

SECTION 087100 – FINISH HARDWARE

**PART 1: GENERAL**

1.1 Scope and Standard

- A. WVU has a standardized lock and keying system and this Design Standard must be followed strictly to maintain that system. This section does **not** allow for variances, “equals” or substitutes to the specified type or manufacturers without prior approval.
- B. Furnish hardware for man doors, including necessary fasteners, drop plates, and other devices necessary for proper application of hardware as the building needs dictate.
- C. Specific Omissions: Hardware for the following is specified or indicated elsewhere, unless specifically listed in the hardware sets:
  - 1. Windows
  - 2. Cabinets of all kinds, including open wall shelving
  - 3. Signs, except as noted
  - 4. Toilet accessories of all kind, including grab bars
  - 5. Overhead doors, except cylinders where scheduled

1.2 References

The following material was used as references:

- A. The Door and Hardware Institute (DHI) Various Publications
- B. American National Standards (ANSI) / Builders Hardware Manufacturer Association (BMHA).
- C. National Fire Prevention Association (NFPA).
  - 1. NFPA 80 Standard for Fire Doors and Fire Windows
  - 2. NFPA 101 Life Safety Code
  - 3. NFPA 105 Smoke and Draft Control Door Assemblies
- D. Underwriters Laboratories (UL)
  - 1. UL 10C – Fire Tests of Door Assemblies
  - 2. UL 305 – Panic Hardware
- E. International Building Code

F. American Disabilities Act (ADA) – 1990 Civil Law

1.3 Submittals

- A. Hardware schedule shall be compiled by an Architectural Hardware Consultant.
- B. Schedules are to be typed in accordance with DHI “Sequence and Format for the Hardware Schedules” vertical format including:
1. Types, style, function, size, and finish of each hardware item.
  2. Names and manufacturer of each item.
  3. Fastenings and other pertinent information.
  4. Cross-reference hardware sets to location indicated on drawings.
  5. Explanation of all abbreviations, symbols, and codes contained in the schedule.
  6. Mounting locations for hardware (per DHI standards).
  7. Door and frame sizes and materials.
- C. Product and Data catalog cuts will be included and attached to the hardware schedule.
- D. Samples may be required per the Architect and will be submitted; and after approval, be incorporated into the work or returned in like-new condition.
- E. A **key schedule** is to be submitted after a meeting between the owner, WVU Lead Locksmith, Architect, and hardware supplier. Provide a keying schedule, listing the levels of keying as well as an explanation of the key system’s function, the key symbols used, and the door numbers controlled per the DHI format and nomenclature. To ensure timely delivery, the keying schedule must be submitted with the hardware schedule submittals to be **to be coordinated through the office of the Lead Locksmith.**
- F. Wiring Diagrams and other pertinent electrical information for the proper installation of all electrical, electromechanical, and electromagnetic products will be submitted with the hardware schedule.
- G. Operation and Maintenance Data: At the completion of the job, furnish to the Owner two copies of the Owner’s operation and maintenance manual. The manual will consist of a hard cover and three-ring binder with the project name on the front. Included in the manual will be: the final copy of the hardware schedule, the catalog cuts for the schedule, the finalized keying schedule, the names and phone numbers of the maintenance representatives for each item supplied and any specialized tools needed to maintain the hardware. Coordinate this delivery with the post-installation job site meeting.

#### 1.4 Quality Assurances

- A. Standards: Manufacturers and model numbers listed are to establish a standard of quality required by West Virginia University.
- B. Substitutions: Products are to be specified to ensure a uniform basis of acceptable materials. No other substitutions will be allowed. Certain products have been selected for their unique characteristics and particular project suitability. **Any deviation must be approved in writing through Design and Construction.**
1. Items specified, as “no substitution” shall be provided exactly as listed.
  2. Items listed with no substitute manufacturers have been requested by Owner/Architect to match existing for continuity and/or future performance and maintenance standards or because there is no known equal product.
  3. If no other products are listed in a category other than the one specified, then “no substitution” is implied.
  4. **Voluntary alternate pricing will not be accepted without the written authorization from the Lead Locksmith.**
- C. Supplier qualifications: The hardware supplier must be engaged regularly in contracting work and be staffed to expedite work. The supplier must have on staff an Architectural Hardware Consultant (AHC) who will be available at reasonable times throughout the job to help with the proper selection, scheduling, detailing installation, and adjusting of the hardware.
- D. Single source responsibility: Obtain each type of hardware (one latch and lock manufacturer, one hinge manufacturer, one closer manufacturer, etc.) from a single manufacturer. **This will be enforced for mechanical and electrical products.**
- E. Fire-Rated Openings: Provide door hardware for fire-rated openings that comply with NFPA standard No. 80 and the requirements of Authorities Having Jurisdiction.
1. Where emergency exit devices are required on fire rated doors (with supplementary marking on door UL labels indicating “Fire Doors to be equipped with Fire Exit Hardware”) provide UL label on exit devices indicating “Fire Exit Hardware”.
- F. Electronic Security Hardware: **When electrified hardware is scheduled in the hardware specification, the hardware supplier must employ an Architectural Hardware Consultant (AHC), knowledgeable in electrified components and systems and who is able to produce wiring diagrams and consult as needed.** Coordinate installation of the electronic security hardware

