PART 1: GENERAL

1.01 SUMMARY

Cornell University expects quality finish hardware that remains functional, flexible, reliable, and serviceable over many years with a minimum amount of maintenance.

1.02 SCOPE OF STANDARD

A. This standard includes all commercial "Finish or ‘Builders’ Hardware" which is required for swing type doors. Under no circumstances must a door need to be removed from its hinges in order to perform maintenance on the hardware. Also, these standards are to include keying system requirements. Exceptions to these standards may be made only with the approval of the Cornell University Lock Shop Supervisor.

B. Types of finish hardware covered by this standard include the following:

1. Hanging devices.
2. Securing Devices (inactive leaf of paired openings)
3. Securing Devices (active leaf of paired openings and single doors)
4. Non-Mechanical Trim
5. Accessories for Pairs of Doors Only
6. Door Control Devices.
7. Protective Plates.
8. Stops and Holders.
10. Miscellaneous Hardware.
11. Electrified Hardware.
12. Key Control System

1.03 STANDARD OF CERTIFICATION

All locksets shall be certified by ANSI, UFAS, ADA, and UL. Provide hardware for fire-rated openings in compliance with NFPA Standard No. 80 and local building code requirements.

1.04 SUBMITTALS

A. Product Data: Submit manufacturer’s technical information for each item of hardware. Include whatever information may be necessary to show compliance with requirements, and include instructions for installation and for maintenance of operating parts and finish. Schedule in vertical format.
B. Hardware Schedule: Submit final hardware schedule in manner indicated below. Hardware schedules are intended for coordination of work.

1. Final Hardware Schedule Content: Based on builders hardware indicated, organize hardware schedule into "hardware sets," as illustrated by the Sequence of Format for the Hardware Schedule as published by the Door and Hardware Institute, indicating complete designations of every item required for each door or opening. Include the following information:
   a. Type, style, function, size, and finish of each hardware item.
   b. Name and manufacturer of each item.
   c. Fastenings and other pertinent information.
   d. Location of each hardware set cross referenced to indications on drawings both on floor plans and in door and frame schedule.
   e. Explanation of all abbreviations, symbols, and codes contained in schedule.
   f. Mounting locations for hardware.
   g. Requirements of other trades to coordinate with hardware. Examples include: location of power conduits and junction boxes for electrically powered hardware, block-outs in frames and empty conduit for future card access systems.
   h. Door and frame sizes and materials:
      i. Hardware schedule shall clearly indicate architect's hardware group and manufacturer of each item proposed. The schedule shall be reviewed prior to submission by a certified Architectural Hardware Consultant, who shall affix his or her seal attesting to the completeness and correctness of the schedule.

2. Submittal Sequence: Submit schedule at earliest possible date particularly where acceptance of hardware schedule must precede fabrication of other work that is critical in the Project construction schedule (e.g., pressed metal frames). Include with schedule the product data, samples, shop drawings of other work affected by door hardware, and other information essential to the coordinated review of schedule.

3. Keying Schedule: Submit separate detailed schedule indicating clearly how the Cornell University Lock Shop’s final instructions on keying of locks has been fulfilled.

C. Samples: Prior to submittal of the final hardware schedule and prior to final ordering of hardware, submit one sample of each type of exposed hardware unit, finish as required, and tagged with full description for coordination with schedule.

1. Samples will be returned to the supplier. Units that are acceptable and remain undamaged through submittal, review, and field comparison process may, after final check of operation, be incorporated in the Work, within limitations of keying coordination requirements.
1.05 QUALITY ASSURANCE

A. Single Source Responsibility: Obtain each type of hardware (latch and lock sets, hinges, closers, etc.) from only one manufacturer offering products complying with these specifications.

B. Supplier Qualifications: A recognized builders hardware supplier who has been furnishing hardware in the Project's vicinity for a period of two years, and who is or employs a registered architectural hardware consultant (AHC) who is available, at reasonable times during the course of the work, for consultation about project's hardware requirements to Owner, Architect, and Contractor.

C. Fire-Rated Openings: Provide door hardware for fire-rated openings that complies with NFPA Standard No. 80 and requirements of authorities having jurisdiction. Provide only items of door hardware that are listed and are identical to products tested by UL, Warnock Hersey, FM, or other testing and inspecting organization acceptable to authorities having jurisdiction for use on types and sizes of doors indicated in compliance with requirements of fire-rated door and door frame labels. Where fire-rated doors are specified, "construction" labeled doors and frames will not be accepted. Coordinate requirements of the specific hardware vendors with the door manufacturer to assure that fire rating is achieved. Notify architect if door must be substantially modified to achieve desired rating.

