SECTION 087100 - DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Commercial door hardware for the following:

a. Swinging doors.

2. Cylinders for doors specified in other Sections included automatic sliding doors.
3. Electrified door hardware.

B. Related Sections include the following:

1. Division 8 Section "Steel 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 as part of fire-rated labeled assemblies.

C. Products furnished, but not installed, under this Section include the following. Coordinating, purchasing, delivering, and scheduling remain requirements of this Section.

1. Final replacement cores and keys.

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 and access control systems.

C. Samples: For exposed door hardware of each type indicated below, in specified finish, full size. Tag with full description for coordination with the Door Hardware Schedule. Submit samples before, or concurrent with, submission of the final Door Hardware Schedule.

1. Door Hardware: As follows:
   a. Locks and latches.
   b. Cylinders and keys.
   c. Operating trim.

2. Samples will be returned to Contractor. Units that are acceptable and remain undamaged through submittal, review, and field comparison process may, after final check of operation, be incorporated into the Work, within limitations of keying requirements.

D. 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 and with power door operators.

      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.

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.

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

F. 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.

G. 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.

H. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, indicating current products comply with requirements.

I. Maintenance Data: For each type of door hardware to include in maintenance manuals specified in Division 1.

J. Warranties: Special warranties specified in this Section.

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, Architect, and Owner 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.

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

1. Comply with Americans with Disabilities Act (ADA), "Accessibility Guidelines for Buildings and Facilities (ADAAG)," ANSI A117.1, and FED-STD-795, "Uniform Federal Accessibility Standards," 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 (22.2 N) applied perpendicular to door.
2) Fire Doors: Minimum opening force allowable by authorities having jurisdiction.

c. Thresholds: Not more than 1/2 inch (13 mm) high. Bevel raised thresholds with a slope of not more than 1:2.

2. NFPA 101: Comply with the following for means of egress doors:

a. Latches, Locks, and Exit Devices: Not more than 15 lbf (67 N) to release the latch. Locks shall not require the use of a key, tool, or special knowledge for operation.
b. Door Closers: Not more than 30 lbf (133 N) to set door in motion and not more than 15 lbf (67 N) to open door to minimum required width.
c. Thresholds: Not more than 1/2 inch (13 mm) 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 according to NFPA 252.

1. Test Pressure: Test at atmospheric pressure.

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 Owner by registered mail or overnight package service.

1.6 COORDINATION

A. 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.

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

C. Keying Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Meetings." 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.
2. Plans for existing and future key system expansion.
3. Preliminary key system schematic diagram.
4. Review all lock and exit device functions when reviewing keying requirements.
5. Requirements for key control system.
6. Installation of permanent keys and cylinder cores.
7. Address for delivery of keys.
8. Address keying and cylinder stamping (identification) as required by owner or owner representative.

D. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Meetings." Review methods and procedures related to electrified door hardware including, but not limited to, the following:

1. Inspect and discuss preparatory work performed by other trades.
2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
3. Review required testing, inspecting, and certifying procedures.

1.7 WARRANTY

A. General Warranty: Special warranties specified in this Article shall not deprive Owner of other rights Owner 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 Mortise Locks: Ten years from date of Substantial Completion.

E. Warranty Period for Exit Devices: Five years from date of Substantial Completion.

F. 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 Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

B. Maintenance Service: Beginning at Substantial Completion, provide six months' full maintenance by skilled employees of door hardware Installer. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper door hardware operation. Provide parts and supplies as used in the manufacture and installation of original products.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

A. General: Provide door hardware for each door to comply with requirements in this Section, door hardware sets indicated in door and frame schedule, and the Door Hardware Schedule on the drawings.

1. Door Hardware Sets: Provide quantity, item, size, finish or color indicated, and named manufacturer's products, or approved equal by another listed manufacturer and complying with BHMA standard referenced.
2. Sequence of Operation: Provide electrified door hardware function, sequence of operation, and interface with other building control systems indicated.

B. Although the Hardware Schedule is intended to cover all doors and to establish a type and standard of quality, it shall be the specific duty and responsibility of the Finish Hardware Supplier to examine the Contract Documents and furnish the proper hardware for all openings, whether scheduled or not.

