

SECTION 087100 - DOOR HARDWARE

PART 1 - GENERAL

1.1 M.S.U. ISSUES

- A. On interior doors, do not install lights that extend below the level of the top of the mounting of the exit device or the lockset.
- B. Door stops on aluminum doors should be large enough to mount strikes or electric strikes and it is preferred that they be solid. Blade stops are not permitted.
- C. At the end of a project, all unused door hardware should be provided to the M.S.U. Key Shop.
- D. When appropriate, wall magnet door holders should be provided to hold doors open during heavy usage periods to save unnecessary wear on the mechanism.
- E. Hinges on all doors that open outward (reverse bevel) shall have NRP (Non Removable Pin) hinges.
- F. A door closer is required on all doors in new or renovated computer labs (or similar spaces) which are not served by building central air conditioning and have window or room air conditioning equipment if the doors connect to non-air conditioned spaces.
- G. All public and personnel doorway hardware shall meet the latest A.D.A. - ICC/ANSI A117.1 standards to provide barrier free access for mobility and physically impaired users.
- H. Where card access controls are provided, electrified locksets or electrified panic bars shall be used instead of electric strikes. The electrified hardware shall include an RX (Request to Exit) switch.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Commercial door hardware for the following:
 - a. Swinging doors.
 - b. Other doors to the extent indicated.
- B. Related Sections include the following:
 - 1. Division 08 Section HOLLOW METAL DOORS AND FRAMES for astragals provided as part of a fire-rated labeled assembly and for door silencers provided as part of the frame.
 - 2. Division 08 Section FLUSH WOOD DOORS for astragals provided as part of a fire-rated labeled assembly.
 - 3. Division 08 Section ACCESS DOORS for access door hardware, except cylinders.

4. Division 08 Section ALUMINUM ENTRANCES AND STOREFRONTS for entrance door hardware, except cylinders.
5. Division 08 Section AUTOMATIC ENTRANCES for entrance door hardware, except cylinders.

C. The following list is provided as a reference to clearly identify manufacturers cited in this standard:

1. Arrow Arrow Architectural Hardware; an ASSA ABLOY Group company
2. Baldwin Baldwin Hardware Corporation
3. Best Best Access Systems, Division of The Stanley Works
4. Corbin Russwin Corbin Russwin Architectural Hardware; an ASSA ABLOY Group company
5. Glynn-Johnson Glynn-Johnson; an Ingersoll-Rand Company
6. Hager Hager Companies
7. Ives Ives; an Ingersoll-Rand Company
8. LCN LCN Closers; an Ingersoll-Rand Company
9. McKinney McKinney Products Company; an ASSA ABLOY Group company
10. Pemko Pemko Manufacturing Co., Inc.; an ASSA ABLOY Group company
11. Reese Reese Enterprises, Inc.
12. Rockwood Rockwood Manufacturing Company; an ASSA ABLOY Group company
13. Sargent Sargent Manufacturing Company; an ASSA ABLOY Group company
14. National Guard National Guard Products, Inc.
15. Von Duprin Von Duprin; an Ingersoll-Rand Company

1.3 SUBMITTALS

A. 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.
 - a. Organize door hardware sets in same order as in the Door Hardware Schedule at the end of Part 3.
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 each 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.

1.4 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with provisions of the following:
 - 1. Michigan Department of Labor, Bureau of Construction Codes and Fire Safety.
 - 2. Michigan State Police Fire Marshal Division.
 - a. Hardware furnished for labeled openings shall be labeled and have been tested by a testing laboratory recognized by the Michigan State Police Fire Marshal Division.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Each item of hardware shall be individually wrapped and packaged to avoid scratching or marking of the finishes.
- B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.

1.6 COORDINATION

- A. Coordinate layout and installation of recessed pivots and closers with floor construction. Anchoring inserts shall be cast into concrete.
- B. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing door hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

1.7 CYLINDERS AND KEYING

- A. All locking devices shall be supplied prepared for seven pin cylinders manufactured by Best Lock Corporation.
- B. All existing cylinders and cores will be salvaged to the M.S.U. Key Shop, unless otherwise directed.
- C. All cylinders, cores, and keys, temporary and permanent, shall be furnished by the M.S.U. Key Shop, which shall also perform the following:
 - 1. Remove existing cores and install construction cores on **existing doors** as required.
 - 2. Furnish construction cylinders, cores, and keys for **new doors**.
 - a. The contractor shall supply the M.S.U. Project Representative with a copy of the project Hardware Schedule to allow the Key Shop to match cylinders to the new hardware.