D. Warranty: Door Closers - 10 years, Exit Devices - 5 Years. The remainder of door hardware shall have a 1 year warranty.

1.06 JOB CONDITIONS

A. Coordination: Coordinate hardware with other work. Tag each item or package separately, with identification related to the final hardware schedule, and include basic installation instruction in the package. Furnish hardware items of proper design for use on doors and frames of the thickness, profile, swing, security and similar requirements indicated, as necessary for proper installation and function. Deliver individually packaged hardware items at the proper times to the proper locations (shop or project area) for installation.

B. Templates: Furnish hardware templates to each fabricator of doors, frames and other work to be factory-prepared for the installation of hardware. Upon request, check the shop drawings of such other work, to confirm that adequate provisions are made for the proper installation of hardware (especially as it relates to fire rating of door assemblies and electrically activated hardware).
1.07 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

2.01 DOOR HARDWARE

A. The following door hardware and manufacturers have proven to meet or exceed the Standards for reliability and ease of repair by Cornell University for the various applications listed. Substitutions may be made only with the approval of the Cornell University Lock Shop Supervisor. In general, all new door handles shall be lever-type, ANSI, UFAS and ADA approved, for handicapped accessibility.

B. Hanging Devices:

2. Continuous Hinges: Select full mortise.
3. Pivots: Rixson

C. Securing Devices (inactive leaf of paired openings):

1. Surface Bolts: Door Controls International
2. Flush Bolts: Door Controls International
3. Dust-Proof Strikes: Door Controls International
5. Exit Devices: Sargent 80 and 90 Series (80 Series is preferred)

D. Securing Devices (active leaf of paired openings and single door)

1. Mortise Locksets and Latchsets: Sargent 8200 Series, various lock functions, “LNL” rose and lever. “WTL” trim may be used in existing buildings to match existing hardware.
   a. Levers, inside and outside, shall be manufactured from solid bar stock (brass or stainless steel). No aluminum shall be allowed.

2. Cylindrical Locksets and Latchsets: Sargent 10 Line and TZone, various lock functions, “LL” rose and lever. Mortise locksets are preferred.
   a. Levers, inside and outside, shall be manufactured from solid bar stock (brass or stainless steel). No aluminum shall be allowed.
3. Deadlocks: Sargent 8200 Series and 4870 Series. Deadlocks should not be used in occupied spaces, except where operating the inside lever automatically retracts the latch-bolt and deadbolt simultaneously.

4. Exit Devices: Sargent 80 and 90 Series, various functions, “ETL” outside trim (80 Series is preferred).
   a. “Key retracts latch-bolt” function should be used on keyed exterior doors.
   b. Cylinder dogging should be used instead of hex key dogging.

E. Non-Mechanical Trim:
   1. Door Pulls: Burns
   2. Push Plates: Burns
   3. Push and Pull Bars: Burns

F. Accessories for Pairs of Door Only:
   1. Soffit Mounted Coordinators: Door Controls International, Trimco

G. Door Control Devices:
   1. Overhead Stops and Holders: Sargent
   2. Surface Door Closers: Sargent 351 Series
   3. Concealed Door Closers: Sargent, LCN

H. Protective Plates:
   1. Mop Plates: Burns
   2. Kick Pates: Burns
   3. Armor Plates: Burns
   4. Door Edges: Burns

I. Stops and Holders:
   1. Floor and Wall Mounted Door Stops: Ives
   2. Electromagnetic Door Holders: Rixson

J. Accessories:
   1. Thresholds: National Guard Products
   2. Gasketing: National Guard Products
K. Miscellaneous Hardware:
   1. Door Silencers: Ives
   2. Latch Guards: Glynn-Johnson

L. Electrified Hardware:
   1. Electrified Mortise Locksets: Best 45H Series IDH Max, Sargent 8200 Series with built in “request-to-exit” signal switch.
   2. Electrified Exit Devices: Sargent 80 Series with “latch retraction” and “request-to-exit” signal switch.
   3. Electric Strikes: HES 1006 and 9600 Series
   4. Electromagnetic Locks: Locknetics (Magnetic locks should not be used without the approval of the Cornell University Lock Shop supervisor)
   5. Power Supplies: Altronix, Best
   6. Key Switches: Locknetics
   7. Automatic Operator Actuators: Camden
   8. Door Position Switches: Sentrol

M. Key Control System:
   1. Key Cabinets: Dupli-Key, Telkee
   2. Keys and Cylinders: Sargent Restricted, Best Premium, Medeco, Keso (Contact the Cornell University Lock Shop Supervisor for keying information.)

