



NORTHWESTERN UNIVERSITY

DESIGN GUIDELINES AND TECHNICAL STANDARDS

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DIVISION 8 – OPENINGS

SECTION 08 1113 – HOLLOW METAL DOORS AND FRAMES

1. General: This section outlines general requirements for interior and exterior hollow metal doors and frames.
2. Design Considerations:
 - a. Paired doors are discouraged. When paired doors are absolutely necessary provide removable mullions.
 - i. Exception: No mullions are required at laboratory access and low use paired doors.
 - b. Exterior doors shall be galvanized.
 - c. Solid grout frames, both interior and exterior, at concrete, concrete masonry, brick masonry, or limestone walls.
 - d. Provide batt insulation full perimeter of hollow metal frames in interior walls at drywall partitions.
3. Quality Assurance:
 - a. Fire Rated Door Assemblies: Comply with SDI 100, Fire-Rated Door Assemblies and in compliance with NFPA 80 and labeled per ASTM E 152 by UL, FM or Warnock-Hersey.
 - b. Temperature Rise Rating: For fire-rated doors in stairwell enclosures, provide door construction tested and certified to limit temperature rise in thirty minutes to 450 degrees, F.
4. Manufacturers: Products of the following manufacturer, provided they comply with requirements of the contract documents:
 - a. Basis-of-Design: 747 N Series by The Curries Company or approved equal.
5. Steel Doors: Fabricate steel doors in accordance with requirements of SDI 100.
 - a. Doors: Grade III - Extra Heavy-Duty, Model 1 - Full Flush, 16 ga. min. face skin for exterior use and 18 ga. min. for interior use. Stiffened with 20 ga. ribs spaced not more than 6" apart, 14ga. lock rail, 12 ga. continuous channel hinge rail, 16 ga. top and bottom rails, seamless edges. Provide 12 ga. reinforcing for closer at head.
 - b. Exterior Doors: Fabricate from hot-dip galvanized steel.

- c. Insulated Assemblies: At exterior locations, provide insulating door and frame assemblies which have been tested in accordance with ASTM C 236 for thermal resistance.
 - i. Minimum U-value: 0.24 BTU per hour per square foot per degree F
 - d. Acoustical Assemblies: Provide assemblies tested by ASTM E 90 procedures and classified in compliance with ASTM E 413.
 - e. Hardware Preparation: Comply with DHI A115 series specifications.
 - f. Glazed or Louvered Doors: Provide minimum 12-inch high bottom rail.
6. Steel Frames: Fabricate steel frames with concealed fasteners.
- a. Construction: Mitered and welded corners. Reinforce head with 12 ga. can.
 - b. 14 ga. for exterior locations, 16ga. for interior locations.
 - c. Exterior Frames: Fabricate from hot-dip galvanized steel.

END OF SECTION

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SECTION 08 1416 – WOOD DOORS

1. General: This section outlines general requirements for wood doors.
2. Design Considerations:
 - a. Wood doors are for interior use only and not for exterior applications, with the following exception:
 - i. Use of custom wood doors for exterior applications may be required for historic buildings. Review specific project requirements with NU Project Manager.
 - b. Natural finishes are preferred. Opaque finishes shall be permitted under special conditions.
 - c. Solid, staved wood core doors with matching hardwood stiles and rails shall be specified, with the exception that mineral cores shall be used for fire rated doors where required by code.
2. Warranties:
 - a. Solid core, wood-faced, interior doors: 5 years.
 - b. Solid core, plastic laminate-faced, interior doors: 5 years.
3. Wood Doors:
 - a. Solid Core Wood-Faced Doors: Face veneers for transparent finish, Premium Grade, Premium, 5 ply construction.
 - b. Solid Core Plastic Laminate-Faced Doors: High-pressure decorative laminate faces meeting the requirements of NEMA LD 3, Custom Grade, 5 ply construction.
 - c. Stile and Rail Wood Doors: Permitted under special conditions. NWWDA Premium/Select grade.
4. Wood Door Frames:
 - a. Steel frames are preferred. Wood frames are permitted only in special situations. Architect shall review requirements and options with NU Project Manager.
 - a. Fabricate frames in accordance with AWI Section 900 and casings in accordance with AWI Section 200. Same grade as door.

END OF SECTION

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SECTION 08 3113 – ACCESS DOORS AND FRAMES

1. General: This section outlines general requirements for access doors and frames.
2. Design Considerations:
 - a. Architect to review locations for access doors and access panels with NU Project Manager during the design phase.
 - b. If possible, access door and access panel locations shall be shown on the drawings.
 - c. All access doors shall be by the same manufacturer. If necessary, the Construction Manager and/or General Contractor shall coordinate with each subcontractor.
3. Manufactured Units: The following are the minimum requirements for manufactured access doors and frames. Architect shall review specific requirements with the NU Project Manager.
 - a. Type: Flush door panel with exposed frame.
 - b. Frame: 14 gage steel.
 - c. Door: 14 gage steel flush panel; when fire-rated, provide standard insulated flush panel/doors with continuous piano hinge.
 - d. Hinge: Double-acting concealed spring hinges allowing door to open a minimum of 165 degrees.
 - e. Locking device: Keyed cylinder lock. Supply 2 keys with each lock. Key all cylinder locks to keying system established for other finish hardware.
 - f. Finish: Baked-on rust-inhibitive prime coat.
4. Fabrication: Fabricate access door and door components of continuous welded construction, with welds ground smooth.
5. Exposed Frames: Fabricate frame with nominal 1-inch-wide exposed flange at door panel perimeter.
6. Doors: Flush panel doors: Fabricate door panel from material and material gage indicated, with a smooth face, and with door edges installed square with door frame.
7. Shop/Factory Finishing: Prime paint finish: Where indicated, finish door assembly with manufacturer's standard factory-applied rust-inhibitive primer.