with the Architect and electrical engineers and provide installation and technical data to the Architect and other related sub-contractor. Upon completion of electronic security hardware installations, verify that all components are working properly, and state in the required guarantee that this inspection has been performed. All wiring must be 18 gauge or thicker. Provide electrical door hardware from the same source manufacturer as mechanical door hardware. (Some wiring may be smaller than 18 gauge due to manufacturer.)

#### 1.5 Delivery, Storage, and Handling

- A. Marking and Packaging: The hardware will be delivered to the job site in the manufacturer's original packages, marked to correspond with the approved hardware schedule and opening numbers. Include installation instructions with each piece of hardware.
- B. Delivery: Some items of hardware may be delivered to fabricators for factory installation. The balance of the hardware will be delivered to the job site once the contractor has secured a dry and heated room in which to lock and store the material. This delivery fee will be included in quoted price of the material. The supplier will deliver and inventory the material in the presence of the contractor and the installer. At this time, installation tips or special instructions will be reviewed. Coordinate this meeting with the pre-installation job site meeting.
- C. Items damaged in shipment will be replaced promptly at contractor's expense.

#### 1.6 Warranty

- A. Starting date for all warranty periods will be from the date of Substantial Completion.
- B. No liability is to be assumed where damage or faulty operation is due to improper installation, improper use or abuse.

Provide warranty from the hardware supplier as follows:

- 1. Hinges: Life of building.
  - 2. Closers: Ten years, electronic closers, two years.
  - 3. Exit devices: Three years, electrified devices, one year.
  - 4. Locksets: Five years, electrified devices, one year.
  - 5. All other hardware: One year.
- C. Products judged to be defective during the warranty period must be replaced or repaired in accordance with the manufacturer instruction and warranty, at no additional cost to the owner.

1.7 Maintenance

- A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions for Owner’s continued adjustment, maintenance, and removal and replacement of door hardware.

**PART 2: PRODUCTS**

2.1 Manufacturers

- A. The following manufacturers have been selected for this project.  
 Note that even though an acceptable substitute manufacturer may be listed, the Product must provide all the functions and features of the specified product or it will not be approved.

<u>Description</u> <u>Substitution</u>	<u>Specified</u>	<u>Acceptable</u>
Hinges (heavy duty)	Hager	McKinney
Hinges (continuous)	Pemko	Markar, Roton
Hinges (pivots)	Ives	Brookline, Rixon
<u>Description</u>	<u>Specified</u>	<u>Acceptable</u>
Locks, latches, deadlocks	Schlage	Sargent, Corbin/Russwin
Electromechanical locks (stand alone)	Onity	
Cylinders and keying	Schlage	Sargent, Corbin/Russwin,
Cylinders and keying – Housing	Best	Best
Exit devices	Von Duprin	Sargent, Schlage
Electric strikes	HES	Von Duprin
Removable mullions	Von Duprin	Sargent
Closers	LCN	Sergeant, Norton
Power operators	LCN	Gyro-Tech
Flush bolts, dust proof strikes	Ives	Trimco, DCI
Coordinators	Ives	Trimco, DCI
Overhead stops/holders	Glynn-Johnson	Sargent
Card Swipe	Specified on line in electrical specifications	
ADA openers	LCN	Gyrotech, Nabco
Magnetic holders	LCN	Sargent
Stops/holders	Ives	Rockwood
Push/pull/kick plates	Ives	Rockwood
Thresholds	NGP	Pemko, Reese, Zero
Seals/door bottoms	NGP	Pemko, Reese, Zero
Weather-strip	NGP	Pemko, Reese, Zero
Key cabinets	Lund	Telkee, HPC