1. Named Manufacturer's Products: Product designation and manufacturer are listed for each door hardware type required for the purpose of establishing minimum requirements. Manufacturers' names are abbreviated in the Door Hardware Schedule.

2.2 HINGES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Hinges:

a. Bommer Industries (BO).
b. Hager Companies (HA).
c. McKinney Products Company (MC).
d. Stanley Commercial Hardware (ST).

2. Continuous Geared Hinges (Aluminum):

a. Bommer Industries (BO).
b. McKinney Products (MC).
c. Pemko Manufacturing (PE).

B. Standards: Comply with the following:

1. Butts and Hinges: BHMA A156.1.
2. Continuous Geared Hinges: BHMA A156.26.
3. Template Hinge Dimensions: BHMA A156.7.

C. Quantity: Provide the following, unless otherwise indicated:
1. Three Hinges: For doors with heights 61 to 90 inches (1549 to 2286 mm).
2. Four Hinges: For doors with heights 91 to 120 inches (2311 to 3048 mm).

D. Template Requirements: Except for hinges and pivots to be installed entirely (both leaves) into wood doors and frames, provide only template-produced units.

E. Hinge Weight: Unless otherwise indicated, provide the following:

1. Entrance Doors: Heavy-weight hinges.
2. Doors with Closers: Antifriction-bearing hinges.
3. Interior Doors: Antifriction-bearing hinges.

F. Hinge Base Metal: Unless otherwise indicated, provide the following:

1. Exterior Hinges: Stainless steel, with stainless-steel pin.
2. Interior Hinges: Steel, with steel pin.
3. Hinges for Fire-Rated Assemblies: Steel, with steel pin.

G. Hinge Options: Comply with the following where indicated in the Door Hardware Schedule or on Drawings:
1. Maximum Security Pin: Fix pin in hinge barrel after it is inserted.

2. Non-removable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for the following applications:

   a. Outswinging corridor doors with locks.

3. Corners: Square.

H. Fasteners: Comply with the following:

1. Threaded-to-the-Head Wood Screws: For fire-rated wood doors.
2. Screws: Phillips flat-head screws; machine screws (drilled and tapped holes) for metal doors and wood screws for wood doors and frames. Finish screw heads to match surface of hinges.

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

2.3 LOCKS AND LATCHES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Mechanical Mortise Locks and Latches:

   a. Best Access Systems (BE) – 45H Series.
   b. Corbin Russwin Hardware (CR) - ML2000 Series.
   c. Sargent Manufacturing (SA) - 8200 Series.
   d. Yale Security Group (YA) - 8800FL Series.

B. Standards: Comply with the following:

1. Mortise Locks and Latches: BHMA A156.13.

C. Mortise Locks: BHMA Certified Grade 1, Series 1000.

D. Certified Products: Provide door hardware listed in the following BHMA directories:

1. Mechanical Locks and Latches: BHMA's "Directory of Certified Locks & Latches."

E. Lock Functions: Function numbers and descriptions indicated in the Door Hardware Schedule comply with the following:

1. Mortise Locks: BHMA A156.13.

F. Lock Throw: Comply with testing requirements for length of bolts to comply with labeled fire door requirements, and as follows:

1. Mortise Locks: Minimum 3/4-inch latchbolt throw.
2. Deadbolts: Minimum 1-inch (25-mm) bolt throw.

G. Backset: 2-3/4 inches (70 mm), unless otherwise indicated.

2.4 DOOR BOLTS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Flush Bolts:

a. Hager Companies (HA).
b. Ives: H. B. Ives (IV).
c. McKinney Products Company (MC).
d. Rockwood Manufacturing Company (RO).
e. Trimco Manufacturing (TR).

B. Standards: Comply with the following:

1. Manual Flush Bolts: BHMA A156.16.

C. Flush Bolts: BHMA Grade 1, designed for mortising into door edge.

D. Bolt Throw: Comply with testing requirements for length of bolts to comply with labeled fire door requirements, and as follows:

1. Mortise Flush Bolts: Minimum 3/4-inch (19-mm) throw.

2.5 EXIT DEVICES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Corbin Russwin Hardware (CR) - ED5000 Series.
b. Sargent Manufacturing (SA) - 80 Series.
c. Yale Security Group (YA) – 7000 Series.

