# SECTION 087100

# DOOR HARDWARE

## PART 1 - GENERAL

### 1.1 GENERAL PROVISIONS

A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

### 1.2 DESCRIPTION OF WORK

A. Work Included: Provide labor, materials and equipment necessary to complete the work of this Section, including but not limited to the following:

1. Commercial door hardware.
2. Cylinders for doors specified in other Sections as listed below.
3. Electrified door hardware and transformers.

B. Alternates: Not Applicable.

C. Items To Be Installed Only: Not Applicable.

D. Items To Be Furnished Only: Not applicable.

E. Related Work: The following items are not included in this Section and will be performed under the designated Sections:

1. Section 087110 – HARDWARE SCHEDULE for hardware by set number.
2. Section 119814- DETENTION DOOR HARDWARE for Detention door hardware.

### 1.3 SUBMITTALS

A. Product Data: Include installation details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: Details of electrified door hardware, indicating the following:

1. Wiring Diagrams: Detail wiring for power, signal, and control systems and differentiate between manufacturer-installed and field-installed wiring. Include the following:

a. System schematic.
b. Point-to-point wiring diagram.
c. Riser diagram.

d. Elevation of each door.

2. Detail interface between electrified door hardware and fire alarm access control and building control and security systems.

C. 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.
h. Description of each electrified door hardware function, including location, sequence of operation, and interface with other building control systems.

1) Sequence of Operation: Include description of component functions that occur in the following situations: authorized person wants to enter; authorized person wants to exit; unauthorized person wants to enter; unauthorized person wants to exit. Reset time period for time delayed hardware.

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.

D. Keying Schedule: Prepared by or under the supervision of supplier, detailing the DCAMM Project Manager's final keying instructions for locks. Include schematic keying diagram and index each key set to unique door designations.

E. Product Certificates: Signed by manufacturers of electrified door hardware certifying that products furnished comply with requirements.

1. Certify that door hardware approved for use on types and sizes of labeled fire doors complies with listed fire door assemblies.

F. Qualification Data: For firms and persons specified in "Quality Assurance" Article.

1. Include lists of completed projects with project names and addresses of architects and owners, and other information specified.

G. Maintenance Data: For each type of door hardware to include in maintenance manuals specified in Division 01.

H. Warranties: Special warranties specified in this Section.

I. Fire Door Assembly Inspection and Testing Reports: Submit a written report of the results of functional testing and inspection for fire door assemblies, in compliance with NFPA 80-2007/2010 requirements. Written report shall be provided to the DCAMM Project Manager to be made available to the Authority Having Jurisdiction (AHJ). Report shall include the door number for each fire door assembly, door location, door and frame material, fire rating, and summary of deficiencies..

## 1.4 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed door hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

B. Supplier Qualifications: Door hardware supplier with warehousing facilities in Project's vicinity and who is or employs a qualified Architectural Hardware Consultant, available during the course of the Work to consult with Contractor, Designer, and the DCAMM Project Manager about door hardware and keying.

1. Electrified Door Hardware Supplier Qualifications: An experienced door hardware supplier who has completed projects with electrified door hardware similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance, and who is acceptable to manufacturer of primary materials.

a. Engineering Responsibility: Prepare data for electrified door hardware, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.

2. Scheduling Responsibility: Preparation of door hardware and keying schedules.

C. Architectural Hardware Consultant Qualifications: A person who is currently certified by the Door and Hardware Institute as an Architectural Hardware Consultant and who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project.

1. Electrified Door Hardware Qualifications: Experienced in providing consulting services for electrified door hardware installations.

D. Source Limitations: Obtain each type and variety of door hardware from a single manufacturer, unless otherwise indicated.

1. Provide electrified door hardware from same manufacturer as mechanical door hardware, unless otherwise indicated. Manufacturers that are listed to perform electrical modifications, by a testing and inspecting agency acceptable to authorities having jurisdiction, are acceptable.