- B. In Residence Halls, Best hardware is typically used.
- C. If a building is partially renovated, the hardware should match the existing hardware in that building with respect to the manufacturer.
- D. Hand of Door: Drawings show direction of slide, swing, or hand of each door leaf. Furnish each item of hardware for proper installation of door movement as shown. **Show doors as working now so that they may be listed left hand/right hand. No reverse bevel.**
- E. Where the exact types of hardware specified are not adaptable to the finished Shape or size of the members requiring hardware, furnish suitable types having as nearly as possible the same operation and quality as the type specified, subject to Locksmith approval.

## 2.2 Materials

### A. Screws and Fasteners

1. Provide hardware manufactured to conform to published template, generally prepared for machine screw installation.
2. Furnish screws for installation with each hardware item. Finish exposed (exposed under any condition) screws to match hardware finish or, if exposed in surfaces of other work, to match finish of this other work as closely as possible including “prepared for paint” surface to receive painted finish.
3. Provide concealed fasteners for hardware units that are exposed when door is closed except to the extent that no standard units of type specified are available with concealed fasteners. Do not use through-bolts for installation where bolt head or nut on opposite face is exposed in other work unless their use is the only means of reinforcing the work adequately to fasten the hardware securely.

### B. Hinges/Bolts

1. The following is a guide for hinge type required for their specification:
  - a. 1 ¾” doors up to and including 3’-0” wide:
    - Exterior: heavy weight (.180), ball bearing, bronze/stainless steel 4 ½” x 4 ½” -N/R pin.
    - Interior: standard (.180) ball bearing steel, 4 ½” x 4 ½”.
  - b. 1 ¾” doors over 3’-0” wide:
    - Exterior: heavy weight (.180), ball bearing, bronze/stainless steel, 5”x 5”-N/R pin.
    - Interior: heavy weight (.180), ball bearing, steel, 5” x 5”.

2. The width of hinges shall be sufficient to clear all trim. Furnish one pair for all door up to 60" high. Furnish one and one half pair for 7' high.
3. Hinge pins: Except as otherwise indicated, provide hinge pins as follows:
  - a. Steel hinges: Steel pins.
  - b. Non-ferrous Hinges: Stainless steel pins.
  - c. Out-swing Exterior Doors: Non-removable pins.
  - d. Interior Doors: Non-rising pins.

C. Continuous Hinge

1. Provide continuous hinges of the type and style noted in the hardware sets.
  - a. Continuous hinges will be of pin and barrel construction with a .25 diameter 304 stainless steel pin, gear type hinges are not acceptable.
  - b. Continuous hinges must be successfully tested for 1,500,000 cycles.
  - c. Continuous hinges will be full mortise installation with template hole pattern.
  - d. Aluminum doors will have continuous hinges made of extruded aluminum 6063-T6 alloy with standard aluminum powder coating finish by hinge manufacturer.

D. Automatic and manual flush bolts shall have forged bronze face-plate with extruded brass lever and with wrought brass guide and strike. Flush bolts for hollow metal doors up to 7' - 6" in height shall have 12" steel or brass rods. Manual flush bolt rods for doors over 7' - 6" in height shall be increased by 6" for each additional 6" of door height. Provide dust proof strikes.

E. Coordinators

1. Where pairs of doors are equipped with automatic flush bolts or astragal, provide a bar type coordinating device, surface applied to the underside of the stop at the frame head.
2. Finish of the coordinator to be prime coat to receive the same finish paint as the door frame.
3. Provide a filler bar of the correct length to span the entire width of the opening, and appropriate brackets for parallel arm door closers and surface vertical rod strikes.

F. Mortise Locks

1. Locks shall be ANSI A156.13, Grade 1 mortise locksets, manufactured from heavy gauge steel, containing components of steel with a zinc dichromate plating for corrosion resistance.
2. Locks are to have a standard 2 3/4" backset with a full 3/4" Throw stainless steel mechanical anti-friction latch bolt. Deadbolt shall be a full 1" throw, constructed of stainless steel.
3. Lever trim shall be cast or forged in the design specified, with 2 1/8" diameter roses. Levers shall be thru-bolted to assure proper alignment. Locks will include screws to accommodate door thickness.
4. All inside thumb-pieces are to have (ADA) Disability turns.
5. Locks meeting this specification: Schlage, Sargent Corbin/Ruswin, Best.