- b. The contractor shall pick up cylinders, cores, and keys from the M.S.U. Key shop with the form "Authorization for Construction Cylinders, Cores, and Keys", completed and authorized by the M.S.U. Project Representative.
- c. The contractor shall install construction cylinders in new doors for alignment of hardware, for use during construction, and for inspection of operation.
- d. All construction keys issued to a contractor for a particular project will be returned to the Key Shop before final payment will be granted. Lost keys are subject to fines consisting of the cost of re-keying all locks on campus, which have the same code as the lost key.
- e. The contractor shall tag and supply to the M.S.U. Key shop one copy of the key for each non-standard lock installed.

1.8 SCHEDULED DOOR HARDWARE

A. Hinges

- 1. Hinge locations shall conform to the National Builders Hardware Association Standards. M.S.U. avoids pivot hinges because they collect dirt and salt.
- 2. On relatively new installations and when existing conditions warrant, salvage existing hinges, clean, lubricate, and reinstall.
- 3. Electric hinges shall not be permitted.

HINGE SCHEDULE

<u>Typical Usage</u>	<u>Quantity</u>	<u>Style</u>	<u>Manufacturer</u>
Classrooms, offices, toilet rooms and storerooms of average size	1 1/2 pair	Full mortise 4 1/2" X 4 1/2" ball bearing, standard weight, butt hinges with non-rising removable pins	McKinney Hager BB1279 or approved equal
Low to medium frequency use entrances and toilet rooms, and stairwell doors of high frequency use.	1 1/2 pair	Full mortise 5" x 4 1/2" ball bearing heavyweight butt hinges with non-rising removable pins	Hager BB1168 McKinney T4B3786 or approved equal
Heavy doors, abused doors, or high frequency doors. Also for dormitory and stairwell doors when replacing frames.	One set, which includes one anchor and one pair butts	Full mortise 5" X 4 1/2" ball bearing, heavyweight, anchor-type hinges with non-rising removable pins, of required hand	Hager AB8505 McKinney or approved equal
New frames for openings with heavy weight and/or large cart traffic. Field check height of existing hinge gains when retrofitting.	1 1/2 pair	5" ball bearing, heavyweight, clearance hinges with non-rising removable pins	Hager BB1267 or approved equal

Existing frames for openings with medium weight cart traffic. Field check height of existing hinge gains when retrofitting.	1 1/2 pair	4 1/2 inch clearance hinges, TA-TB2895 x NRP	McKinney
These may be used only on existing doorframes when none of the above alternatives are appropriate, and only with the prior approval of the M.S.U. Key Shop.		780-210HD (surface mount) 780-224HD (mortise mount)	Hager-Roton

B. Lock and Latch Sets – Full Mortise

1. The quality of each mortise lock set assembly, including cylinder and escutcheon, must be Grade 1 for both operation and security in accordance with ANSI A156.13 and the latest BHMA “Directory of Certified Locks and Latches.”
2. The lock set must accept Best interchangeable 7-pin tumbler cores and cylinders.
3. Locksets shall be full-mortise Corbin Russwin ML 2000 Series, with functions as listed in the lock and latch set schedule below. Knob and trim style shall be Corbin Russwin YWN trim, unless specified otherwise. Lever handle and trim style shall be Corbin Russwin NSN. Locksets shall have screwless shank and 2-3/4 inch basket.
4. Provide curved lip strike plate with tongue of appropriate length for type of door trim used.
5. Locksets on doors with card access controls shall be Sargent 8271-RX in either the WTL or LWIL trim style. All electrified locksets shall be 24 VDC.