E. Regulatory Requirements: Comply with provisions of the following:

1. Where indicated to comply with accessibility requirements, comply with Massachusetts Architectural Access Board and the Americans with Disabilities Act (ADA), "Accessibility Guidelines for Buildings and Facilities (ADAAG)," as follows:

a. Handles, Pulls, Latches, Locks, and other Operating Devices: Shape that is easy to grasp with one hand and does not require tight grasping, tight pinching, or twisting of the wrist.
b. Door Closers: Comply with the following maximum opening-force requirements indicated:

1) Interior Hinged Doors: 5 lbf applied perpendicular to door.
2) Sliding or Folding Doors: 5 lbf applied parallel to door at latch.
3) Fire Doors: Minimum opening force allowable by authorities having jurisdiction.

c. Thresholds: Not more than 1/2 inch high. Bevel raised thresholds with a slope of not more than 1:2.

2. Requirements of 521 CMR 20.8.1 and NFPA 101: Comply with the following for means of egress doors:

a. Latches, Locks, and Exit Devices: Not more than 15 lbf to release the latch. Locks shall not require the use of a key, tool, or special knowledge for operation.
b. Delayed-Egress Locks: Lock releases within 15 seconds after applying a force not more than 15 lbf for not more than 3 seconds.
c. Door Closers: Not more than 15 lbf to open door to minimum required width.
d. Thresholds: Not more than 1/2 inch high.

3. Electrified Door Hardware: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.

F. Fire-Rated Door Assemblies: Provide door hardware for 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 at positive pressure according to NFPA 252.

G. Smoke- and Draft-Control Door Assemblies: Where smoke- and draft-control door assemblies are required, provide door hardware that meet requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105.

1. Air Leakage Rate: Maximum air leakage of 0.3 cfm/sq. ft. at the tested pressure differential of 0.3-inch wg of water.

H. Keying Conference: Conduct conference at Project site to comply with requirements in Division 01. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including, but not limited to, the following:

1. Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
2. Preliminary key system schematic diagram.
3. Requirements for key control system.
4. Address for delivery of keys.

I. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01. Review methods and procedures related to electrified door hardware including, but not limited to, the following:

1. Inspect and discuss electrical roughing-in and other preparatory work performed by other trades.
2. Review sequence of operation for each type of electrified door hardware.
3. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
4. Review required testing, inspecting, and certifying procedures.

## 1.5 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up for door hardware delivered to Project site.

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.

C. Deliver keys to manufacturer of key control system.

## 1.6 COORDINATION

A. Coordinate layout and installation of recessed pivots and closers with floor construction. Cast anchoring inserts into concrete. Concrete, reinforcement, and formwork requirements are specified in Section 033000 - CAST-IN-PLACE 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.

C. Electrical System Roughing-in: Coordinate layout and installation of electrified door hardware with connections to power supplies, fire alarm system and detection devices, access control and building control system.

D. Existing Openings: Where hardware components are scheduled for application to existing construction or where modifications to existing door hardware are required, field verify existing conditions and coordinate installation of door hardware to suit opening conditions and to provide proper door operation.

## 1.7 WARRANTY

A. General Warranty: Special warranties specified in this Article shall not deprive the DCAMM Project Manager of other rights the DCAMM Project Manager may have under 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. Special Warranty: Written warranty, executed by manufacturer agreeing to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period. Failures include, but are not limited to, the following:

1. Structural failures including excessive deflection, cracking, or breakage.
2. Faulty operation of operators and door hardware.
3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

C. Warranty Period: Three years from date of Substantial Completion, unless otherwise indicated.

D. Warranty Period for Manual Closers: Ten years from date of Substantial Completion.

## 1.8 MAINTENANCE SERVICE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for the facility's continued adjustment, maintenance, and removal and replacement of door hardware.

# PART 2 - PRODUCTS

## 2.1 SCHEDULED DOOR HARDWARE

A. Scheduled and acceptable manufacturers must provide all the functions and features of the specified product or it will not be approved.