**Premium Manufacturers**

<b>Schlage</b>	<b>Sargent</b>	<b>Corbin/Ruswin</b>	<b>Best</b>
L9000 93A	8200 LNJ	ML2200 LWA	40 H 3H

G. Cylindrical Locksets and Latchsets.

1. Heavy-duty cylindrical locksets and latchsets shall conform to ANSI A156.2, Series 4000, Grade 1. Functions as listed in Hardware Sets.
2. Locks shall have field reversible handing.
3. Lever support shall be sustained by use of two independent spring cartridges, one for each lever.
4. Locks shall have special tapped holes in outside mounting plate to resist loosening of thru-bolt.
5. Springs to be full compression type.
6. Strike to be 16 gauge, with 1" deep box construction, curved lip of sufficient length to clear trim and protect clothing.
7. Locks shall have free wheeling lever to eliminate the ability to exert excessive force on the end of the lever.
8. Locks to have inner spindle that independently operates lever when locked.



9. Locks meeting this specification: Schlage, Sargent, Corbin/Russwin, Best.

### Premium Manufacturers

<b>Schlage</b>	<b>Sargent</b>	<b>Corbin/Russwin</b>	<b>Best</b>
D Series Sparta	10 Series LJ	CL3300 NZD	93K 14D

### H. Exit Devices

1. Exit devices shall be touch-pad type, fabricated of brass, bronze, stainless steel, or aluminum, plated to the standard architectural finishes to match the balance of the door hardware.
2. Exit devices shall be tested to ANSI/BMHA A156.3 test requirements by a BMHA certified testing laboratory. **A written certification showing successful completion of a minimum of 100,000,000 cycles must be provided.**
3. Touch-pad shall match exit device finish, and shall be stainless steel for US26, US26D, US28, US32, and US32D finishes.
4. All devices to incorporate a **Security Dead Latching** feature. Devices without DL feature will not be acceptable.
5. Provide **Roller Strikes (RS)** for all rim and surface mounted vertical rod devices. **Devices without roller strikes will not be acceptable.** Provide standard manufacturer's strikes for concealed vertical rod devices.
6. Mechanism case shall sit flush on the face of all doors. **Devices shim kits must be used to eliminate pinch points.** Glass trim for doors with cutouts shall not extend beyond face of door as stated in Section 08111, 2.02. **(Precision requires S-98 or NS-40 to meet Part 6).**
7. All non-fire related exit devices shall have **Cylinder Dogging** where needed.
8. Exit devices shall be UL listed panic exit hardware. All exit devices for fire rated openings shall be UL labeled fire exit hardware.
9. All exit devices shall incorporate a fluid damper or other device, which eliminates noise associated with exit device operation. Touch-pad shall extend a minimum of one half of the door width. **End-cap will be flush design, heavy duty die-cast alloy with a sloped backed low profile.**

10. A key removable mullion is the Owner's preferred application on pairs of hollow metal doors and frames.
11. On fire rated pairs of doors the "LBR" option will be used.
12. Where lever trim is required, break-away trim will be used.
13. Exit devices meeting this specification: Von Duprin, Sargent, Precision.

**Premium Manufacturers**

<b>Von Duprin</b>	<b>Sargent</b>	<b>Precision</b>
99 Series	<b>19-GL8800/8600xRS</b>	<b>Apex 2000</b>

- I. Electric Strikes
  1. Electric strikes shall be UL 1034 Burglary Listed, ANSI/BHMA 156.1, Grade 1, manufactured with investment cast stainless steel, internal steel components, die cast aluminum back box, high-density steel keeper, stamped steel faceplates, and have latch bolt strike monitoring (LBSM).
  2. Strikes are to be dual-voltage 12 or 24 volts DC, field reversible for fail-safe/fail-secure applications, non-handed, tamper resistant, and have self-contained (internal) solenoid.
  3. Electric strikes meeting this specification: Hes, Von Duprin.
- J. Door Closers
  1. **All closers will utilize a stable fluid withstanding temperature range of 120 degrees F – 30 degrees F without seasonal adjustment of closer speed to properly close the door. Closers on fire rated doors will be provided with temperature stabilizing fluid that complies with Standard UL 10C for "Positive Pressure Fire Test of Door Assemblies" and UBC 7-2 (1997).**
  2. Cylinder body shall be 1 1/2" in diameter, and double heat-treated pinion shall be 11/16" in diameter. Door closer shall have hydraulic, full rack and pinion action with a high strength **cast iron cylinder. (Note: Sargent & Rixson meet Part 2.)**
  3. Spring power shall be continuously adjustable over the full range of closer sizes, and allow for reduced opening force for the physically handicapped. Hydraulic regulation shall be by tamper-proof, non-critical valves. Closers shall have separate adjustment for latch speed, general speed, and back check. **A written certification showing the successful completion of a minimum of 10,000,000 cycles for exterior door closers must be provided.**