LOCK AND LATCH SET SCHEDULE

Typical Usage	Lock set
Use only in relatively new existing installations. Field check condition of existing locksets.	Salvage existing – clean lubricate, and reinstall.
Card access control door	Sargent 8271-RX-NSN
Classrooms, laboratories, teaching laboratories, and outside entrances with lock	Corbin Russwin ML2055
Offices	Corbin Russwin ML2051
Closets or passages	Corbin Russwin ML2010

Janitor closets and storage rooms	Corbin Russwin ML2057
Doors to roof, and from penthouse to roof two floors or less above grade and all air plenums.	Corbin Russwin ML2022, keyed both sides with abrasive knob inside
Mechanical rooms, transformer rooms, steam service tunnel access, telephone closets, and from public building space to roof, three floors or more above grade. M.S.U. Key Shop will modify lockset for lock cylinder and rigid knobs both sides when used from public space to roof below the third floor.	Corbin Russwin ML2057-M21, all with abrasive knob outside and free knob inside.
Penthouse to roof access, three floors or more above grade.	Corbin Russwin ML2057, all with abrasive knob outside and free knob inside.
Residence hall rooms	Corbin Russwin ML2065 YW Knob
Residence hall stairwells	Corbin Russwin ML2010
Toilet room with single stool, and barrier-free dormitory rooms.	Corbin Russwin ML2065
Barrier-free offices, used only on special request	Corbin Russwin ML2051
Loading dock floors with heavy cart traffic	Rockwood trim protector bar R111LPB

C. Exit Devices

1. Exit devices shall be rim-mounted and reversible with functions and options as listed below. Devices shall be mounted with panic bar at 37 inches above the floor with the devices undogged, or at the nearest approved manufacturer's standard.
2. **Concealed vertical rod shall not be used.**
3. Use Rockwood push plate's 70B series with all doggable exit devices.
4. All doors with card access controls shall be Von Duprin 98 Series exit devices

EXIT DEVICES SCHEDULE

<u>Typical Usage</u>	<u>Exit Device</u>
Use only for relatively new existing installations. Field check condition of existing.	Salvage existing, clean lubricate and reinstall.
Rated or stairwell opening with card access control	Von Duprin RX98F with E996L Electrified Lever Trim

Stairwell with no lock and that cannot be dogged down	Arrow FS3808 x SL08A Von Duprin 98L-F-BE Sargent 19-12-8815 x ETL
Stairwell with lock, or entrance in labeled opening where device cannot be dogged down during the day	Arrow FS3808 x SL08 Von Duprin 98L-F Sargent 19-12-8813 x ETL
Entrance door with card access control and key override	Von Duprin RX 98 NL QEL+
Entrance door with card access control and no key override	Von Duprin RX 98 DT QEL+
Entrance with dogging and outside pull trim	Arrow FS3803 x SP02 Von Duprin 98DL Sargent 19-8810 x PTB
Entrance with dogging, outside pull trim and keyed cylinder	Arrow FS3803 x SL03 Von Duprin 98NL Sargent 19-12-8804 x PTB
Fire escapes or low occupancy classrooms with exit only requirements	Arrow FS3803 Von Duprin 98EO-F Sargent 19-12-8810
Locations requiring controlled egress.	VonDuprin CHEXIT Series CX98 controlled exit device.
Residence hall wide stile entrance/exit doors with dogging and without cylinder	Von Duprin 98DT (pull trim and blank escutcheon) Arrow S3803 x SP02 Sargent 19-8810 x PTB
Residence hall wide stile entrance/exit doors with dogging and cylinder	Von Duprin 98DT (pull trim and cylinder) Arrow S3803 x SP03 Sargent 19-8804 x PTB
Rated opening requiring daytime passage and nighttime locking. Door is always latched.	Von Duprin 98 Series Double Cylinder Exit Device

D. Dead Bolts

1. Dead bolts shall be full-mortise Corbin Russwin ML2200 Series with thumb turn lever 519F10 and 2 ¾ inch backset, and with functions as listed below. Unless required to match existing hardware locations or noted on drawing, center of cylinder will be at 60 inches above the finished floor.
 - a. Salvage existing dead bolts, clean lubricate and reinstall. Use only for relatively new existing installations. Field check condition of existing.
 - b. Corbin Russwin ML 2217 is typical for gang toilet rooms for use by custodial and maintenance workers.

E. Push/Pull Units

1. Push/pull plates shall be stainless steel or bronze as required for the finish desired. Pull handles shall be solid forged metal with finish specified and be through bolted through plate and door. Punch push plate for cylinder when required by dead bolt. Unless otherwise noted, pull handles and plates shall be centered at 38 inches above the floor and push plates at 46 inches above the floor.