| Item | Scheduled Manufacturer | Acceptable Manufacturers |
|---|---|---|
| Hinges | Ives (IVE) | McKinney, Hager, Stanley |
| Continuous Hinges | Markar (MAR) | Stanley, Ives |
| Locksets & Deadlocks | Schlage (SCH) | Sargent, Best |
| Access Control Locks | Schlage (SCH) | User Standard |
| Cylinders & Keying | Schlage (SCH) | User Standard |
| Core | User Standard | |
| Exit Devices & Mullions | Von Duprin (VON) | Precision, Sargent |
| Door Closers & Auto- | LCN (LCN) | Sargent |

| | | |
|---|---|---|
| matic Operators | | |
| Push & Pull Plates & Bars | Ives (IVE) | Rockwood, Burns |
| Flush Bolts & Coordinators | Ives (IVE) | Rockwood, Burns |
| Protection Plates | Ives (IVE) | Rockwood, Burns |
| Stops & Holders | Ives (IVE) | Rockwood, Burns |
| Overhead Stops | Glynn-Johnson (GLY) | Sargent, Rixson |
| Silencers | Ives (IVE) | Rockwood, Burns |
| Thresholds & Weatherstrip | National Guard (NGP) | Pemko, Reese |

B. Hand of Door: Drawings show direction of slide, swing, or hand of each door leaf. Furnish each item of hardware for proper installation and operation of door movement as shown.

C. Where the hardware specified is not adaptable to the finished shape or size of the members requiring hardware, furnish suitable types having the same operation and quality as the type specified, subject to the Designer's approval.

## 2.2 MATERIALS

A. Fasteners:

1. Provide hardware manufactured to conform to published templates, 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" surfaces 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 thru-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.
4. All hardware shall be installed with the fasteners provided by the hardware manufacturer.

B. Hinges:

1. The following is a guide for hinge type required for this specification:
   a. 1-3/4" thick doors up to and including 3'-0" wide:
      1) Exterior: standard weight, ball bearing, bronze/stainless steel, 4-1/2" high
      2) Interior: standard weight, ball bearing, steel, 4-1/2" high
   b. 1-3/4" thick doors over 3'-0" wide:
      1) Exterior: heavy weight, ball bearing, bronze/stainless steel, 5" high
      2) Interior: heavy weight, ball bearing, steel, 5" high
2. Provide 3 hinges per door leaf for doors 90 inches or less in height, and one additional hinge for each 30 inches of additional door height.
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-Swinging Exterior Doors: Non-removable pins
d. Interior Doors: Non-rising pins

4. The width of hinges shall be 4-1/2" or as required for clearance.

C. Continuous Hinges:

1. Provide continuous hinges fabricated from anodized aluminum or stainless steel as scheduled.
2. Provide bearings at each hinge knuckle for quiet, smooth, self-lubricating operation.
3. Hinges shall be capable of supporting door weights up to 600 pounds, and shall be successfully tested for 1,500,000 cycles.
4. Install hinges with fasteners supplied by manufacturer. Hole pattern shall be symmetrically patterned.

D. Flush Bolts:

1. Automatic and manual flush bolts shall have forged bronze faceplates with extruded brass levers and with wrought brass guides and strikes. Doors up to 7'-6" in height shall have 12" steel or brass rods. Manual flush bolts for doors over 7'-6" in height shall be increased by 6" for each additional 6" of door height. Provide dust-proof strikes where scheduled.

E. Coordinators:

1. Where pairs of doors are equipped with automatic flush bolts, an astragal, or other hardware that requires synchronized closing of the doors, 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 doorframe.
3. Provide a filler bar of the correct length for the unit to span the entire width of the opening, and appropriate brackets for parallel arm door closers and surface vertical rod exit device strikes. Factory-prep coordinators for vertical rod devices if required.

F. Mortise Locks:

1. Mortise locks shall be certified as ANSI A156.13, Grade 1 Operational, Grade 1 Security, and shall be manufactured from heavy gauge steel, containing components of steel with a zinc dichromate plating for corrosion resistance. Lock case shall be multi-function and field reversible for handing without opening the case.
2. Locks are to have a standard 2-3/4" backset with a full 3/4" throw 2-piece stainless steel mechanical anti-friction latch bolt. Deadbolt shall be a full 1" throw, constructed of stainless steel.
3. Lever trim shall be solid brass, bronze, or stainless steel, cast or forged in the design specified, with wrought roses and external lever spring cages. Levers shall be thru-bolted to assure proper alignment, and shall have a 2-piece spindle. Lever trim on the secure side of doors serving rooms considered by the authority having jurisdiction to be hazardous shall have a tactile warning.
   a. Basis of Design, Lever Style: Schlage 17A.