4. All closers shall have solid forged steel main arms (and forged forearms for parallel closers).
5. Closer cylinders, arms, and metal covers shall have a powder coating finish which has been certified to exceed 100 hours salt spray testing by ETL, and independent testing laboratory used by BHMA for ANSI certification. For metal components that can not be powder coated, a special rust inhibiting finish (SRI) must be used.
6. All closers will not be seen on the public side or hallway side of the door. The appropriate drop or mounting plates will be used as conditions dictate. The door closer will never be used as a stop and will never have a built in holder.
7. Door closers meeting the specification: LCN, Sargent, Norton, Stanley.

<b>LCN</b>	<b>Sargent</b>	<b>Norton</b>		<b>Stanley</b>
<b>4040 Series</b>	<b>280 Series</b>	<b>7500 Series</b>	<b>QDC - 100</b>	<b>351</b>

K. Power Operators

- A. Where low kinetic energy, as defined by ANSI Standard A156.19, power operators are indicated for doors required to be accessible to the disabled, provide pneumatically and electrically powered operators complying with the 1990 ADA for opening force and time to close standards.
- B. Full closing force shall be provided when the power or assist cycles ends.
- C. All power operator systems shall include the following features and Function:
  1. Provision for separate conduits to carry high and low Voltage wiring in compliance with the National Electric Code, section 725-31.3.
  2. **When obstruction or resistance to the opening swing is encountered, the operator will pause, then reattempt to open the door.** If the obstruction or resistance remains, the operator will again pause the door.
  3. **The operator will be designed to prevent damage to the mechanism if the system is actuated while the door is latched or if the door is forced during the cycle.**
  4. All covers, mounting plates, and arm systems shall be powder coated and successfully pass a minimum of 100 hours testing as outlined in ANSI Standard A156.18.
  5. UL listed for use on labeled doors.

6. All operators shall be non-handed with spring power over range of 1 thru 6.
7. Provisions in the control box or module shall provide control (inputs and outputs) for: electric strike delay, auxiliary contacts, sequential operation, fire alarm systems, actuators, swing side sensors, stop side sensors.
8. Easily accessible main-power and maintain hold open switches will be provided on the operator.
9. An electronically controlled clutch to provide an adjustable opening force.
10. Provide units that incorporate a microprocessor to control all motor and clutch functions.
11. Provide an on-board power supply capable of delivering both 12V and 24V outputs up to a maximum of 1.0 ampere combined load.
12. Slow blow fuses shall protect all input and output wiring. These fuses shall be easily replaceable without special tools or component replacement.
13. Power Operators meeting this specification: LCN.

**LCN  
4600/4800**

**L. Push Plates**

1. Push plates shall be 8" wide x 16" high x .050" thick. Where door stile does not allow 6" plates, 4" plates may be used.

**M. Door Pulls & Push Bars:** Pulls shall be 1" diameter solid bar stock, 10" center to center, with a projection of 2 1/2" and clearance of 1 1/2" and a back plate as scheduled. Push bars shall be 1" diameter solid bar stock, of sufficient length to span from center to center of each stile.

**N. Protective Plates:** Provide kick, mop, or armor plates of .050 material with four beveled edges on the push side of all doors that have an automatic closing device and that have through traffic. Where scheduled, supply protective plates on the pull side of doors. Edge guards may be required as necessary (see hardware schedule). Protection plates must be sized appropriately not to conflict with any louvers. Furnish with machine or wood screws, finished to match plates.

Sizes of the plates shall be as follows:

Kick plates: 10" high x 2" less than door width (LTDW) on singles, 1" (LTDW) on pairs.

