Manufacturers:
 - a. Sargent Manufacturing (SA) - 980S Series. **PREFERRED BRAND**
 - b. Stanley Precision (PR) - 822 Series.
 - c. Von Duprin (VD) - 9954 Series.

2.10 INTEGRATED WIEGAND OUTPUT EXIT DEVICES – MULTI-CLASS READER

A. Integrated Wiegand Output Multi-Class Exit Hardware: Wiegand output ANSI 156.3 Grade 1 rim, mortise, and vertical rod exit device hardware with integrated proximity card reader, latchbolt and touchbar monitoring, and request-to-exit signaling, in one complete unit. Hard wired, solenoid driven locking/unlocking control of the lever handle exit trim with 3/4" throw latch bolt. U.L listed and labeled for either panic or "fire exit hardware" for use on up to 3 hour fire rated openings. Available with or without keyed high security cylinder override.

1. Open architecture, hard wired platform supports centralized control of locking units with new or existing Wiegand compatible access control systems. Inside push bar (request-to-exit) signaling and door position (open/closed status) monitoring (via separately connected DPS).
2. Integrated reader supports the following credentials:
 - a. 125kHz proximity credentials: HID, AWID, Indala, and EM4102.
 - b. 13.56 MHz proximity credentials: HID iClass, HID iClass SE, SE for MIFARE Classic, DESFire EV1.
3. 12VDC external power supply required for reader. 24VDC required for solenoid operated exit trim. Fail safe or fail secure options.
4. Installation requires only one cable run from the exit hardware to the access control panel without requirements for additional proprietary lock panel interface boards or modules.
5. Competitor Alternates Allowed Option>Installation to include manufacturer's access control panel interface board or module where required for Wiegand output protocol.
 - a. Acceptable Manufacturers:

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- 1) Sargent Manufacturing (SA) – M1 80 Series.

2.11 DOOR CLOSERS

- A. All door closers specified herein shall meet or exceed the following criteria:
 1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers including installation and adjusting information on inside of cover.
 2. Standards: Closers to comply with UL-10C and UBC 7-2 for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.
 3. Cycle Testing: Provide closers which have surpassed 15 million cycles in a test witnessed and verified by UL.
 4. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the physically handicapped, provide units complying with ANSI ICC/A117.1.
 5. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates, and through-bolt or security type fasteners as required.
- B. Door Closers, Surface Mounted (Heavy Duty): ANSI/BHMA A156.4, Grade 1 surface mounted, heavy duty door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron or aluminum alloy body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control. Provide non-handed units standard.
 1. Acceptable Manufacturers:
 - a. LCN Closers (LC) - 4040XP Series.
 - b. Sargent Manufacturing (SA) - 351 Series. **PREFERRED BRAND**

2.12 AUTOMATIC DOOR OPERATORS

- A. General: Provide operators of size recommended by manufacturer for door size, weight, and movement; for condition of exposure; and for compliance with UL 325. Coordinate operator mechanisms with door operation, hinges, and activation devices.

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1. Fire-Rated Doors: Provide door operators for fire-rated door assemblies that comply with NFPA 80 for fire-rated door components and are listed and labeled by a qualified testing agency.

- B. Electrohydraulic Door Operators: Self-contained low-pressure units with rack and pinion design contained within a cast aluminum housing. Door closing speed controlled by independent hydraulic adjustment valves in the sweep and latch range of the closing cycle. Operator is to provide conventional door closer opening and closing forces unless the power operator motor is activated. Unit is to include an adjustable hydraulic backcheck valve to cushion the door speed if opened violently. Non-handed units for both push and pull side applications.

- C. Brackets and Reinforcements: Manufacturer's standard, fabricated from aluminum with nonferrous shims for aligning system components.

- D. Standard: Certified ANSI/BHMA A156.19.
 1. Performance Requirements:
 - a. Opening Force if Power Fails: Not more than 15 lbf required to release a latch if provided, not more than 30 lbf required to manually set door in motion, and not more than 15 lbf required to fully open door.
 - b. Entrapment Protection: Not more than 15 lbf required to prevent stopped door from closing or opening.

- E. Configuration: Surface mounted. Door operators to control single swinging and pair of swinging doors.

- F. Operation: Power opening and spring closing operation capable of meeting ANSI A117.1 accessibility guideline. Provide time delay for door to remain open before initiating closing cycle as required by ANSI/BHMA A156.19. When not in automatic mode, door operator to function as manual door closer with fully adjustable opening and closing forces, with or without electrical power.
 1. On-off switch to control power to be toggle switch operated.