4. Locks meeting this specification: Schlage L9000 series, Sargent 8200 series, Best 40H series, and Corbin Russwin ML2000 Series.

G. Access Control Locks:

1. Lockset and exit device trim listed to UL294.
2. Lockset and exit device trim to meet or exceed A156.25 Grade 1 Operational and Security.
3. Lockset and exit device listed to UL10C, shall be compliant with ICC / ANSI A117.1, NFPA 101, and NFPA 80.
4. Lockset and exit device trim to be manufactured with open architecture characteristics capable of handling new and existing access control software and credential reading technology.
5. Lockset and exit device trim to be modular in design, to have the ability to change credential reader without being removed from door.
6. Provide option for tamper torx screws on inside escutcheon for higher securit.
7. Locking escutcheon, security lever trim are to be non-handed, operate independently of non-locking levers for extended life cycles. Handing to be field reversible.
8. Lockset and exit device trim to have the following standard status switches: Lock/Unlock Status (Clutch Position), Request-to-Exit Switch, Request to Enter Switch, Door Position Switch, Deadbolt Position, Interior Cover Tamper Guard.
9. Lockset and exit device trim to communicate battery status and communication status.
10. Exterior lever to be designed with ability to rotate freely while door remains securely locked, preventing damage to internal lock components from vandalism by excessive force.
11. Furnish locks with the appropriate function which will be field configurable without taking the lock off the door.
12. Power supply required 12VDC or 24VDC.
13. Connection cabling to be:
    a. Data: 24AWG, 4 conductor shielded (Belden 9843, 9841 or equivalent).
    b. DC Power: 18 AWG, 2 conductor, Belden 8760 or equivalent)
    c. Other wiring options may be available based on application, environment, and length of cabling required.
14. Should power be lost to device, lockset and exit device trim to have the ability to be field configured to manage access control in one of the three field configurable methods below:
    a. Fail locked (secured)
    b. Fail unlocked (unsecured)
    c. Fail As-Is
15. Lockset and exit device trim to have real-time communication with access control system, such that all events at lockset and exit device trim are communicated real-time to network control software.
16. Lost communication between the device and network, lockset and exit device trim to have ability to manage access control offline in one of four field configurable methods below:
    a. Fail locked (secured)
    b. Fail unlocked (unsecured)
    c. Fail As-Is

17. Fail to Degraded/cache mode utilizing cache memory with field selectable options to either grant access up to the last 1,000 unique previously accepted User IDs, or grant access up to the last 1,000 unique previously accepted Facility/Site codes.
18. Lockset and Exit Trim system interface to be:
    a. Wiegand or Clock & Data via PIB300 (Panel Interface Board).
    b. Directly via RS485.
19. Lockset and exit device trim utilized with brightblue software, SMS Premier/Enterprise software, or 3rd Party software to have capability to be remotely locked down real-time without user interface at the device.
20. Lockset and exit device trim utilized with third-party software to have capability to be remotely unlocked real-time without user interface at the device.
21. Lockset and exit device trim to have visual tri-colored LED to indicate operational systems status, system error conditions and low power conditions.
22. Lockset and exit device trim to have audible feedback that can be enabled or disabled.
23. Credential reader capabilities for brightblue Software, SMS Premier/Enterprise Software or 3rd Party Partner integrated software may include and may not be limited to:
    a. 13.56 MHz Smart card credential - Secure section (Multi-Technology and Smartcard): Schlage, XceedID ISO-X, MIFARE, ISO-X Lite, my-d, DESFire 8-EV1.
    b. 13.56 MHz Serial number only (Multi-Technology and Smartcard): MIFARE, DESfire, iClass,Inside Pictotag, ST Micro, TI Tagit.
    c. 125 kHz Proximity card credentials: Schlage, XceedID, HID, GE/CASI ProxLite and AWID.
    d. Multi-Technology readers that read both 13.56 MHz Smart Cards + 125 kHz Prox cards.
    e. Dual credential reading capabilities credential card/fob + pin.
    f. 12 button keypad with backlit buttons.
    g. Magnetic card triple track reader capable of reading tracks 1, 2 or 3 per configuration in field.
    h. Full insertion reader capable of reading information along full length of magnetic stripe.
24. The lock and exit device trim will have the ability to utilize multiple manufacturer's key systems in the lever including:
    a. Full Size cylinders from Schlage, Falcon and Sargent up to 6-pin cylinders
    b. Full Size Interchangeable Cores from Schlage, Sargent, Corbin Russwin, Medeco, and Yale format by Medeco in up to 6 pin cylinders
    c. Small Format Interchangeable core up to 7 pin by Schlage, Falcon, BEST, Sargent, Corbin Russwin, Medeco, Yale, and others.