END OF SECTION

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SECTION 08 4113 – ALUMINUM FRAMED ENTRANCES AND STOREFRONTS

1. General: This section outlines general requirements for aluminum framed entrances and storefronts.
2. Design Considerations:
 - a. Kawneer TUFFLINE system is preferred, with 8-1/4" mid rail, 10-1/4" bottom rail, and 1" insulating glass.
 - b. Provide all welded construction with back-sealed joints to prevent light leaks.
 - c. Provide ROTON Series 780LL continuous hinges. Refer to Door Hardware section for additional information.
 - d. Paired doors are discouraged. When paired doors are necessary, provide fixed or removable mullions.
3. Performance Requirements – Exterior Assemblies: Design to comply with the performance criteria listed below:
 - a. Thermal Movement: Design to accommodate expansion and contraction resulting from air temperature range of 120 degrees F, solar heat gain, and nighttime re-radiation.
 - b. Structural Performance: Design to withstand all live and dead loads without deformation and without deflection greater than 1/175 of span.
 - c. Deflection in Plane of Wall: Not greater than that which would reduce glass edge clearance to 25 percent of design dimension or 1/8 inch, whichever is greater, or that which would reduce glass bite to 75 percent of design dimension.
 - d. Wind Loads:
 - i. Determine in accordance with ASCE 7.
 - ii. Design system to withstand 150 percent of design wind load with no failure or permanent deformation greater than 0.2 percent of span.
 - e. Air Infiltration:
 - i. Fixed Framing: Not more than 0.06 cfm per square foot of fixed area
 - ii. Measure at 6.24 psf
 - iii. Single Doors: Not more than 0.5 cfm per linear foot of crack

- iv. Pairs of Doors (Not recommended): Not more than 1.0 cfm per linear foot of crack
 - v. Doors: Measure at 1.57 psf
 - f. Water Penetration:
 - i. Fixed framing (excluding operable door edges): No penetration at 6.24 psf.
 - g. Condensation Resistance:
 - i. Fixed framing: Not less than 45.
 - ii. Door frames: Not less than 48.
 - h. Thermal Transmittance (U-Value):
 - i. Fixed framing: Not more than 0.65.
 - ii. Door frames: Not more than 0.93.
- 4. Warranty: Review project specific requirements with NU Project Manager.
- 5. Materials:
 - a. Aluminum Members: ASTM B 221 for extrusions, ASTM B 209 for sheet/plate; alloy and temper recommended by the manufacturer for the strength required, for corrosion resistance, and for the finish required.
 - b. Fluoropolymer Finish: Multiple coats of thermally cured primer and topcoats, resin minimum 70 percent "Kynar 500" or "Hylar 5000"; comply with AAMA 605.2 and AA-C12C42R1X (inhibited chemical-cleaned; acid chromate-fluoride-phosphate chemical coating; organic coating). Clean with inhibited chemicals and conversion-coat with acid chromate-fluoride-phosphate treatment, in accordance with coating manufacturer's instructions. Products: Provide one of the following products:
 - i. "Fluoropon"; The Valspar Corporation.
 - ii. "Nubelar" or "Nubelar S"; The Glidden Company.
 - iii. "Duronar"; PPG Industries, Inc.
- 6. Framing Systems:
 - a. Aluminum Framing System: Extruded aluminum.
 - b. Style: Flush glazed (without projecting stops), with glazing centered in frame members; see drawings for profiles, dimensions, and arrangement of members.

- c. Framing members: Thermally improved or thermally broken design with concealed, low thermal conductance material completely separating exterior metal members from interior metal members. Use only standard construction methods which have been in use for at least five (5) years.
 - d. Glazing method: Resilient gasket glazed, with provision for replacement of glazing without disassembly of framing.
 - e. Finish: Review options with NU Project Manager during the design phase.
 - f. Aluminum Door Frames: Extruded tube or channel frames with welded joints.
7. Swinging Doors:
- a. Stile and Rail Doors: Glazed doors with tubular extruded aluminum frame members.
 - b. Frame joints: Welded.
 - c. Thickness: 1-3/4 inches.
 - d. Stile width: 5 inches (Narrow stile doors are not recommended).
 - e. Full glazed, with one mullion minimum.
 - f. Glazing stops: Snap-on extruded aluminum, designed to allow replacement of glazing without disassembly of frame. Provide non-removable exterior stops.
 - g. Finish: Typically to match framing system. Review options with NU Project Manager during the design phase.
 - h. Weather-stripping:
 - i. At fixed stops: Replaceable, compression type molded gaskets of neoprene or EPDM rubber complying with C 864 or of polyvinyl chloride complying with ASTM D 2287.
 - ii. At other edges: Replaceable woven polypropylene, wool, or nylon pile, with aluminum or nylon fabric backing, complying with AAMA 701.
 - iii. Provide weather-stripping on all exterior doors.

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SECTION 08 5000 – WINDOWS

1. General: This section outlines general requirements for exterior windows.
2. Design Considerations:
 - a. Fixed windows are preferred. Operable windows will be permitted in residence halls and under special conditions.
 - b. Maintain clearance from adjacent surfaces to permit re-glazing.
 - c. Wood windows are not permitted.
 - d. Window Design: Where glazing stops are indicated, design for re-glazing without removal or dismantling of ventilator/sash or frames.
 - i. Operable ventilator/sash: Design so ventilator/sash can be removed from inside. In residence halls at first floors and other areas accessible from grade, provide ventilating locks at 4" open position.
 - ii. Provide weather-stripping on all operable ventilator/sash in exterior wall.
 - iii. Thermally improved or thermally broken construction: Provide frame and ventilator/sash members with concealed, structural, load-bearing, low thermal conductance material separating exterior metal members from interior metal members. Use only a standard construction which has been in use at least five (5) years. Do not bridge thermal gap with any fasteners or hardware.
 - iv. Glazing Stops: Aluminum to match windows, screwed or snapped on.
3. Performance Requirements: As specified in AAMA 101, for window type, grade, and class indicated.
4. Basis of Design Manufacturers:
 - a. Double-hung windows: Traco TR-9000 or Milco/Wasau #3750 are preferred.
 - b. Projected windows: Traco TR-3500 preferred.
 - c. Casement windows: Traco TR-3100 or EFCO Series 590 are preferred.
 - d. Acceptable field values: Not more than 1.5 times laboratory allowed value.
 - e. Acceptable field result: No water leakage.
 - f. Thermal Performance Required: Thermally improved or thermally broken construction.

5. Quality Assurance:
 - a. Test Units: Fabricated in accordance with requirements of contract documents, fully assembled, and glazed as specified in AAMA 101.
 - i. Air, Water, and Structural Test Methods: As specified in AAMA 101.
 - ii. Component Structural Test Methods: As specified in AAMA 101.
 - b. Field Tests:
 - i. Air infiltration test method: ASTM E 783.
 - ii. Water infiltration test method: AAMA 501.3.
6. Warranty: Review project specific requirements with NU Project Manager.
7. Fixed Windows: (Preferred for all windows)
 - a. Glazing method: Compression gasket/sealant tape; glazing stops; pre-glazed.
 - b. Grade: F, Heavy Commercial.
8. Hung Windows (for Residence Halls): Vertically sliding sash, with counterbalances. Provide tilting sash to allow cleaning of both sides of sash from inside of same unit.
 - a. Glazing method: Compression gasket/sealant tape; glazing stops; pre-glazed
 - b. Grade: DH-HC40
 - c. Counterbalances: One on each side of each operable sash
 - d. Hardware: Locks: Manufacturer's standard
 - e. Lift handle: Continuous bar on bottom rail
 - f. Pull-down handle: Continuous pull on bottom rail
9. Materials:
 - a. Fluoropolymer coating: Multiple coats of thermally cured fluoropolymer primer and top coats, resin minimum 70 percent "Kynar 500" or "Hylar 5000"; comply with AAMA 605.2 and AA-C12C42R1X (inhibited chemical-cleaned; acid chromate-fluoride-phosphate chemical conversion coating; organic coating). Provide the number and type of coats as recommended by coating manufacturer for color and sheen required.
 - b. Fasteners: Do not use exposed fasteners, except for hardware.
 - i. Hardware fasteners: Match finish of members to which they are fastened.
Anchor fasteners: Same as anchors.