- G. Features: Operator units to have full feature adjustments for door opening and closing force and speed, backcheck, motor assist acceleration from 0 to 30 seconds, time delay, vestibule interface delay, obstruction recycle, and hold open time from 0 up to 30 seconds.

- H. Provide outputs and relays on board the operator to allow for coordination of exit device latch retraction, electric strikes, magnetic locks, card readers, safety and motion sensors and specified auxiliary contacts.

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- I. Activation Devices: Provide activation devices in accordance with ANSI/BHMA A156.19 standard, for condition of exposure indicated and for long term, maintenance free operation under normal traffic load operation. Coordinate activation control with electrified hardware and access control interfaces. Activation switches are standard SPST, with optional DPDT availability.
- J. Signage: As required by cited ANSI/BHMA A156.19 standard for the type of operator.
 - 1. Acceptable Manufacturers:
 - a. LCN Automatic Operator (LC) - 4640 Series. **PREFERRED BRAND**
 - b. Norton (NO) – 6000 Series

2.13 ARCHITECTURAL TRIM

- A. Door Protective Trim
 - 1. General: Door protective trim units to be of type and design as specified below or in the Hardware Sets.
 - 2. Size: Fabricate protection plates (kick, armor, or mop) not more than 2" less than door width (LDW) on stop side of single doors and 1" LDW on stop side of pairs of doors, and not more than 1" less than door width on pull side. Coordinate and provide proper width and height as required where conflicting hardware dictates. Height to be 6".
 - 3. Metal Protection Plates: ANSI/BHMA A156.6 certified metal protection plates (kick, armor, or mop), beveled on four edges (B4E), fabricated from the following:
 - a. Stainless Steel: 300 series, 050-inch thick Fasteners: Provide manufacturer's designated fastener type as specified in the Hardware Sets.
 - 4. Acceptable Manufacturers:
 - a. Burns Manufacturing (BU).
 - b. Rockwood Manufacturing (RO).
 - c. Trimco (TC).

2.14 DOOR STOPS AND HOLDERS

- A. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.
- B. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 certified door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as

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indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.

1. Acceptable Manufacturers:
 - a. Burns Manufacturing (BU).
 - b. Rockwood Manufacturing (RO).
 - c. Trimco (TC).

C. Overhead Door Stops and Holders: ANSI/BHMA A156.6, Grade 1 certified overhead stops and holders to be surface or concealed types as indicated in Hardware Sets. Track, slide, arm and jamb bracket to be constructed of extruded bronze and shock absorber spring of heavy tempered steel. Provide non-handed design with mounting brackets as required for proper operation and function.

1. Acceptable Manufacturers:
 - a. Rixson Door Controls (RF).
 - b. Sargent Manufacturing (SA). **PREFERRED BRAND**
 - c. Glynn Johnson (GJ).

2.15 ARCHITECTURAL SEALS

- A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.
- B. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.
 1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.
- C. Fire Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL-10C.
 1. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and UBC 7-2, Fire Tests of Door Assemblies.

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- D. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated, based on testing according to ASTM E 1408.
- E. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.
- F. Acceptable Manufacturers:
 - 1. National Guard Products (NG).
 - 2. Pemko Manufacturing (PE).
 - 3. Reese Enterprises, Inc. (RS).

2.16 ELECTRONIC ACCESSORIES

- A. Door Position Switches: Door position magnetic reed contact switches specifically designed for use in commercial door applications. On recessed models, the contact and magnetic housing snap-lock into a 1" diameter hole. Surface mounted models include wide gap distance design complete with armored flex cabling. Provide SPDT, N/O switches with optional Rare Earth Magnet installation on steel doors with flush top channels.
 - 1. Acceptable Manufacturers:
 - a. Securitron (SU) - DPS Series.
 - b. Sentrol (SO) – 1078 x color
- B. Wiegand Test Unit: Test unit verifies proper Wiegand output integrated card reader lock installation in the field by testing for proper wiring, card reader data integrity, and lock functionality including lock/unlock, door position, and request-to-exit status. 12 or 24VDC voltage adjustable operating as Fail Safe or Fail Secure.
 - 1. Acceptable Manufacturers:
 - a. Sargent Manufacturing (SA) - WT1 Wiegand Test Unit.

2.17 LOCK BOXES

- A. The University Fire Marshal’s Office administers the university’s Knox Box program (exterior lock boxes for emergency rapid entry) and will facilitate obtaining the appropriate Knox Box Application.
- B. To comply with local ordinance requirements, Cornell University requires the provision of exterior lock boxes for emergency rapid entry. All new and existing buildings that have fire alarm and/or fire detection systems, which interconnect with the fire department, are to be covered by this standard. Alarm system interconnects include, but are not

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limited to, municipal fire alarm, radio, telephone leased line, telephone dialer, or central station systems.