H. Exit Devices:

1. Exit devices shall be touchpad type, fabricated of brass, bronze, stainless steel, or aluminum, plated to the standard architectural finishes to match the balance of the door hardware.
2. All exit devices shall incorporate a fluid damper or other means which reduce noise associated with exit device operation. Touchpad shall extend a minimum of one half of the door width. End-cap will have two-point attachment to door. Touch-pad shall match exit device finish, and shall be stainless steel for US26, US26D, US28, US32, and US32D finishes. Provide compression springs in devices, latches, and outside trims or controls.

3. All devices to incorporate a security dead latching feature.
4. Provide roller strikes for all rim and surface mounted vertical rod devices, ASA strikes for mortise devices, and manufacturer's standard strikes for concealed vertical rod devices.
5. Mechanism case shall sit flush on the face of all flush doors, or spacers shall be furnished to fill gaps behind devices. Where glass trim or molding projects off the face of the door, provide glass bead kits.
6. All non-fire-rated exit devices shall have cylinder dogging.
7. Where lever handles are specified as outside trim for exit devices, provide heavy-duty lever trims with forged or cast escutcheon plates. Provide vandal-resistant levers that will travel to a 90-degree down position when more than 35 pounds of torque are applied, and which can easily be re-set. Lever style will match the lever style of the locksets.
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. Provide electrical options as scheduled.
10. Exit devices meeting this specification: Von Duprin 98 series, Precision Apex series, Sargent 80 series with dead latching.

I. Door Closers:

1. Door closers shall have fully hydraulic, full rack and pinion action with a high strength cast iron cylinder. Cylinder body shall be 1-1/2” in diameter, and double heat-treated pinion shall be 11/16” in diameter.
2. Hydraulic fluid shall be of a type requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F. Fluid shall be fireproof and shall pass the requirements of the UL10C “positive pressure” fire test.
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.
4. All closers shall have solid forged steel main arms (and forged forearms for parallel arm closers).
5. Closers shall not incorporate a pressure relief valve.
6. All closers shall have metal covers.
7. Closer cylinders, arms, and metal covers shall have a powder coating finish which has been certified to exceed 100 hours salt spray testing by an independent testing laboratory used by BHMA for ANSI certification. For metal components that can't be powder coated, a special rust inhibiting finish (SRI) must be used.
8. Door closers meeting this specification: LCN 4010/4110 series, and Sargent 281Series.

J. Push Plates: 8" wide x 16" high x 0.050" thick. Where door stile does not allow 8" wide plates, 4" wide plates may be used.

K. Door Pulls & Push Bars: Solid bar stock, diameter and length as scheduled. Push bars shall be of sufficient length to span from center to center of each stile.

L. Protection Plates: Provide kick plates as scheduled, with 4 beveled edges. Furnish with machine or wood screws, finished to match plates. Plates shall be 8" high x 2" LWOD on single doors, 1" LWOD on pairs of doors.

M. 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. Where wall stops cannot be used, provide dome type floor stops of the proper height.
   c. At any opening where a wall or floor stop cannot be used, a heavy-duty overhead stop must be used.

N. Thresholds and Weatherstrip: Furnish as scheduled and per architectural 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.

O. Silencers: "Push-in" type silencers for each hollow metal or wood frame, three for each single frame, two for each pair frame. Omit where gasketing is scheduled.