B. Standard: BHMA A156.3.

1. BHMA Grade: Grade 1.

C. Certified Products: Provide exit devices listed in BHMA's "Directory of Certified Exit Devices."

D. Panic Exit Devices: Listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for panic protection, based on testing according to UL 305.

E. Fire Exit Devices: Complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire and panic protection, based on testing according to UL 305 and NFPA 252.

F. Through Bolts: For exit devices and trim on wood doors.

2.6 CYLINDERS AND KEYING

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Best Access Systems (BE). No Substitution. Match existing.

B. Standards: Comply with the following:

1. Cylinders: BHMA A156.5.
2. Key Control System: BHMA A156.5.

C. Cylinder Grade: BHMA Grade 1.

D. Cylinders: Manufacturer's standard tumbler type, constructed from brass or bronze, stainless steel, or nickel silver, and complying with the following:

1. Number of Pins: Seven.
2. Bored-Lock Type: Cylinders with tailpieces to suit locks.

E. Permanent Cores: Manufacturer's standard; finish face to match lockset; complying with the following:

1. Interchangeable Cores: Core insert, removable by use of a special key, and usable with other manufacturers' cylinders.

F. Construction Keying: Comply with the following:

1. Construction Master Keys: Provide cylinders with feature that permits voiding of construction keys without cylinder removal. Provide 10 construction master keys.

G. Keying System: Unless otherwise indicated, provide a factory-registered keying system complying with the following requirements:

1. Grand Master Key System: Cylinders are operated by a change key, a master key, and a grand master key.

H. Keys: Provide nickel-silver keys complying with the following:

1. Stamping: Permanently inscribe each key with a visual key control number and include the following notation:

a. Notation: "DO NOT DUPLICATE."

2. Quantity: In addition to one extra blank key for each lock, provide the following:

a. Cylinder Change Keys: Four.
b. Master Keys: Five.
c. Grand Master Keys: Five.

2.7 STRIKES

A. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:

1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
3. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.

B. Standards: Comply with the following:

1. Strikes for Mortise Locks and Latches: BHMA A156.13.
2. Strikes for Bored Locks and Latches: BHMA A156.2.
3. Strikes for Auxiliary Deadlocks: BHMA A156.5.
4. Dustproof Strikes: BHMA A156.16.

2.8 OPERATING AND PROTECTIVE TRIM UNITS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Hager Companies (HA).
2. Ives: H. B. Ives (IV).
3. McKinney Products (MC).
4. Rockwood Manufacturing (RO).
5. Trimco Manufacturing (TR).

B. Standard: BHMA Certified A156.6.

C. Materials: Fabricate protection plates from the following:

1. Stainless Steel: .050 inches thick, beveled four sides (B4E) with countersunk screw holes.
2. Furnish protection plates sized two inches less than door width (LDW) on push side and by height specified in door hardware sets.

D. Push/Pull Plates: .050 inch thick, 4 inches wide by 16 inches high with square corners and beveled edges, secured with exposed screws.

1. Straight Pull Design: 1-inch round diameter with 10-inch centers and 1 1/2-inch clearance from face of door.
2. Offset Pull Design: 1-inch round diameter pull, with 10-inch centers and clearance of 1-1/2 inches from face of door with offset of 45 degrees.

E. Fasteners: Provide manufacturer's designated fastener type as indicated in door hardware sets.

2.9 ACCESSORIES FOR PAIRS OF DOORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Keyed Removable Mullions:

    a. Corbin Russwin Hardware (CR).
    b. Sargent Manufacturing (SA).
    c. Yale Security Group (YA).

B. Standards: Comply with the following:

1. Coordinators: BHMA A156.3.
2. Removable Mullions: BHMA A156.3.

C. Fire-Exit Removable Mullions: Provide keyed removable mullions for use with fire exit devices complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire and panic protection, based on testing according to UL 305 and NFPA 252. Mullions shall be used only with exit devices for which they have been tested.