- C. Lock box for the storage of building keys shall be as follows:
 - 1. Manufacturer: The Knox Company, 846 Production Place, Newport Beach, CA. 92663 (City of Ithaca Requirement)
- D. Model and location of lock box shall be prescribed and established by University Fire Marshal’s Office in collaboration with the fire department having jurisdiction. Lock boxes shall be installed and affixed to the structure in accordance with the manufacturer’s detailed instructions.

2.18 FABRICATION

- A. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.

2.19 FINISHES

- A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.
- B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware.
- C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.
- B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

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3.02 PREPARATION

- A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.
- B. Wood Doors: Comply with ANSI/DHI A115-W series.

3.03 INSTALLATION

- A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.
 - 1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices, locking devices, closing devices, and seals.
- B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:
 - 1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
 - 2. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
 - 3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."
 - 4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.
- C. Retrofitting: Install door hardware to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.
- D. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."
- E. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

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3.04 FIELD QUALITY CONTROL

- A. Field Inspection: Supplier will perform a final inspection of installed door hardware and state in report whether work complies with or deviates from requirements, including whether door hardware is properly installed, operating and adjusted.

3.05 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

3.06 CLEANING AND PROTECTION

- A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.
- B. Clean adjacent surfaces soiled by door hardware installation.
- C. Clean operating items as necessary to restore proper finish. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

3.07 DEMONSTRATION

- A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

3.08 DOOR HARDWARE SCHEDULE

- A. The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.
- B. Note to specification writer; every hardware set that has electronic hardware shall be provided with a “Theory of Operation”.**
- C. The hardware sets noted below are typical applications used at Cornell University.**

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Project specific door hardware must also be reviewed and approved by the Cornell University Lock Shop (607-255-4753)

D. Manufacturer's Abbreviations:

- 1. MK - McKinney
- 2. PE - Pemko
- 3. RO - Rockwood
- 4. SA - Sargent
- 5. RF - Rixson
- 6. LC - LCN Closers
- 7. SU - Securitron
- 8. AS - Altronix Corp
- 9. HS – HES

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Basis of Design Hardware Schedule**Set: 1.0**

Description: Bathroom Multi-stall Fire Rated

3 Hinge	As Required	MK
1 Restroom Lock	8216 LNL	SA
1 Door Closer	351 UO	SA
1 Kick Plate	K1050 6" high	RO
1 Wall Stop	406	RO
1 Gasketing	S773BL	PE

Set: 2.0

Description: Bathroom Single Stall Fire Rated

3 Hinge	As Required	MK
1 Dormitory Lock W/Indicator	50 8225 LNL	SA
1 Door Closer	351 UO	SA
1 Kick Plate	K1050 6" high	RO
1 Wall Stop	406	RO
1 Gasketing	S773BL	PE

Set: 3.0

Description: Single Integrated Access Control Fire Rated

3 Hinge	As Required	MK
1 Access Control Lock	M1-82271-24V-BIPS LNL	SA
1 Door Closer	351 UO	SA
1 Kick Plate	K1050 6" high	RO
1 Wall Stop	406	RO
1 Gasketing	S773BL	PE
1 Electric Power Transfer	EL-CEPT	SU
1 ElectroLynx Harness	QC-C Length as required	MK
1 ElectroLynx Harness	QC-C006P	MK

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Set: 4.0

Description: Single Access Control Separate Reader Fire Rated (NEW CONSTRUCTION)

3 Hinge	As Required	MK
1 Fail Secure Electric Lock	RX 8271-24V LNL	SA
1 Door Closer	351 UO	SA
1 Kick Plate	K1050 6" high	RO
1 Wall Stop	406	RO
1 Gasketing	S773BL	PE
1 Electric Power Transfer	EL-CEPT	SU
1 ElectroLynx Harness	QC-C Length as required	MK
1 ElectroLynx Harness	QC-C006P	MK
1 Position Switch	DPS-M	SU
1 Proximity Reader	Multi-class get model number for each opening from Cornell Police Access Control Program (607-255-4393)	HD
1 Power Supply	Verify with battery backup	AS

Set: 5.0

Description: Single Access Control Separate Reader Fire Rated (EXISTING FRAME CONSTRUCTION)