P. Automatic Operators:

1. Provide low energy automatic operator units with hydraulic closer complying with ANSI A156.19 where automatic operators are specified..
2. Provide hydraulic fluid of a type requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F. Fluid shall be fireproof and shall pass the requirements of the UL10C “positive pressure” fire test.
3. Provide units with conventional door closer opening and closing forces unless the power operator motor is activated. Provide door closer assembly with adjustable spring size, back-check, and opening and closing speed adjustment valves to control door
4. Provide units with on/off switch for manual operation, motor start up delay, vestibule interface delay, electric lock delay, and door hold open delay.
5. Provide units with conventional door closer opening and closing forces unless the power operator motor is activated. Provide door closer assembly with adjustable spring size, back-check valve, sweep valve, latch valve to control door.
6. Provide drop plates, brackets, or adapters for arms as required for details.
7. Provide hard-wired actuator switches for operation as specified. Actuators shall be weather-resistant type at exterior applications.
8. Provide key switches, with LED’s, recommended and approved by the manufacturer of the automatic operator as required for the function as described in the operation description of the hardware group with the provisions below.
9. Where automatic operators are scheduled, provide complete assemblies of controls, switches, power supplies, relays, and parts/material recommended and approved by the manufacturer of the automatic operator for each individual leaf. Actuators shall control both doors simultaneously at pairs. Exterior and vestibule doors with automatic operators shall be sequenced to allow ingress or egress through both sets of openings as directed by the Designer. Locate the actuators, key switches, and other controls as directed by the Designer.
10. Provide units with vestibule inputs, which allow sequencing operation of two units, and a SPDT relay for interfacing with latching or locking devices.
11. Acceptable manufacturers and/or products: LCN 4600 series, Norton 6900 series, Besam Power Swing.

2.3 FINISHES

A. With the exception of all items listed below, the finish of all hardware shall be US26D - satin chrome or US32D - satin stainless steel. Exceptions are as follows:

1. Door Closers: Aluminum powder coat finish.
2. Coordinators: Prime painted.
3. Thresholds: Mill finish aluminum.
4. Weatherstrip and Sweeps: Clear anodized aluminum.
5. Silencers: Grey.

2.4 KEYING

A. Provide a new key system from the same manufacturer as the locks conforming to the following requirements:

1. Provide restricted patented removable core cylinders at all keyed devices, removable mullions, and exit device trim. Restricted system shall control the access to the products by requiring a signed letter of authorization and/or authorization form from the Owner or authorized agent of the Owner. Patent shall protect against the unauthorized manufacturing and duplication of the products. Restricted patented cores shall not be operable by non-patented key blanks. Restricted patented cores shall incorporate a mechanism to check for the patented features on the keys. Provide construction cores with construction master keying for use during construction. The hardware supplier, accompanied by the Owner or Owner's security agent, shall install permanent keyed cores upon completion of the project. The temporary construction cores are to be returned to the hardware supplier.
2. Provide permanent cores and cylinders keyed by the manufacturer or authorized distributor as directed by the Owner. Provide owner with a copy of the bitting list, return receipt requested.
3. The hardware supplier, accompanied by a qualified factory representative for the manufacturer of the cores and cylinders, shall meet with Owner and Designer to review keying requirements and lock functions prior to ordering finish hardware. Submit a keying schedule to Designer for approval.
4. Provide cores and cylinders, unless noted otherwise, operated by a Great Grand Master Key System to be established for this project. Allow for ten Grand Master Keys under the Great Grand. Do not use the letter "I", "O", or "X" for any of the grand masters. Allow for twenty-four Master Keys under each Grand Master, and sixty-four changes under each master key. All cylinders shall be keyed in alike or different sets as noted by their respective key set number. Do not use the letter "I" or "O" in any of the master key sets.
5. Provide patented restricted keys as follows:
   a. Ten grand master keys for each set.
   b. Ten master keys for each set.
   c. Three keys per core and/or cylinder.
   d. Two construction core control keys
   e. Two permanent core control keys
   f. Six construction master keys for each type (Contractor is to provide one set of construction keys to Designer)
6. Visual key control:

a. Keys shall be stamped with their respective key set number and stamped “DO NOT DUPLICATE".
b. Grand master and master keys shall be stamped with their respective key set letters.
c. Do not stamp any keys with the factory key change number.
d. Do not stamp any cores with key set on face (front) of Core. Stamp on back or side of cores so not to be visible when core is in cylinder.