- ii. Other fasteners: Noncorrosive and corrosion-resistant material that is compatible with materials being fastened.
- c. Concealed Anchors: Specify one or more of the following:
 - i. Aluminum.
 - ii. Steel, zinc electroplated after fabrication in accordance with ASTM B 633.
 - iii. Stainless steel.
- d. Pile Weather Stripping: Woven polypropylene, wool, or nylon pile; complying with AAMA 701.
- e. Sealants:
 - i. Use only non-hardening, non-shrinking, and non-migrating materials.
 - ii. For nonworking, metal-to-metal joints within window units: Small joint sealant conforming to 803.3, as described in AAMA 800.
 - iii. For joints between other window components: Suitable for application.
 - iv. For joints between window units and other building components: Provide products specified in Division 7.
 - v. For glazing: Provide products specified elsewhere.

10. Accessories:

- a. Window Cleaner's Anchors: Stainless steel; designed, located, and anchored to comply with ASME A39.1 or with requirements of governing authorities if more stringent. Reinforce window frames and anchor frames to structure as required. Verify location of anchors with the owner. Install window cleaner's anchors at each exterior window above the ground floor.
- b. Insect Screens: Formed or extruded aluminum frames with screen fabric. Design to fit tightly, but be removable, using as few exposed fasteners or latches as possible.
 - i. Do not use wickets for access to window-operating hardware, unless absolutely necessary; make wickets hinged or sliding, with the same type of frames as screens, and tight-fitting. Frame construction: Minimum wall thickness of 0.040-inch, with joints mitered or coped and fastened with concealed fasteners. Anchor screen fabric with removable plastic or rubber splines
 - ii. Finish: To match window.
 - iii. Screen Fabric: Aluminum wire fabric complying with FS RR-W-365, Type VII.

- iv. Mesh size: Window manufacturer's standard.
- v. Provide screens for all operable ventilators/sash

11. Field Quality Control: Test for air and water infiltration after installation. Review specific requirements with NU Project Manager during the design phase.

END OF SECTION

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SECTION 08 7100 – Door Hardware

1. General:
 - a. This section outlines the requirements for door hardware.
 - b. Door hardware specifications shall be reviewed with the NU Project Manager and the NU Lock Shop during the design phases of the project.
2. SUMMARY
 - a. This Section includes commercial door hardware for the following:
 - i. Swinging doors.
 - ii. Sliding Doors.
 - iii. Other doors to the extent indicated.
 - b. Door hardware includes, but is not necessarily limited to, the following:
 - i. Mechanical door hardware.
 - ii. Electromechanical door hardware, power supplies, back-ups and surge protection.
 - iii. Automatic operators.
 - iv. Cylinders specified for doors in other sections.
 - c. Related Sections:
 - i. Section 06 10 00 – Rough Carpentry.
 - ii. Section 06 20 00 – Finish Carpentry.
 - iii. Section 08 01 00 – Operations and Maintenance.
 - iv. Section 08 06 10 – Door Schedule.
 - v. Section 08 06 71 – Door Hardware Schedule.
 - vi. Section 08 11 13 – Hollow Metal Doors and Frames.
 - vii. Section 08 14 16 – Flush Wood Doors.
 - viii. Section 08 14 23 – Clad Wood Doors.
 - ix. Section 08 14 33 – Stile and Rail Wood Doors.

- x. Section 08 17 00 – Integrated Door Opening Assemblies.
 - xi. Section 08 41 13 – Aluminum-Framed Entrances and Storefronts.
 - xii. Section 08 42 26 – All-Glass Entrances.
 - xiii. Section 08 42 29 – Automatic Entrances.
 - xiv. Section 08 71 13 – Automatic Door Operators.
 - xv. Section 08 81 00 – Glass and Glazing.
 - xvi. Section 09 90 00 – Painting and Coating.
 - xvii. Section 28 13 00 – Access Control.
- d. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.
- i. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
 - ii. ANSI/SDI A250.13 - Testing and Rating of Severe Windstorm Resistant Components for Swing Door Assemblies.
 - iii. ASTM E1886 - Test Method for Performance of Exterior Windows, Curtin Walls, Doors and Shutters Impacted by Missiles and Exposed to Cyclic Pressure Differentials.
 - iv. ASTM E330 - Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure difference.
 - v. ASTM E1996 - Standard specification for performance of exterior windows, curtain walls, doors and storm shutters impacted by Windborne Debris in Hurricanes.
 - vi. FEMA 361 2008 - Design and Construction Guidance for Community Safe Rooms.
 - vii. ICC 500 - ICC/NSSA Standard for the Design and Construction of Storm Shelters.
 - viii. ICC/IBC - International Building Code.
 - ix. NFPA 70 - National Electrical Code.
 - x. NFPA 80 - Fire Doors and Windows.
 - xi. NFPA 101 - Life Safety Code.
 - xii. NFPA 105 - Installation of Smoke Door Assemblies.

- xiii. TAS-201-94 - Impact Test Procedures.
- xiv. TAS-202-94 - Criteria for Testing Impact and Non-Impact Resistant Building Envelope Components using Uniform Static Air Pressure.
- xv. TAS-203-94 - Criteria for Testing Products Subject to Cyclic Wind Pressure Loading.
- e. Standards: Hardware specified herein shall comply with the following industry standards:
 - i. ANSI/BHMA Certified Product Standards - A156 Series
 - ii. UL10C – Positive Pressure Fire Tests of Door Assemblies

3. SUBMITTALS

- a. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.
- b. 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.
 - i. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."
 - ii. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.
 - iii. Content: Include the following information:
 - 1. Type, style, function, size, label, hand, and finish of each door hardware item.
 - 2. Manufacturer of each item.
 - 3. Fastenings and other pertinent information.
 - 4. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
 - 5. Explanation of abbreviations, symbols, and codes contained in schedule.