PUSH/PULL UNIT SCHEDULE

Salvage existing, reinstall	Use only for relatively new existing installations. Field check condition of existing.
Push plate	Baldwin 8" x 16" wrought push plate, 2210 or equal by Rockwood.
Push plate and handle	Baldwin 8" x 16" wrought pull plate 2110 with 2565 handle or equal by Rockwood.

F. Closers

1. All closers should be overhead, surface mounted closers, and must conform with ADA. **Concealed or floor closers are not acceptable. LCN Series 4040 is not acceptable.**

CLOSERS SCHEDULE

<u>Typical Usage</u>	<u>Maximum Size Interior Door</u>	<u>Maximum Size Exterior Door</u>	<u>LCN Catalog Number</u>	<u>Corbin Russwin Catalog Number</u>
Interior doors - High Frequency: Closer mounted on <u>pull</u> side of door.	Up to 54 inches	n/a	4011	DC8200

Interior doors - Low Frequency: Closer mounted on <u>pull</u> side of door. (offices, storage rooms, electrical, mechanical)	Up to 48 inches	n/a	4011	DC6200
Exterior doors, or interior doors where the closer cannot be mounted on the door side of the frame. This closer mounts on the room side of the frame. It requires four inches or more clearance above the door opening.	Up to 54 inches	Up to 42"	4021	DC8220
	60 inches	60 inches	4025 or 4026 sized to match door	DC8220
Exterior doors, or interior doors where the closer cannot be mounted on the door side of the frame and the mounting space on the frame is less than four inches. Design the door header to avoid this closer when possible.	Up to 54 inches 60 inches	Up to 42" 60 inches	4021 with 18G plate 4025 or 4026 with 18G plate, sized to match door	DC8220 x 754F24
Exterior doors and interior doors - high frequency - where hold open is required.	Up to 54"	Up to 42"	4111 w/CUSH-N- STOP x H.O.	DC86210 x A5
Interior Doors – low frequency – where hold open is required (offices, storage rooms, electrical, mechanical)	Up to 48"	n/a	4111 w/ CUSH- N-STOP x H.O.	DC6210 x A5

G. Doorstops

DOORSTOP SCHEDULE

<u>Typical Usage</u>	<u>Doorstop</u>
Typical for lever handle locksets	Glynn-Johnson projected wall-mounted doorstop WB33.
Typical for all doors with knobs unless otherwise required by job condition	Ives wall mounted doorstop (408-1/2 at concrete or masonry, 406-1/2 at all wood and hollow walls with wood blocking, and 407-1/2 only at existing hollow walls having no blocking), or equal by Baldwin. Coordinate blocking in new walls with other trades.
Typical for overhead door control where there is no wall or no closer (e.g. student rooms).	Glynn Johnson 90/GJ900S
When using closer as a stop.	LCN door closer 4111 SHCNS (stop arm)

H. Kick Plates

- Kick plates are required on the push side of all doors that have door closers.** Kick plates shall be beveled on three sides and furnished with match oval head screws.

2. Salvage existing, clean and reinstall.
3. Rockwood 304 stainless steel kick plate -.050 inch x 16" high x width of door less 1 inch. Provide higher or lower protection when noted on door schedule.
4. Rockwood bronze kick plate -.050 inch x 16" high x width of door less 1 inch. Provide higher or lower protection when noted on door schedule. Use bronze only to match existing; the bronze corrodes when the lacquer finish wears away. Provide trim protectors at high kick plates for doors with heavy cart traffic.

I. Weather-stripping

WEATHERSTRIPPING SCHEDULE

<u>Typical Usage</u>	<u>Weather-stripping</u>
Field-check condition of existing vinyl and pile seats. Note or specify replacement as required.	Salvage existing when appropriate, clean and reinstall.
At both jambs and head	Pemko extruded aluminum retainer with vinyl bulb, 306A or equal by Reese.
Typical heavy use door bottom on new hollow metal doors. Do not use this door bottom with plastic laminated doors as insufficient material is left for screws.	Pemko full mortise automatic door bottom, 434A or equal by Reese.
Typical heavy use door bottom for plastic laminate doors.	Pemko semi-mortise automatic door bottom, 430AM or equal by Reese.
Typical heavy use door bottom for existing hollow metal doors.	Pemko surface mounted automatic door bottom, 430AS or equal by Reese.
Typical lighter duty door bottom for new doors.	Pemko full mortise automatic door with neoprene sponge, 411 or equal by Reese.
Typical lighter duty door for existing hollow metal doors.	Pemko surface mounted automatic door bottom, 412 or equal by Reese.
Exterior Door Sweeps	National Guard C607A or Pemko 18062
Exterior Door Thresholds	National Guard 425 or Pemko 175