7. Deliver grand master keys, master keys, change keys, and/or key blanks from the factory or authorized distributor directly to the Owner in sealed containers, return receipt requested. Failure to comply with these requirements may be cause to require replacement of all or any part of the keying system that was compromised at no additional cost to the Owner.
8. Approved products: Schlage Everest T, Best CORMAX, Sargent Signature.

B. All master keys shall be delivered directly to the DCAMM Project Manager by the hardware supplier, who shall obtain an itemized transmittal for delivery of same.

C. Provide key cabinet suitable for size of project. Locate as acceptable to the DCAMM Project Manager.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

A. Examine doors and frames, 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. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

A. Steel Doors and Frames: Comply with DHI A115 series.

1. Surface-Applied Door Hardware: Drill and tap doors and frames according to SDI 107.

B. Wood Doors: Comply with DHI A115-W series.

C. Where on-site modification of doors and frames is required, prepare hardware locations in accordance with the following:

1. Steel Doors and Frames: For surface applied door hardware, drill and tap doors and frames according to ANSI/SDI A250.6.
2. Wood Doors: Comply with DHI WDHS.5 "Recommended Hardware Reinforcement Locations for Mineral Core Wood Flush Doors."

3. Where doors are in rated assemblies, comply with NFPA 80 for restrictions on on-site door hardware preparation.

## 3.3 INSTALLATION

A. 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. Custom Steel Doors and Frames: DHI's "Recommended Locations for Builders' Hardware for Custom Steel Doors and Frames."
3. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."

B. Install each door hardware item to comply with manufacturer's 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. Do not install surface-mounted items until finishes have been completed on substrates involved.

1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.

C. Key Control System: Place keys on markers and hooks in key control system cabinet, as determined by final keying schedule.

D. Boxed Power Supplies: Locate power supplies as indicated or, if not indicated, above accessible ceilings. Verify location with Designer.

1. Configuration: Provide the least number of power supplies required to adequately serve doors with electrified door hardware.

E. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Section 079200 - JOINT SEALANTS.

## 3.4 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.

1. Spring Hinges: Adjust to achieve positive latching when door is allowed to close freely from an open position of 30 degrees.
2. Electric Strikes: Adjust horizontal and vertical alignment of keeper to properly engage lock bolt.

3. Door Closers: Adjust sweep period so that, from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches from the latch, measured to the leading edge of the door.

B. Six-Month Adjustment: Approximately six months after date of Substantial Completion, Installer shall perform the following:

1. Examine and readjust each item of door hardware as necessary to ensure function of doors, door hardware, and electrified door hardware.
2. Consult with and instruct the DCAMM Project Manager's personnel on recommended maintenance procedures.
3. Replace door hardware items that have deteriorated or failed due to faulty design, materials, or installation of door hardware units.

## 3.5 FIELD TESTING FOR FIRE DOOR ASSEMBLIES

A. Fire Door Assembly Inspection and Testing: Provide functional testing and inspection of fire door assemblies in accordance with NFPA 80-2007/2010. Inspections shall be performed by individuals certified by Intertek as a Fire Door Assembly Inspector, using reporting forms provided by the Door and Hardware Institute (DHI). Alternatively, inspections may be performed by individuals acceptable to the Designer and DCAMM Project Manager, who have knowledge and understanding of the operating components of the applicable door type, and who have experience in preparing written reports of testing and inspection results.

1. Schedule fire door assembly inspection within 90 days of Substantial Completion of the Project.
2. Submit a signed, written final report as specified in Paragraph 1.3: Submittals.
3. Contractor shall correct all deficiencies and schedule a reinspection of fire door assemblies which were noted as deficient on the inspection report.
4. Inspector shall reinspect fire door assemblies after repairs are made.
5. Additional reinspections which are required due to incomplete repairs will be performed by the inspector at the expense of the Contractor.

## 3.6 CLEANING AND PROTECTION

A. Clean adjacent surfaces soiled by door hardware installation.

B. Clean operating items as necessary to restore proper function and finish.

C. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of Substantial Completion.

END OF SECTION