6. Mounting locations for door hardware.
7. Door and frame sizes and materials.
 - iv. 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.
- c. Proof of Certification: Provide copy of manufacturer(s) official certification or accreditation document indicating proof of status as a qualified and authorized provider of the primary Integrated Wiegand Access Control Products.
- d. Keying Schedule: Prepared by the Owner, Contractor to order manufacturer pinned cylinders.
- e. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Submittals. The manual to include the name, address, and contact information of the manufacturers providing the hardware and their nearest service representatives. The final copies delivered after completion of the installation test to include "as built" modifications made during installation, checkout, and acceptance.
- f. Warranties and Maintenance: Special warranties and maintenance agreements specified in this Section.

4. QUALITY ASSURANCE

- a. Manufacturers Qualifications: Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.
- b. Installer Qualifications: Installers, trained by the primary product manufacturers, with a minimum 3 years documented experience installing both standard and electrified builders 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.
- c. Door Hardware Supplier Qualifications: Experienced commercial door hardware distributors with a minimum 5 years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project. Supplier recognized as a factory direct distributor in good standing by the manufacturers of the primary materials with a warehousing facility in Project's vicinity.

- d. Supplier to have a certified Architectural Hardware Consultant (AHC) available during the course of the Work to consult with Contractor, Architect, and Owner concerning both standard and electromechanical door hardware and keying.
 - i. Scheduling Responsibility: Preparation of door hardware schedules.
- e. Automatic Operator Supplier Qualifications: Suppliers are to be factory trained, certified, and a direct purchaser of the specified power operators and be responsible for the installation and maintenance of the units and accessories indicated for the Project.
- f. Source Limitations: Obtain each type and variety of Door Hardware specified in this Section from a single source, qualified supplier unless otherwise indicated.
 - i. Electrified modifications or enhancements made to a source manufacturer's product line by a secondary or third party source will not be accepted.
 - ii. Provide electromechanical door hardware from the same manufacturer as mechanical door hardware, unless otherwise indicated.
- g. Regulatory Requirements: Comply with NFPA 70, NFPA 80, NFPA 101 and ANSI A117.1 requirements and guidelines as directed in the model building code including, but not limited to, the following:
 - i. NFPA 70 "National Electrical Code", including electrical components, devices, and accessories listed and labeled as defined in Article 100 by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
 - ii. Where indicated to comply with accessibility requirements, comply with Americans with Disabilities Act (ADA), "Accessibility Guidelines for Buildings and Facilities (ADAAG)," ANSI A117.1 as follows:
 - 1. 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.
 - 2. Door Closers: Comply with the following maximum opening-force requirements indicated:
 - a. Interior Hinged Doors: 5 lbf applied perpendicular to door.
 - b. Fire Doors: Minimum opening force allowable by authorities having jurisdiction.
 - 3. Thresholds: Not more than 1/2 inch high. Bevel raised thresholds with a slope of not more than 1:2.
 - iii. NFPA 101: Comply with the following for means of egress doors:

1. 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.
 2. Thresholds: Not more than 1/2 inch high.
- h. 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 (neutral pressure at 40" above sill) or UL-10C.
- i. Test Pressure: Positive pressure labeling.
 - i. Pre-Submittal Conference: Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier(s), Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing door hardware.
 - i. Prior to installation of door hardware, arrange for manufacturers' representatives to hold a project specific training meeting to instruct the installing contractors' personnel on the proper installation and adjustment of their respective products. Product training to be attended by installers of door hardware (including electromechanical hardware) for aluminum, hollow metal and wood doors. Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.
 - ii. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.
 - iii. Review sequence of operation narratives for each unique access controlled opening.
 - iv. Review and finalize construction schedule and verify availability of materials.
 - v. Review the required inspecting, testing, commissioning, and demonstration procedures.
5. DELIVERY, STORAGE, AND HANDLING
- a. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.
 - 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, as applicable all manufacture supplied, permanent keys, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

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 standard and electrified hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.
- b. Door Hardware and Electrical Connections: Coordinate the layout and installation of scheduled electrified door hardware and related access control equipment with required connections to source power junction boxes, low voltage power supplies, detection and monitoring hardware, and fire and detection alarm systems.
- c. Door and Frame Preparation: Related Division 08 Sections (Steel, Aluminum and Wood) doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

7. WARRANTY

- a. General Warranty: Reference Division 01, General Requirements. 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. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:
 - i. Structural failures including excessive deflection, cracking, or breakage.
 - ii. Faulty operation of the hardware.
 - iii. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - iv. Electrical component defects and failures within the systems operation.
- c. Standard Warranty Period: One year from date of Substantial Completion, unless otherwise indicated.
- d. Special Warranty Periods:

- i. Ten (10) years for mortise locks and latches.
- ii. Five (5) years for exit hardware.
- iii. Ten (10) years for manual door closers.
- iv. Two (2) years for electromechanical door hardware.

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. Continuing Service: Beginning at Substantial Completion, and running concurrent with the specified warranty period, provide continuous (6) months full maintenance including repair and replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper door opening operation. Provide parts and supplies as used in the manufacture and installation of original products.

9. SCHEDULED DOOR HARDWARE

- a. General: Provide door hardware for each door to comply with requirements in Door Hardware Sets and each referenced section that products are to be supplied under.
 - i. Designations: Requirements for quantity, item, size, finish or color, grade, function, and other distinctive qualities of each type of door hardware are indicated in the Door Hardware Sets at the end of Part 3. Products are identified by using door hardware designations, as follows:
 - 1. Named Manufacturer's Products: Product designation and manufacturer are listed for each door hardware type required for the purpose of establishing requirements. Manufacturers' names are abbreviated in the Door Hardware Schedule.
 - 2. Products furnished, but not installed, under this Section include the following. Coordinating, purchasing, delivering, and scheduling remain requirements of this Section.
 - a. Permanent cores to be installed by contractor.
 - b. Keys to be issued by Owner.
- b. Finishes – All finishes for hardware [(626/630/689), (613/690), or (612/691)] are available as university standards. (606/688) available with special approval. No other finishes will be allowed without approval from owner and 20% additional product for attic stock to the owner.