2.10 CLOSERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Surface-Mounted Closers (Heavy Duty): BHMA Certified Grade 1.

    a. Corbin Russwin Hardware (CR) - DC6000 Series with heavy duty arms.
    b. LCN Door Closers (LC) – 4040XP Series with heavy duty arms.
    c. Norton Door Controls (NO) - 7500 Series with heavy duty arms.
    d. Sargent Manufacturing (SA) - 351 Series with heavy duty arms.
    e. Yale Security Group (YA) - 4400 Series with heavy duty arms.

2. Surface-Mounted Closers (Standard Duty):

    a. Corbin Russwin Hardware (CR) – DC6000 Series.
    b. LCN Door Closers (LC) - 1460 Series.
    c. Norton Door Controls (NO) - 8500 Series.
    d. Sargent Manufacturing (SA) - 1431 Series.
    e. Yale Security Group (YA) - 3500 Series.

B. Standards: Comply with the following:

1. Closers: BHMA A156.4.

C. Certified Products: Provide door closers listed in BHMA's "Directory of Certified Door Closers."

D. Size of Units: Unless otherwise indicated, comply with manufacturer's written recommendations for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force.

E. Closer Options: As indicated in hardware sets, provide door closer options including: delayed action, hold open arms, extra duty parallel arms, positive stop/hold open arms, and compres-

sion stop/hold open arms. Even if not indicated in hardware sets, provide special mounting brackets, spacers and drop plates for a complete and proper installation.

2.11 STOPS AND HOLDERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Glynn-Johnson; an Ingersoll-Rand Company (GJ).
2. Hager Companies (HAG).
3. Ives: H. B. Ives (IVS).
4. McKinney Products (MC).
5. Rixson. (RX).
6. Rockwood Manufacturing Company (RO).
7. Sargent Manufacturing Company. (SA).
8. Trimco Manufacturing. (TR).

B. Standards: Comply with the following:

1. Stops and Bumpers: BHMA A156.16.
2. Electromagnetic Door Holders: BHMA A156.15.
3. Combination Overhead Holders and Stops: BHMA A156.8.
4. Door Silencers: BHMA A156.16.

C. Stops and Bumpers: BHMA Grade 1.

D. Combination Overhead Stops and Holders: BHMA Grade 1.

E. Electromagnetic Door Holders for Labeled Fire Door Assemblies: Coordinate with fire detectors and interface with fire alarm system.

F. Silencers for Metal Door Frames: BHMA Grade 1; neoprene or rubber, minimum diameter 1/2 inch (13 mm); fabricated for drilled-in application to frame.

2.12 DOOR GASKETING

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Door Gasketing:

a. McKinney Products (MC).
b. National Guard Products, Inc. (NGP).
c. Pemko Manufacturing Co., Inc. (PE).
d. Reese Enterprises, Inc. (RE).
e. Sealeze Corporation (SEL).
f. Zero International, Inc. (ZRO).

2. Door Bottoms:

a. McKinney Products (MC).

b. National Guard Products, Inc. (NGP).
c. Pemko Manufacturing Co., Inc. (PE).
d. Reese Enterprises, Inc. (RE).
e. Zero International, Inc. (ZRO).

B. Standard: Comply with BHMA A156.22.

C. General: Provide continuous weather-strip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated or scheduled. Provide noncorrosive fasteners for exterior applications and elsewhere as indicated.

1. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
2. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.
3. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

D. Air Leakage: Not to exceed 0.50 cfm per foot (0.000774 cu. m/s per m) of crack length for gasketing other than for smoke control, as tested according to ASTM E 283.

E. Smoke-Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke-control ratings indicated, based on testing according to UL 1784.

1. Provide smoke-labeled gasketing on smoke-labeled doors.

F. Fire-Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL 10B or NFPA 252.

G. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.

H. Gasketing Materials: Comply with ASTM D 2000 and AAMA 701/702.

2.13 THRESHOLDS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. McKinney Products (MC).
2. National Guard Products, Inc. (NGP).
3. Pemko Manufacturing Co., Inc. (PE).
4. Reese Enterprises, Inc. (RE).
5. Zero International, Inc. (ZRO).