2.02 KEYING REQUIREMENTS

A. The Cornell University Lock Shop will specify all keying systems for coordination and integration with the campus keying program. Contact the Cornell University Lock Shop Supervisor at 607-255-7112 for keying instructions.

B. Definitions:
   1. Construction Key: Key used during construction before occupancy by construction personnel.
   2. Master Key: Operates all locks in portion of system assigned to it.
   3. Grand Master Key: Operates all locks in system, including possibly several master keyed systems.
   4. Great Grand Master Key: Operates all locks in an area or college, including master and grand master keyed systems.

C. All keying and key orders shall be placed with the approval of the Cornell University Lock Shop Supervisor.
D. Lock manufacturer shall forward master keys, grand master keys, and great-grand master keys to the Cornell University Lock Shop, Humphreys Service Building, 603 Dryden Road, Ithaca, NY 14853.

E. Keys and cylinders shall be stamped with the keyset number as directed by the Cornell University Lock Shop Supervisor.

F. Construction Keying:
   1. Required on all Cornell University projects. The final keys and cylinders shall NOT be used during construction.

G. Keys to be forwarded to the Cornell Lock Shop for distribution:
   1. Cylinder locks: Three (3) each.
   2. Master keys: Six (6) each.
   3. Grand master keys: Two (2) total.
   4. Great-grand master keys: Two (2) total.
   5. Construction master keys: Twenty (20) total.
   6. Uncut Change Key Blanks: Fifty (50) for each different key way.

2.03 LOCKS, LATCHES, AND BOLTS

A. Strikes: Provide manufacturer's standard wrought box strike for each latch or lock bolt, with curved lip extended to protect frame, finished to match hardware set.
   1. Provide flat lip strikes for locks with one-piece, anti-friction latchbolts as recommended by manufacturer.
   2. Provide recess type top strikes for bolts locking into head frames, unless otherwise indicated.
   3. Provide dust-proof strikes for foot bolts, except where special threshold construction provides non-recessed strike for bolt.
   4. Provide mud boxes and conduits in frames and doors at locations for electronic or security hardware.

B. Lock Throw: Provide 3/4" minimum throw of latch and 1" minimum throw of deadbolt used on pairs of doors. Comply with UL requirements for throw of bolts and latch bolts on rated fire openings.

C. Flush Bolt Heads: Minimum of 1/2" diameter rods of brass, bronze, or stainless steel with minimum 12" long rod.

2.04 SILENCERS

A. Provide three (3) silencers for each single door. Provide two (2) silencers for each pair of doors.
2.05 PUSH/PULL UNITS

A. Concealed Fasteners: Provide manufacturer’s special concealed fastener system for installation, thru-bolted for matched pairs but not for single units.

2.06 CLOSERS AND DOOR CONTROL DEVICES

A. Size of Units: Except as otherwise specifically indicated, comply with the manufacturer’s recommendations for size of door control unit depending on size of door, exposure to weather, and anticipated frequency of use.

B. Closers to be mounted on door rather than on frame and should be mounted away from view of the general public.

C. Access-Free Manual Closers: Where manual closers are indicated for doors, provide adjustable units complying with ANSI A117.1 provisions for door opening force and delayed action closing.

D. Electric Door Holders: Provide units designed to hold door in open position under normal usage and to release door automatically under fire conditions.

E. Closers to have full rack and pinion hydraulic operation with separate controls for closing and latching speeds.

2.07 EXIT DEVICES

A. Provide low profile push pad type devices with opposing lever handles. Lever handles to match lever handles on locksets.

B. Exit Devices shall be "UL" listed for life safety. All exit devices for fire rated openings shall have "UL" labels for "Fire Exit Hardware."

C. All exit devices mounted on labeled wood doors shall be thru-bolted mounted on the door per the door manufacturers’ requirements.

D. All trim shall be thru-bolted to the lock stile case.

E. Exit Device Dogging: Except on fire-rated doors, where closers are provided on doors equipped with exit devices, equip the units with keyed cylinder dogging device to keep the latch bolt retracted, when engaged.

2.08 DOOR TRIM UNITS

A. Fasteners: Provide manufacturers’ standard exposed fasteners for door trim units (kick plates, edge trim, viewers, knockers, mail drops and similar units) of either machine screws or self-tapping screws.
B. Protection Plates: Fabricate protection plates (armor, kick or mop) not more than 2” less than door width by the height indicated.

2.09 WEATHERSTRIPPING AND SEALS

A. In general, all exterior doors shall be installed in a weather-tight manner. Weather-stripping of exterior doors shall be provided to reduce infiltration rates to the standards of the New York State Energy Conservation Construction Code. Care shall be taken to provide weather-stripping that does not interfere with the operation and installation of Finish Hardware. Provide smoke, light, or sound seals on interior doors where indicated or scheduled. Provide non-corrosive fasteners for exterior applications and elsewhere as indicated.