- c. Substitutions: No substitutions will be allowed without prior approval from the owner in writing. Any substitution approved will also need to supply 20% additional of each hardware item approved not in the university standard for attic stock

10. HANGING DEVICES

- a. Hinges: ANSI/BHMA A156.1 certified butt hinges with number of hinge knuckles as specified in the Door Hardware Sets.
- i. Quantity: Provide the following hinge quantity, unless otherwise indicated:
 1. Two Hinges: For doors with heights up to 60 inches.
 2. Three Hinges: For doors with heights 61 to 90 inches.
 3. Four Hinges: For doors with heights 91 to 120 inches.
 4. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.
 - ii. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:
 1. Widths up to 3'0": 4-1/2" standard or heavy weight as specified.
 2. Sizes from 3'1" to 4'0": 5" standard or heavy weight as specified.
 - iii. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:
 1. Exterior Doors: Heavy weight, non-ferrous, ball bearing hinges unless Hardware Sets indicate standard weight.
 2. Interior Doors: Standard weight, steel, ball bearing hinges unless Hardware Sets indicate heavy weight.
 3. Tornado Resistant Assemblies: At a minimum, provide heavy weight hinges with stainless steel screws used in accordance with and specified as part of a Severe Storm Shelter Opening meeting ICC 500 and FEMA 361.
 - iv. Hinge Options: Comply with the following where indicated in the Hardware Sets or on Drawings:
 1. 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. Out-swinging exterior doors.

- b. Out-swinging access controlled doors.
 - v. Acceptable Manufacturers:
 - 1. Hager Companies (HA).
 - 2. McKinney Products (MK).
 - b. Continuous Geared Hinges: ANSI/BHMA A156.26 certified continuous geared hinge with minimum 0.120-inch thick extruded 6060 T6 aluminum alloy hinge leaves and 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, or half surface, in standard and heavy duty models, as specified in the Hardware Sets. Concealed continuous hinges to be U.L. listed for use on up to and including 90 minute rated door installations and U.L. listed for windstorm components where applicable. Factory cut hinges for door size and provide with removable service power transfer panel where indicated at electrified openings.
 - i. Acceptable Manufacturers:
 - 1. Pemko Manufacturing (PE).
 - 2. McKinney Products (MK).
 - c. Pin and Barrel Continuous Hinges: ANSI/BHMA A156.26 certified pin and barrel continuous hinges with minimum 12 gauge (.105) Type 304 stainless steel hinge leaves, concealed teflon- coated stainless pin, and twin self-lubricated nylon bearings at each knuckle separation. Fabricate hinges non-handed and U.L. listed for use on up to and including 3 hour rated doors and U.L. listed for windstorm components where applicable. Provide hinges with power transfer cutouts where indicated at electrified openings.
 - i. Acceptable Manufacturers:
 - 1. Markar Products (MA).
 - 2. McKinney Products (MK).
 - 3. Pemko Manufacturing (PE).
 - d. Floor Closers: ANSI/BHMA A156.4 certified floor closers provided either center hung or 3/4" offset hung type complete with top and intermediate pivots (offset closers only) in quantity according to manufacturer's recommendation. Floor closers available with options for labeled, lead lined and regular doors. Provide independent and adjustable valves for closing speed, latch speed, and backcheck with built-in dead stop and hold open features as specified. Provide finish cover plates or thresholds as indicated in door Hardware Sets.
 - i. Acceptable Manufacturers:

1. Rixson Door Controls (RF).
 - e. Pivots: ANSI/BHMA A156.4, Grade 1, certified pivots provided either center hung or 3/4" offset type complete with top, bottom, and intermediate pivots (offset pivots only) in quantity according to manufacturer's recommendations. Space intermediate pivots equally not less than 25 inches on center apart or not more than 35 inches on center for doors over 121 inches high. Pivot hinges to have oil impregnated bronze bearing in the top pivot and a radial roller and thrust bearing in the bottom pivot with the bottom pivot designed to carry the full weight of the door. Pivots to be UL listed for windstorm where applicable.
 - i. Acceptable Manufacturers:
 1. Rixson Door Controls (RF).
 - f. Sliding Door Hardware: Sliding door hardware is to be of type and design as specified and should comply with ANSI/BHMA A156.14.
 - i. Sliding Bi-Passing Pocket Door Hardware: Provide complete sets consisting of track, hangers, stops, bumpers, floor channel, guides, and accessories indicated.
 - ii. Bi-folding Door Hardware: Rated for door panels weighing up to 125 lb.
 - iii. Pocket Sliding Door Hardware: Rated for doors weighing up to 200 lb.
 - iv. Acceptable Manufacturers:
 1. Hafele Manufacturing (HF).
 2. Pemko Manufacturing (PE).

11. POWER TRANSFER DEVICES

- a. Electrified Quick Connect Transfer Hinges: Provide electrified transfer hinges with Molex™ standardized plug connectors and sufficient number of concealed wires (up to 12) to accommodate the electrified functions specified in the Door Hardware Sets. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Wire nut connections are not acceptable.
 - i. Acceptable Manufacturers:
 1. Hager Companies (HA) - ETW-QC (# wires) Option.
 2. McKinney Products (MK) - QC (# wires) Option.
- b. Electrified Quick Connect Continuous Geared Transfer Hinges: Provide electrified transfer continuous geared hinges with a 12" removable service panel cutout accessible without de-mounting door from the frame. Furnish with Molex™ standardized plug connectors with sufficient number of concealed wires

(up to 12) to accommodate the electrified functions specified in the Door Hardware Sets. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Wire nut connections are not acceptable.

i. Acceptable Manufacturers:

1. Bommer Industries (BO) - SER-QC (# of wires) Option.
2. McKinney Products (MK) - SER-QC (# wires) Option.
3. Pemko Manufacturing (PE) - SER-QC (# wires) Option.

- c. Electrified Quick Connect Stainless Steel Continuous Transfer Hinges: Provide electrified transfer stainless steel continuous hinges with electrical transfer access prep accessible without de-mounting door from the frame. Furnish with Molex™ standardized plug connectors with sufficient number of concealed wires (up to 12) to accommodate the electrified functions specified in the Door Hardware Sets. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Wire nut connections are not acceptable.

i. Acceptable Manufacturers:

1. Markar Products (MA) - MP-ETAP-EL (# wires) Option.
2. McKinney Products (MK) - MCK-ETAP-EL (# wires) Option.

- d. Electrified Quick Connect Intermediate Transfer Pivots: Provide electrified offset intermediate transfer pivot hinges with Molex™ standardized plug connectors and sufficient number of concealed wires (up to 12) to accommodate the electrified functions specified in the Door Hardware Sets. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Wire nut connections are not acceptable.

i. Acceptable Manufacturers:

1. Rixson Door Controls (RF) - E-M19-QC (# wires).

- e. Electric Door Hardware Cords: Provide electric transfer wiring harnesses with standardized plug connectors to accommodate up to twelve (12) wires. Connectors plug directly to through- door wiring harnesses for connection to electric locking devices and power supplies. Provide sufficient number of concealed wires to accommodate electric function of specified hardware. Provide a connector for through-door electronic locking devices and from hinge to junction box above the opening. Wire nut connections are not acceptable. Determine the length required for each electrified hardware component for the door type, size and construction, minimum of two per electrified opening.