B. Standard: Comply with BHMA A156.21.

2.14 FABRICATION

A. Manufacturer's Nameplate: Do not provide manufacturers' products that have manufacturer's name or trade name displayed in a visible location (omit removable nameplates) except in conjunction with required fire-rated labels and as otherwise approved by Architect.

1. Manufacturer's identification will be permitted on rim of lock cylinders only.

B. Base Metals: Produce door hardware units of base metal, fabricated by forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness. Furnish metals of a quality equal to or greater than that of specified door hardware units and BHMA A156.18 for finishes. Do not furnish manufacturer's standard materials or forming methods if different from specified standard.

C. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to commercially recognized industry standards for application intended. Provide Phillips flat-head screws with finished heads to match surface of door hardware, unless otherwise indicated.

1. Concealed Fasteners: For door hardware units that are exposed when door is closed, except for units already specified with concealed fasteners. Do not use through bolts for installation where bolt head or nut on opposite face is exposed unless it is the only means of securely attaching the door hardware. Where through bolts are used on hollow door and frame construction, provide sleeves for each through bolt.
2. Steel Machine or Wood Screws: For the following fire-rated applications:

   a. Mortise hinges to doors.
   b. Strike plates to frames.

3. Steel Through Bolts: For the following fire-rated applications, unless door blocking is provided:
   a. Closers to doors and frames.
   b. Surface-mounted exit devices.

4. Spacers or Sex Bolts: For through bolting of hollow metal doors.
5. Fasteners for Wood Doors: Comply with requirements of DHI WDHS.2, "Recommended Fasteners for Wood Doors."

2.15 FINISHES

A. Standard: Comply with BHMA A156.18.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

D. BHMA Designations: Comply with base material and finish requirements indicated by the following:

1. BHMA 626: Satin chromium plated over nickel, over brass or bronze base metal.
2. BHMA 628: Satin aluminum, clear anodized, over aluminum base metal.
3. BHMA 630: Satin stainless steel, over stainless-steel base metal.
4. BHMA 652: Satin chromium plated over nickel, over steel base metal.
5. BHMA 689: Aluminum painted, over any base metal.

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.

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. 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 specified in Division 9 Sections. 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. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."

D. Provide and coordinate concealed wood blocking for wall mount stops as detailed in Door Hardware Schedule.

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. 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 (75 mm) from the latch, measured to the leading edge of the door.

3.5 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.

3.6 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain door hardware and door hardware finishes.

3.7 HARDWARE SCHEDULE

A. The hardware sets listed below represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process.

HARDWARE SETS

SET #1

Doors:

3	Hinges	TA2714 4 1/2 X 4 1/2	26D	MC
1	Office Lock	73-7P 8205 LNP	26D	SA
1	Cylinder / Core	as required	626	BE
1	Wall Stop	409	US32D	RO
3	Door Silencers	608	GREY	RO

SET #2

Doors:

3	Hinges	TA2714 4 1/2 X 4 1/2 NRP	26D	MC
1	Card Reader	-	-	-
1	Lockset	-	-	-
1	Cylinder / Core	as required	626	BE
1	Closer	CPS-8501	689	NO
1	Kickplate	K1050 10" x 2" LDW x B4E x CSK	US32D	RO
1	Kick Down Holder	461	US26D	RO
3	Door Silencers	608	GREY	RO

SET #3

Doors:

3	Hinges	TA2714 4 1/2 X 4 1/2 NRP	26D	MC
1	Office Lock	73-7P 8205 LNP	26D	SA
1	Cylinder / Core	as required	626	BE
1	Closer	CPS-8501	689	NO
1	Kickplate	K1050 10" x 2" LDW x B4E x CSK	US32D	RO
1	Kick Down Holder	461	US26D	RO
3	Door Silencers	608	GREY	RO

SET #4

Doors:

3	Hinges	TA2714 4 1/2 X 4 1/2	26D	MC
1	Classroom Lock	73-7P 8237 LNP	26D	SA
1	Cylinder / Core	as required	626	BE
1	Closer	8501	689	NO
1	Kickplate	K1050 10" x 2" LDW x B4E x CSK	US32D	RO
1	Wall Stop	409	US32D	RO
3	Door Silencers	608	GREY	RO