2 Hinge	As Required	MK
1 Electric Hinge	QC - 12	MK
1 Fail Secure Electric Lock	RX 8271-24V LNL	SA
1 Door Closer	351 UO	SA
1 Kick Plate	K1050 6" high	RO
1 Wall Stop	406	RO
1 Gasketing	S773BL	PE
1 ElectroLynx Harness	QC-C Length as required	MK
1 ElectroLynx Harness	QC-C006P	MK
1 Position Switch	DPS-M	SU
1 Proximity Reader	Multi-class get model number for each opening from Cornell Police Access Control Program (607-255-4393)	HD

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1	Wall Stop	406	RO
3	Silencer	608	RO

Set: 9.0

Description: High Voltage Electrical Rooms

3	Hinge	As Required	MK
1	Exit Device	12 8804 ETL	SA
1	Door Closer	351 UO	SA
1	Kick Plate	K1050 6" high	RO
1	Wall Stop	406	RO
1	Gasketing	S773BL	PE

Set: 10.0

Description: Mechanical/Storage Rooms Non-rated

3	Hinge	As Required	MK
1	Storeroom Lock	8204 LNL	SA
1	Kick Plate	K1050 6" high	RO
1	Wall Stop	406	RO
3	Silencer	608	RO

Set: 11.0

Description: Mechanical/Storage Rooms Fire Rated

3	Hinge	As Required	MK
1	Storeroom Lock	8204 LNL	SA
1	Door Closer	351 UO	SA
1	Kick Plate	K1050 6" high	RO
1	Wall Stop	406	RO
1	Gasketing	S773BL	PE

Set: 12.0

Description: Office Non-rated

3	Hinge	As Required	MK
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1	Storeroom Lock	8205 LNL	SA
1	Kick Plate	K1050 6" high	RO
1	Wall Stop	406	RO
3	Silencer	608	RO

Set: 13.0

Description: Office Fire Rated

3	Hinge	As Required	MK
1	Office Lock	8205 LNL	SA
1	Door Closer	351 UO	SA
1	Kick Plate	K1050 6" high	RO
1	Wall Stop	406	RO
1	Gasketing	S773BL	PE

Set: 14.0

Description: Stairs Fire Rated

3	Hinge	As Required	MK
1	Exit Device	12 8813 ETL	SA
1	Door Closer	351 UO	SA
1	Kick Plate	K1050 6" high	RO
1	Wall Stop	406	RO
1	Gasketing	S773BL	PE

Notes: Must verify function required on the exit device for each stairwell

Set: 15.0

Description: Single Access Control

3	Hinges	As Required	MK
1	Exit Device	LD 43 55 56 8804 ETL	SA
1	Concealed Overhead Stop	1-X36	RF
1	Door Closer	351 UO	SA
1	Threshold	253x3*FG MSES25SS	PE
1	Sweep	3452*NB TKSP8	PE

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1	Electric Power Transfer	EL-CEPT	SU
1	ElectroLynx Harness	QC-C Length as required	MK
1	ElectroLynx Harness	QC-C006P	MK
1	Position Switch	DPS-M	SU
1	Proximity Reader	Multi-class get model number for each opening from Cornell Police Access Control Program (607-255-4393)	HD
1	Power Supply	Verify with battery backup	AS

Notes: Notes: Outside door closed & locked at all times. Presenting valid credential outside shunts door position switches, activated electric latch retraction in exit device & allows for authorized entrance. Inside free at all time for immediate egress. Operating inside trim activates request to exit switch in exit device shunting door position switch and allowing authorized egress. With loss of power or activation of building fire system door remains locked.

Set: 16.0

Description: Exterior Access Control with Operator

3	Hinges	As Required	MK
1	Exit Device	LD 43 55 56 8804 ETL	SA
1	Concealed Overhead Stop	1-X36	RF
1	Automatic Opener	9542 REG	LC
2	Actuator	Camden Door Controls CM45xWT	
1	Threshold	253x3*FG MSES25SS	PE
1	Gasket	By Frame Manufacturer	
1	Sweep	3452*NB TKSP8	PE
1	Electric Power Transfer	EL-CEPT	SU
1	ElectroLynx Harness	QC-C Length as required	MK
1	ElectroLynx Harness	QC-C006P	MK
1	Position Switch	DPS-M	SU
1	Proximity Reader	Multi-class get model number for each opening from Cornell Police Access Control Program (607-255-4393)	HD
1	Power Supply	Verify with battery backup	AS

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Notes: Notes: Outside door closed & locked at all times. Presenting valid credential outside activates outside operator paddle shunts door position switch, activated electric latch retraction in exit device & allows for authorized entrance. Inside free at all time for immediate egress. Depressing inside touchpad activating request to exit switch in exit device or use of inside operator paddle shunts door position switch, activates electric latch retraction and allows authorized egress. With loss of power or activation of building fire system door remains locked.