i. Acceptable Manufacturers:

1. McKinney Products (MK) - Inner Door Cord 3 inches: QC-C003P.
 2. McKinney Products (MK) - Inner Door Cord 3 foot door: QC-C206P.
 3. McKinney Products (MK) - Inner Door Cord 4 foot door: QC-C306P.
 4. McKinney Products (MK) - Inner Door Cord 15 feet: QC-C1500P.
 5. McKinney Products (MK) - Hinge to Junction Panel 15 feet: QC-C1500P.
 6. Or Northwestern University approved equal.
- f. Provide one each of the following tools as part of the base bid contract to the contractor:
- i. McKinney Products (MK) - Electrical Connecting Kit: 52-3000.
 - ii. McKinney Products (MK) - Connector Hand Tool: 52-0439.
 - iii. Or Northwestern University approved equal..

12. DOOR OPERATING TRIM

- a. Flush Bolts and Surface Bolts: ANSI/BHMA A156.3 and A156.16, Grade 1, certified automatic, self-latching, and manual flush bolts and surface bolts. Manual flush bolts to be furnished with top rod of sufficient length to allow bolt location approximately six feet from the floor. Furnish dust proof strikes for bottom bolts. Surface bolts to be minimum 8" in length and U.L. listed for labeled fire doors and U.L. listed for windstorm components where applicable. Provide related accessories (mounting brackets, strikes, coordinators, etc.) as required for appropriate installation and operation.
 - i. Acceptable Manufacturers:
 1. McKinney Architectural Hardware (MK).
 2. Rockwood Manufacturing (RO).
- b. Coordinators: ANSI/BHMA A156.3 certified door coordinators consisting of active-leaf, hold- open lever and inactive-leaf release trigger. Coordinators fabricated from steel with nylon- coated strike plates and built-in adjustable safety release.
 - i. Acceptable Manufacturers:
 1. McKinney Architectural Hardware (MK).
 2. Rockwood Manufacturing (RO).

- c. Door Push Plates and Pulls: ANSI/BHMA A156.6 certified door pushes and pulls of type and design specified below or in the Hardware Sets. Coordinate and provide proper width and height as required where conflicting hardware dictates.
 - i. Push/Pull Plates: Minimum .050 inch thick, 4-inches wide by 16-inches high, with square corners and beveled edges, secured with exposed screws unless otherwise indicated.
 - ii. Straight Pull Design: Minimum 1-inch round diameter stainless steel bar or tube stock pulls with 2 1/2-inch projection from face of door unless otherwise indicated.
 - iii. Offset Pull Design: Minimum 1-inch round diameter stainless steel bar or tube stock pulls with 2 1/2-inch projection and offset of 90 degrees unless otherwise indicated.
 - iv. Push Bars: Minimum 1-inch round diameter horizontal push bars with minimum clearance of 2 1/2-inch projection from face of door unless otherwise indicated.
 - v. Fasteners: Provide machine screws for all metal doors (drill and tap not self-tapping) and provide manufacture standard for all wood doors.
 - vi. Acceptable Manufacturers:
 - 1. Rockwood Manufacturing (RO).
 - 2. McKinney (MK)
 - 3. Trimco (TR)
- d. Locking Pull System: Post-mount style door pulls with integrated deadbolt locking system in type and design as specified in the Hardware Sets. Pulls available in multiple head, floor, or combination locking options, with outside keyed rim cylinder operation and inside turn piece activation. Mounting applications for aluminum, glass, steel and wood doors, with customized sizing and configuration options. Pull finishes include brass, bronze, and stainless steel. Provide pulls standard with dustproof strike and auxiliary door stop as specified.
 - i. Acceptable Manufacturers:
 - 1. Rockwood Manufacturing (RO) – LP Series.
 - 2. Blumcraft (BL)

13. CYLINDERS AND KEYING

- a. General: Permanent cores to be supplied by Owner.

- b. Permanent Cores: Manufacturer's standard; finish face to match lockset; complying with the following:
 - i. Acceptable Manufacturers:
 - 1. Medeco M3 fixed core (MC) – No Substitution permanent cylinders provided by contractor.

14. MECHANICAL LOCKS AND LATCHING DEVICES

- a. Mortise Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.13, Series 1000, Operational Grade 1 certified mortise locksets furnished in the functions as specified in the Hardware Sets. Locksets to be manufactured with a corrosion resistant, stamped 12 gauge minimum formed steel case and be field-reversible for handing without disassembly of the lock body. Lockset trim (including knobs, levers, escutcheons, roses) to be the product of a single manufacturer. Furnish with standard 2 3/4" backset, 3/4" throw anti-friction stainless steel latchbolt, and a full 1" throw stainless steel bolt for deadbolt functions.
 - i. Acceptable Manufacturers:
 - 1. Sargent Manufacturing (SA) – LC 8200 Series. Provide #97 cylinder rosette for all keyed locks.
- b. Multi-Point Locksets: Vertical rod locking devices designed for openings requiring multiple latching points within one locking mechanism. Rods are retracted by dual mounted outside lever trim controls available in a variety of ANSI/BHMA operational functions. Option for single top latching only eliminates the need for bottom strikes. Electromechanical options include solenoid activated trim and inside and outside lever monitoring.
 - i. Acceptable Manufacturers:
 - 1. Sargent Manufacturing (SA) - 7000 Series.
- c. Cylindrical Locksets, Grade 1 (Extra-Heavy Duty): ANSI 156.2 Series 4000, Grade 1 certified cylindrical (bored) locksets able to withstand 3000 inch pounds of torque applied to the locked lever without gaining access. Locksets to fit a standard 2 1/8" bore without the use of through- bolts. Lever handles to be made of solid material with no plastic fillers and latchbolt head to be one-piece stainless steel construction encased within the lock body. Furnish with standard 2 3/4" backset, 1/2" throw latchbolt (3/4" at rated paired openings), and universal non-handed.
 - i. Acceptable Manufacturers:
 - 1. Sargent Manufacturing (SA) – 11 Line.
 - 2. Only when replacing existing Cylindrical locks and not replacing door.

- d. Lock Trim Design: LNL, LNJ [LNG or TEG *by approval only, if approved no attic stock required*], [WTL *by approval only, if approved no attic stock required*]. *all other trim must be approved by the owner and provide 20% additional product in attic stock.*
- e. Knurling: Where specified provide knurling or abrasive coating to all levers on doors leading to hazardous areas such as mechanical rooms, boiler and furnace rooms, janitor closets, and as otherwise required by the Illinois Accessibility Code.