Mop plates: 4" high x 1" (LTDW) on singles, 1" (LTDW) on pairs.

Armor plates: 36" high x 2" (LTDW) on singles, 1" (LTDW) on pairs.

Size width of plates on pull side of doors at 1" (LTDW).  
(LTDW) less than door width

O. Door Stops and Holders

1. It shall be the responsibility of the hardware supplier to provide door stops for all doors in accordance with the following requirements:
  - a. Wall stops shall be used wherever possible.
  - b. At no time will a hinge pin stop be acceptable.
  - c. At any opening where wall stop cannot be used, a heavy duty overhead stop will be required.
  - d. All exterior doors will have an overhead stop and may, at the Owner's option, be a stop and holder. This **overhead stop will not be built into the closing device, but will work in conjunction with the closer.**

2. Wall Stops that meet this specification: Ives, Rockwood

P. Thresholds and Gasketing: Furnish as specified and per details. Match finish of other items as closely as possible. Provide only those units where resilient or flexible seal strip is easily replaceable and readily available. Thresholds, sweeps, and weather-stripping will be supplied to weather proof the exterior doors. The thresholds will be supplied to fit the particular sill conditions and not conflict with the American Disabilities Act (ADA). Exterior pairs of doors will have split astragal to prevent air infiltration. Interior doors may require gasketing; thresholds and sweeps to act as a sound barrier per the Owner's request.

1. Thresholds and Gasketing that meet this specification: NGP, Pemko, Reese, Zero.

Q. Silencers: Furnish "push-in" type silencers for each hollow metal or wool frame, 3 for each single frame, 2 for each pair frame. Omit where gasketing is scheduled, unless the frames are factory pre-drilled.

1. Silencers that meet this specification: Ives, Rockwood.

- R. **Magnetic Holders:** Where magnetic holders are scheduled, provide a surface of wall mounted electromagnetic door release with a minimum of 25 pounds of holding force, or positive release button to initiate the closing motion. Where magnetic holders are used on fire-rated doors, they must be wired as recommended by factory.

### 2.3 Finishes

- A. All hardware will be of stainless steel, dull chrome or sprayed aluminum finish.  
**Verification of finishes to be provided through Locksmith.**

### 2.4 Keying

#### **Keying Requirements**

- A. **Key System:** All cylinders shall be furnished and supplied into the existing University Patented/Restricted Key System as directed by Owner. Non-Interchangeable Core cylinders are to be furnished typically with the exception of Schlage full size conventional IC cores #23-030 (or Best cores – at housing).
- B. **Orders to the manufacturer for all products pertaining to the key system, shall be accompanied with a “Letter of Authorization” by an authorized University representative.**
- C. **Keying Meeting: The keying meeting(s) shall be initiated by the supplier within 60 days of award of contract and be conducted by a supplier representative, a University authorize representative and a manufacturer authorized representative.** A final keying schedule shall be detailed and produced by the supplier and submitted through the Architect to the Owner for final approval.
- D. **Construction Keying:**
1. All cylinders are to be furnished with a split key construction system. The University is responsible for removing construction key inserts upon taking possession of the facility or any part thereof. Contractor shall remove all cylinders.
- E. **Key Cylinders:**
1. Shall have a utility patent and produced solely by the manufacturer (OEM cylinders or key blanks will not be allowed).
  2. All cylinders shall be keyed and assembled by the manufacturer.

3. Standard cylinders shall be 6 pin and manufactured of solid brass using nickel silver bottom pins, brass master pins, and phosphorus bronze springs Tumbler Springs. (Brass bottom pins or steel tumbler springs are not allowed.
4. Interchangeable core cylinders shall be 7 pin manufactured of solid brass using nickel silver bottom pins and brass master pins and phosphorus spring Tumbler Springs. (Brass bottom pins or steel tumbler springs are not allowed)

F. Keys and Key Blanks

1. All cut keys and/or key blanks of any type are to be manufactured of nickel silver and patented to guard against unauthorized duplication.
2. Furnish quantities as follows: 3 each per Change Key, 6 each per Master key, 3 each Permanent Control Keys, 12 each Split Key Construction Keys, 6 each Split Key removal tools, 12 each Interchangeable Core Construction Keys, 6 each Interchangeable Core Control Keys, and 100 each Key Blanks.
3. All Construction and Permanent keys of any type are to be shipped directly to the authorized Owner's representative directly from the manufacturer using the PKI System. Note to contractor: Contact the Owner's representative for construction keys.  
**Any deviation from the specification must be approve in writing through the Architect to the Owner.**