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J. Foot and Head Bolts

1. Foot and head bolts shall have 12-inch downset and 3/4 inch throw unless otherwise noted. Manual bolts shall have lever operation which allows for partial opening before engaging bolt.

FOOT AND HEAD BOLT SCHEDULE

<u>Typical Usage</u>	<u>Foot and Head Bolts</u>
Head bolt. Use only on non-labeled door openings.	Baldwin extension flush bolt 0610
Floor bolt. Use only on non-labeled door openings.	Baldwin extension flush bolt 0610. Provide Baldwin 0621 or 0622 dustproof strike. Set floor strike in epoxy or expanding grout. Coordinate type and installation of floor strike with floor material (tile, carpet, etc.).
Typical at labeled door opening. Avoid pairs of doors at labeled openings if possible by using ganged single doors.	Ives FB31P. Provide strike plates for active door leaf and dustproof floor strike. Set floor strike in epoxy or expanding grout. Coordinate type and installation of floor strike with floor material (tile, carpet, etc.).

K. Coordinators

1. Avoid door coordinators wherever possible by using removable door mullions.

DOOR COORDINATOR SCHEDULE

<u>Typical Usage</u>	<u>Foot and Head Bolts</u>
Salvage only roller type coordinators, and only in low traffic areas.	Salvage existing.
Use at low traffic areas with no potential for vandalism.	Ives projected coordinator with roller operation against active and inactive doors, model 469 or 469 1/2, or equal. Provide strikes and required accessories.

Use at high traffic openings and areas subject to vandalism.	Glynn-Johnson linear stop-mounted coordinator, Series COR, with fillers x size as required.
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- L. Removable Mullion
 - 1. Salvage existing – check anchorage.
 - 2. Von Duprin removable steel mullion KR4954 with MT54 storage unit x prime paint, or equal by Arrow or Sargent.
- M. Secret Latch
 - 1. Rockwood RW 602x26D or Major MRS 200 SPB or MRS 200 PA(AL)

1.9 HARDWARE FINISHES

- A. Unless noted elsewhere, finish of hardware listed in Scheduled Hardware shall have Dull Bronze or Dull Chromium finish as established by the U.S. Bureau of Standards and listed in the schedule below. Items of hardware not categorized below shall have finish best matching the selected finish series.

HARDWARE FINISHES SCHEDULE

<u>Item</u>	<u>Dull Bronze (DB) Finish Series</u>	<u>Dull Chromium (DC) Finish Series</u>
Hinges (All hinges shall have extra heavy copper base plating.)	US10	US26D
Locksets (latch sets)	US10	US26D
Panic Devices	US10	US32D (stainless)
Deadbolts	US10	US26D
Push/pull plates	US10	US26D
Doorstops	US10	US26D
Kick plates	US10	US32D or US10
Vision lite glass stops	Natural Anodized Aluminum	Natural Anodized Aluminum
Weather-stripping	Natural Anodized Aluminum	Natural Anodized Aluminum
Closers		
Wood	Dark Bronze	Aluminum
Plastic laminate	Dark Bronze	Aluminum

Hollow metal	Dark Bronze	Aluminum
Natural Anodized Aluminum	Dark Bronze	Aluminum
Dark Bronze Aluminum	Dark Bronze or KDP Dark if noted	Aluminum or KDP Dark if noted

1.10 INSTALLATION

- A. Install all new and/or rework existing hardware in compliance with the manufacturer's recommendations and as noted on Door Schedule and specified herein. Mortised items will be adjusted to fit flush.
- B. Do not install surface mounted items until finishes have been completed on the substrates involved.
- C. Lubricate and adjust all hardware to operate properly.

END OF SECTION 087100