15. ELECTROMECHANICAL LOCKING DEVICES

- a. Electromechanical Mortise Locksets, Grade 1 (Heavy Duty): Subject to same compliance standards and requirements as mechanical mortise locksets, electrified locksets to be of type and design as specified below.
 - i. Electrified Lock Options: Where indicated in the Hardware Sets, provide electrified options including: outside door lock/unlock trim control, latchbolt and lock/unlock status monitoring, and request-to-exit signaling. Unless otherwise indicated, provide electrified locksets standard as fail secure.
 - ii. Acceptable Manufacturers:
 - 1. Sargent Manufacturing (SA) - 8200 Series.

16. INTEGRATED WIEGAND OUTPUT ACCESS CONTROL LOCKING DEVICES

- a. Integrated Wiegand Output Mortise Locks: Wiegand output ANSI A156.13, Grade 1, mortise lockset with integrated iClass® elite card reader, request-to-exit signaling, door position status switch, and latchbolt monitoring in one complete unit. Hard wired, solenoid driven locking/unlocking control of the lever handle trim, 3/4" deadlocking anti-friction latch, and 1" case-hardened steel deadbolt. Lock is U.L listed and labeled for use on up to 3 hour fire rated openings. Keyed high security cylinder override.
 - i. Open architecture, hard wired platform supports centralized control of locking units with new or existing Wiegand compatible access control systems. Latchbolt monitoring and door position switch act in conjunction to report door-in-frame (DPS) and door latched (door closed and latched) conditions.
 - ii. Reader supports 13.56 MHz (2K-32K) iClass® elite credentials.
 - iii. 24VDC operation with iClass® elite reader. Fail safe or fail secure options.
 - iv. Installation requires only one cable run from the lock to the access control panel without requirements for additional proprietary lock panel interface boards or modules.

- v. Installation to include manufacturer's access control panel interface board or module where required for Wiegand output protocol.
- vi. Acceptable Manufacturers:
 - 1. Sargent Manufacturing (SA) - Harmony - H2 8200 Series.or university approved equal

17. AUXILIARY LOCKS

- a. Mortise Deadlocks, Small Case: ANSI/BHMA A156.5, Grade 1, certified small case mortise type deadlocks constructed of heavy gauge wrought corrosion resistant steel. Steel or stainless steel bolts with a 1" throw and hardened steel roller pins. Deadlocks to be products of the same source manufacturer and keyway as other specified locksets.
 - i. Acceptable Manufacturers:
 - 1. Sargent Manufacturing (SA) - 4870 Series.
- b. Push-Pull Latches, Ligature Resistant, Mortise: ANSI/BHMA A156.13, Series 1000, Operational and Security Grade 1 mortise type push-pull locks and latches with ligature- resistant paddle trim capable of being mounted in vertical (up or down) and horizontal (sideways) positions. Locksets to be manufactured with a corrosion resistant, formed steel case and be non-handed, field-reversible for re-handing without disassembly of the lock body. Paddles and covers are manufactured from cast stainless steel or brass material. Provide optional lead-lining (lock body) and Torx® fasteners as specified in Hardware Sets.
 - i. Acceptable Manufacturers:
 - 1. Sargent Manufacturing (SA) - 8200 ALP Series.

18. LOCK AND LATCH 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:
 - i. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
 - ii. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
 - iii. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.
- b. Standards: Comply with the following:
 - i. Strikes for Mortise Locks and Latches: BHMA A156.13.

- ii. Strikes for Bored Locks and Latches: BHMA A156.2.
- iii. Strikes for Auxiliary Deadlocks: BHMA A156.5.
- iv. Dustproof Strikes: BHMA A156.16.

19. ELECTROMAGNETIC LOCKING DEVICES

- a. Surface Electromagnetic Locks (Heavy Duty): Electromagnetic locks to be surface mounted type conforming to ANSI A156.23, Grade 1 with minimum holding force strength of 1,200 pounds. Locks to be capable of either 12 or 24 voltage and be UL listed for use on fire rated door assemblies. Electronics are to be fully sealed against tampering and allow exterior weatherproof applications. As indicated in Hardware Sets, provide specified mounting brackets and housings. Power supply to be by the same manufacturer as the lock with combined products having a lifetime replacement warranty.
 - i. Acceptable Manufacturers:
 - ii. Security Door Controls (SD) – EMLock 1500 Series.
 - iii. Securitron Door Controls (SU) – M62 Series.

20. ELECTRIC STRIKES

- a. Standard Electric Strikes: Heavy duty, cylindrical and mortise lock electric strikes conforming to ANSI/BHMA A156.31, Grade 1, UL listed for both Burglary Resistance and for use on fire rated door assemblies. Stainless steel construction with dual interlocking plunger design tested to exceed 3000 lbs. of static strength and 350 ft-lbs. of dynamic strength. Strikes tested for a minimum 1 million operating cycles. Provide strikes with 12 or 24 VDC capability and supplied standard as fail-secure unless otherwise specified. Option available for latchbolt and latchbolt strike monitoring indicating both the position of the latchbolt and locked condition of the strike.
 - i. Acceptable Manufacturers:
 - 1. Folger Adam EDC (FO) - 700 Series
 - 2. HES (HE) - 1006 Series.
- b. Surface Mounted Rim Electric Strikes: Surface mounted rim exit device electric strikes conforming to ANSI/BHMA A156.31, Grade 1, and UL Listed for both Burglary Resistance and for use on fire rated door assemblies. Construction includes internally mounted solenoid with two heavy-duty, stainless steel locking mechanisms operating independently to provide tamper resistance. Strikes tested for a minimum of 500,000 operating cycles. Provide strikes with 12 or 24 VDC capability supplied standard as fail-secure unless otherwise specified. Option available for latchbolt and latchbolt strike monitoring indicating both the position of the latchbolt and locked condition of the strike. Strike requires no cutting to the jamb prior to installation.

- i. Acceptable Manufacturers:
 - 1. HES (HE) - 9500/9600 Series.
 - 2. Folger Adam (FO)
- c. Provide electric strikes with in-line power controller and surge suppressor by the same manufacturer as the strike with combined products having unlimited lifetime warranty.