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

2.10 THRESHOLDS

A. Thresholds shall not exceed 1/2” (one half inch) in height, typically, at any accessible entrance.

B. Cope thresholds tightly around frames. Seal around edges to close all gaps between thresholds and frames.

2.11 OVERHEAD HOLDERS AND STOPS

A. Concealed holders to be installed with the jamb bracket mortised flush with the bottom of the jamb. The arm and channel to be mortised into the door. Construction of channel shall be formed stainless steel with stainless steel end caps.

B. Surface mounted holders to be installed with the jamb bracket mounted on the stop.

2.12 HINGES AND PIVOTS

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

B. Screws: Furnish Phillips flat-head screws. Use all-purpose or machine screws for installation of units in hollow metal. Use wood screw for installation of units in wood. Finish screw heads to match surface of hinges or pivots.
C. Hinge Pins: Except as otherwise indicated, provide hinge pins as follows:

1. Type:
   a. Steel Hinges: Steel pins
   b. Non-ferrous Hinges: Stainless steel pins

2. Exterior Doors: Non-removable pins.

3. Interior Doors: Non-rising pins.

4. Lockable Door with hinge on Key Side: Non removable pins.

D. Number of Hinges: Provide number of hinges indicated, but not less than three (3) hinges for door leaf for doors 90” or less in height and one additional hinge for each 30” of additional height.

E. Size of Hinges: 4 1/2” x 4 1/2” unless noted otherwise in schedule.

2.13 CONTINUOUS HINGES:

A. Continuous hinges to be manufactured of extruded 6063-T6 aluminum alloy with anodized finish (painted gear cap only).

B. All hinges shall be manufactured to template. Uncut hinges shall be non-handed and shall be a pinless assembly of three interlocking extrusions applied to the full length of the door and frame without mortising.

2.14 HARDWARE FINISHES

A. Finishes for hardware units at each door or opening, to the greatest extent possible shall be US10 or US26D. In general, match all hardware items to a standard finish for a singular building. US26D is recommended for new buildings using US32D for exterior door and interior doors that will be exposed to high moisture or caustic conditions.

2.15 LOCK BOXES

A. To comply with local ordinance requirements, Cornell University requires the provision of exterior lock boxes for emergency rapid entry. All new and existing buildings that have fire alarm and/or fire detection systems which interconnect with the fire department are to be covered by this standard. Alarm system interconnects include, but are not limited to, municipal fire alarm, radio, telephone leased line, telephone dialer, or central station systems.
B. Lock box for the storage of building keys shall be as follows:

1. Manufacturer: The Knox Company, 846 Production Place, Newport Beach, CA. 92663

C. Model and location of lock box shall be prescribed and established by the fire department with jurisdiction. Lock boxes shall be installed and affixed to the structure in accordance with the manufacturer’s detailed instructions.

PART 3: EXECUTION

3.01 INSTALLATION

A. Mount hardware units at heights in compliance with the Building Code of New York State.

B. Install each hardware item in compliance with the manufacturer's instructions and recommendations. Where cutting and fitting is required to install hardware onto or into surfaces that are later to be painted, or finished in another way, coordinate removal, storage, and reinstallation or application of surface protection with finishing work. Do not install surface-mounted items until finishes have been completed on the substrates involved.

C. Set units level, plumb, and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.

D. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors in accordance with American National Standards Institute (ANSI) standards.

E. Set thresholds for exterior doors in full bed of butyl-rubber or polyisobutylene mastic sealant.

F. Weatherstripping and Seals: Comply with manufacturer's instructions and recommendations to the extent installation requirements are not otherwise indicated.

3.02 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 cannot be adjusted to operate freely and smoothly, or as intended for the application made.

1. Where door hardware is installed more than one month prior to acceptance or 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, ventilating, and air conditioning (HVAC) equipment.
B. Clean adjacent surfaces soiled by hardware installation. Remove all temporary labels, construction marks, and soil from door hardware.

C. Instruct the Cornell University Lock Shop personnel in the proper adjustment and maintenance of door hardware and hardware finishes.

D. Six-Month Adjustment: Approximately six months after the date of the Architect's Final Certificate, the Installer, accompanied by representative(s) of the manufacturer of latchsets and locksets and of door control devices, and of other major hardware suppliers, shall return to the Project to perform the following work:

1. Re-adjust each item of door hardware, as per a list to be compiled by the Installer and agreed to by the Cornell University Lock Shop Supervisor, to restore function of doors and hardware to comply with specified requirements.

2. Consult with and instruct Cornell University Lock Shop 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.