Set: 17.0

Description: Interior Exit Access Control with Operator Fire Rated

3 Hinge	As Required	MK
1 Exit Device	12 43 55 56 8804 ETL	SA
2 Actuator	Camden Door Controls CM45xWT	
1 Door Operator	4642 REG	LC
1 Wall Stop	406	RO
1 Gasketing	S773BL	PE
1 Electric Power Transfer	EL-CEPT	SU
1 ElectroLynx Harness	QC-C Length as required	MK
1 ElectroLynx Harness	QC-C006P	MK
1 Position Switch	DPS-M	SU
1 Proximity Reader	Multi-class get model number for each opening from Cornell Police Access Control Program (607-255-4393)	HD
1 Power Supply	Verify with battery backup	AS

Notes: Notes: Outside door closed & locked at all times. Presenting valid credential outside activates outside operator paddle shunts door position switch, activated electric latch retraction in exit device & allows for authorized entrance. Inside free at all time for immediate egress. Depressing inside touchpad activating request to exit switch in exit device or use of inside operator paddle shunts door position switch, activates electric latch retraction and allows authorized egress. With loss of power or activation of building fire system door remains locked.

Set: 18.0

Description: Interior Exit Integrated Access Control Fire Rated

3 Hinge	As Required	MK
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1 Access Control Exit Device	12 LD 43 56 M1-8906-24V-BIPS ETL	SA
1 Door Closer	351 UO	SA
1 Wall Stop	406	RO
1 Gasketing	S773BL	PE
1 Electric Power Transfer	EL-CEPT	SU
1 ElectroLynx Harness	QC-C Length as required	MK
1 ElectroLynx Harness	QC-C006P	MK
1 Power Supply	Verify with battery backup	AS

Notes: Notes: Outside door closed & locked at all times. Presenting valid credential outside shunts integrated door position switches & allows for authorized entrance. Inside free at all time for immediate egress. Operating inside trim activates request to exit switch in lock shunting integrated door position switch and allowing authorized egress. With loss of power or activation of building fire system door remains locked.

Set: 18.0A

Description: Interior Exit Integrated Access Control Fire Rated – Secure Door with Panic Out, Access In During Emergency Ingress

2 Hinge	As Required	MK
1 ElectroLynx Hinge	QC12	MK
1 Access Control Exit Device	12 LD 43 56 M1-8975-24V-BIPS ETL	SA
1 Door Closer	351 UO	SA
1 Wall Stop	406	RO
1 Gasketing	S773BL	PE
1 Electric Power Transfer	EL-CEPT	SU
3 ElectroLynx Harness	QC-C Length as required	MK
1 ElectroLynx Harness	QC-C006P	MK
1 Power Supply	Verify with battery backup	AS
1 Smart Pac		HS

Notes: Outside door closed & locked at all times. Presenting valid credential outside shunts integrated door position switches & allows for authorized entrance. Inside free at all times for immediate egress. Operating inside trim activates request to exit switch in lock shunting

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integrated door position switch and allowing authorized egress. With loss of power or activation of building fire system door latches but level unlocks.

Set: 19.0

Description: Single Passage

3 Hinge	As Required	MK
1 Passage Latch	8215 LNL	SA
1 Kick Plate	K1050 6" high	RO
1 Wall Stop	406	RO
3 Silencer	608	RO

Set: 20.0

Description: Single Passage Rated

3 Hinge	As Required	MK
1 Passage Latch	8215 LNL	SA
1 Door Closer	351 UO	SA
1 Kick Plate	K1050 6" high	RO
1 Wall Stop	406	RO
1 Gasketing	S773BL	PE

Set: 21.0

Description: Cross Corridor Pair Fire Rated MHO

6 Hinge	As Required	MK
2 Exit Device	12 43 NB8713 ETL	SA
2 Door Closer	351 UO	SA
2 Kick Plate	K1050 6" high	RO
2 Electromagnetic Holder	996	RF
1 Gasketing	S773BL	PE
2 Astragal	18041 *NB	PE

Set: 22.0

Description: Pair Storeroom Rated

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6 Hinge	As Required	MK
2 Flush Bolt	555/557 As Required	RO
1 Dust Proof Strike	570	RO
1 Storeroom Lock	8204 LNL	SA
1 Door Closer	351 UO	SA
2 Wall Stop	406	RO
1 Gasketing	S773BL	PE
1 Astragal	S771BL	PE
1 Metal Astragal	By Door Manufacturer	

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