G. Locksets and Cylinders shall be of the same manufacturer.

## 2.5 KEY CONTROL

- A. Provide a key control system, including envelopes, labels, tags with Self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet, all as recommended by system manufacturer, with capacity for 150% of the number of locks required for the Project.
1. Provide complete cross-index system set up by the hardware supplier, and place keys on markers and hooks in the cabinet as determined by the final schedule.
  2. Provide piano hinged panel type cabinet for wall mounting.

## **PART 3: EXECUTION**

### 3.1 Examination

- A. Prior to installation of any hardware, examine all doors, frames, walls, and related items for conditions that would prevent proper installation of finish hardware. Correct all defects prior to proceeding with installation.
- B. Prior to hardware installation, the **general contractor will set up a pre-install job sit meeting** with the hardware supplier, hardware installer, and any other trades people deemed necessary (i.e. electrical contractor, security contractor, etc.) for communication to assure trouble free installation. This meeting would be best coordinated with the delivery requirements detailed in section 1.05.
- C. The hardware supplier will observe the installation of the first lockset, closer, and exit device.

### 3.2 Installation

- A. All hardware will be installed by qualified tradesmen skilled in the application of commercial grade hardware. For technical assistance if necessary, installers may contact the manufacturer's representative for the item in question, as listed in the hardware schedule.
- B. Mount hardware units at heights indicated in "Recommended Locations For Builders Hardware for Standard Steel Doors (and Wood Doors) and Frames" by the Door and Hardware Institute.
- C. Install each hardware item in compliance with the manufacturer's instructions and recommendations, using only the fasteners provided by the manufacturer.
- D. Do not install surface mounted items until finishes have been completed on the substrate. Protect all installed hardware during painting.
- E. Set units level, plumb and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.
- F. All operating parts shall move freely and smoothly without binding, sticking, or excessive clearance.
- G. Set thresholds for exterior door in full bed mastic sealant complying with Requirements specified in Division 7 Section "Joint-Sealers".

### 3.3 Adjusting, Cleaning, and Demonstrating



- A. Adjust and check each operating item of hardware and each door to ensure proper operation or function of every unit. Replace units that can not be adjusted to operate freely and smoothly at substantial completion.
- B. Where door hardware is installed more than one month prior to acceptanceOr occupancy of a space or area, return to the installation during the week prior to acceptance or occupancy and make final check and adjustment of all hardware items in such space or area. Clean operating items as necessary to restore proper function and finish of hardware and doors. Adjust door control devices to compensate for final operation of heating and ventilating equipment.
- C. Clean adjacent surfaces soiled by hardware installation.
- D. Instruct Owner’s personnel in the proper adjustment, lubrication, and maintenance of door hardware and hardware finishes.

3.4 Field Quality Control

- A. **Six-month Adjustment:** Approximately six months after the date of Substantial Completion, the installer, accompanied by representatives of the manufacturers of latchsets and locksets, door control devices, and of other major hardware suppliers, **shall return to the Project to perform post installation job site meeting:**
  - 1. Examine and re-adjust each item of door hardware as necessary to restore function of doors and hardware to comply with specified requirements.
  - 2. Consult with and instruct Owner’s personnel in recommended additions to the maintenance procedures.
  - 3. Replace hardware items that have deteriorated or failed due to faulty design, materials, or installation of hardware units.
  - 4. Prepare a written report of current and predictable problems (of substantial nature) in the performance of the hardware.
  - 5. Delivery Operations and Maintenance Manuals (described in Section 1.03 Submittals, Part G) and any other special tools needed to maintain the hardware.

3.4 Protection

- A. Provide for the proper protection of all items of hardware until the Owner accepts the project as complete. Damaged or disfigured hardware shall be replaced by the responsible party.

3.5 Hardware Schedule

- A. Provide hardware for each door to comply with requirements of Section “Finish Hardware” and hardware set numbers indicated in the door schedule.
- B. It is intended that the following schedule includes all items of finish hardware necessary to complete the work. If a discrepancy is found in the schedule, such as a missing item, improper hardware for a frame, door or fire codes, the preamble will be the deciding document.

END OF SECTION 087100