21. CONVENTIONAL EXIT DEVICES

- a. General Requirements: All exit devices specified herein shall meet or exceed the following criteria:
 - i. At doors not requiring a fire rating, provide devices complying with NFPA 101 and listed and labeled for "Panic Hardware" according to UL305. Provide proper fasteners as required by manufacturer including sex nuts and bolts at openings specified in the Hardware Sets.
 - ii. Where exit devices are required on fire rated doors, provide devices complying with NFPA 80 and with UL labeling indicating "Fire Exit Hardware". Provide devices with the proper fasteners for installation as tested and listed by UL. Consult manufacturer's catalog and template book for specific requirements.
 - 1. 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 to be used only with exit devices for which they have been tested.
 - iii. Except on fire rated doors, provide exit devices with hex key dogging device to hold the pushbar and latch in a retracted position. Provide optional keyed cylinder dogging on devices where specified in Hardware Sets.
 - iv. Flush End Caps: Provide heavy weight impact resistant flush end caps made of architectural metal in the same finish as the devices as in the Hardware Sets. Plastic end caps will not be acceptable. Prefix on all exit devices should be 43-.
 - v. Lever Operating Trim: Where exit devices require lever trim, furnish manufacturer's heavy duty trim with cold forged escutcheons, beveled edges, and four threaded studs for thru-bolts.
 - 1. Lock Trim Design: As indicated in Hardware Sets, provide finishes and designs to match that of the specified locksets. Provided free-wheeling type trim where indicated.

2. Where function of exit device requires a cylinder, provide an interchangeable core type keyed cylinder (Rim or Mortise) as specified in Hardware Sets.
 - vi. Vertical Rod Exit Devices: Provide and install interior surface and concealed vertical rod exit devices as Less Bottom Rod (LBR) unless otherwise indicated.
 - vii. Narrow Stile Applications: At doors constructed with narrow stiles, or as specified in Hardware Sets, provide devices designed for maximum 2" wide stiles.
 - viii. Dummy Push Bar: Nonfunctioning push bar matching functional push bar.
 - ix. Rail Sizing: Provide exit device rails factory sized for proper door width application.
 - x. Through Bolt Installation: For exit devices and trim as indicated in Door Hardware Sets.
- b. Conventional Push Rail Exit Devices (Heavy Duty): ANSI/BHMA A156.3, Grade 1 certified panic and fire exit hardware devices furnished in the functions specified in the Hardware Sets. Mounting rails to be formed from smooth stainless steel, brass or bronze architectural materials no less than 0.072" thick, with push rails a minimum of 0.062" thickness. Painted or aluminum metal rails are not acceptable. Exit device latch to be investment cast stainless steel, pullman type, with deadlock feature.
 - i. Acceptable Manufacturers:
 1. Sargent Manufacturing (SA) - 80 Series.
- c. Extruded Aluminum Removable Mullions: ANSI/BHMA A156.3 anodized, removable mullions with malleable-iron top and bottom retainers. Mullions to be provided standard with stabilizers and imbedded weatherstrip.
 - i. Acceptable Manufacturers:
 1. Sargent Manufacturing (SA) - 650A Series, or Northwestern University approved equal..
- d. Tube Steel Removable Mullions: ANSI/BHMA A156.3 removable steel mullions with malleable-iron top and bottom retainers and a primed paint finish. Provide keyed removable feature, stabilizers, and mounting brackets as specified in the Hardware Sets. At openings designed for severe wind load conditions due to hurricanes or tornadoes, provide manufacturers approved mullion and accessories to meet applicable state and local windstorm codes.
 - i. Acceptable Manufacturers:

1. Sargent Manufacturing (SA) - 980S Series, or Northwestern University approved equal..

22. ELECTROMECHANICAL CONVENTIONAL EXIT DEVICES

- a. Electrified Conventional Push Rail Devices (Heavy Duty): Subject to same compliance standards and requirements as mechanical exit devices, electrified devices to be of type and design as specified below.
 - i. Acceptable Manufacturers:
 1. Sargent Manufacturing (SA) - 80 Series.
- b. Electrified Options: As indicated in hardware sets, provide electrified exit device options including: electric latch retraction, electric dogging, outside door trim control, exit alarm, delayed egress, latchbolt monitoring, lock/unlock status monitoring, touchbar monitoring and request-to-exit signaling. Unless otherwise indicated, provide electrified exit devices standard as fail secure.
- c. Electrified Tube Steel Removable Mullions: ANSI/BHMA A156.3 removable steel mullions with malleable-iron top and bottom retainers and a primed paint finish. Provide keyed removable feature, electrical quick connect wiring, stabilizers, and mounting brackets as specified in the Hardware Sets.
 - i. Acceptable Manufacturers:
 1. Sargent Manufacturing (SA) - EL980S Series.
- d. Hurricane and Tornado Resistance Compliance: Electromechanical conventional exit devices and electrified tube steel removable mullions to be U.L. listed for windstorm components where applicable. Provide the appropriate hurricane or tornado resistant products that have been independent third party tested, certified, and labeled to meet state and local windstorm building codes applicable to project.

23. INTEGRATED WIEGAND OUTPUT ACCESS CONTROL EXIT DEVICES

- a. Wiegand Output Integrated Card Reader Exit Hardware: Wiegand output ANSI 156.3 Grade 1 rim, mortise, and vertical rod exit device hardware with integrated proximity card reader, latchbolt and touchbar monitoring, and request-to-exit signaling, in one complete unit. Hard wired, solenoid driven locking/unlocking control of the lever handle exit trim with 3/4" throw latch bolt. U.L listed and labeled for either panic or "fire exit hardware" for use on up to 3 hour fire rated openings. Available with or without keyed high security cylinder override.
 - i. Open architecture, hard wired platform supports centralized control of locking units with new or existing Wiegand compatible access control systems. Inside push bar (request-to- exit) signaling and door position (open/closed status) monitoring (via separately connected DPS).
 - ii. Reader supports 13.56 MHz (2K-32K) iClass® elite credentials.

- iii. 24VDC operation available with iClass® elite reader. 24VDC required for solenoid operated exit trim. Fail safe or fail secure options.
- iv. Installation requires only one cable run from the exit hardware to the access control panel without requirements for additional proprietary lock panel interface boards or modules.
- v. <Competitor Alternates Allowed Option>Installation to include manufacturer's access control panel interface board or module where required for Wiegand output protocol.
- vi. Acceptable Manufacturers:
 - 1. Sargent Manufacturing (SA) - Harmony - H2 80 Series, or Northwestern University approved equal.

24. DOOR CLOSERS

- a. Door closers specified herein shall meet or exceed the following criteria:
 - i. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers including installation and adjusting information on inside of cover.
 - ii. Standards: Closers to comply with UL-10C and UBC 7-2 for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.
 - iii. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the physically handicapped, provide units complying with ANSI ICC/A117.1 provisions for door opening force and delayed action closing.
 - iv. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.
 - 1. Where closers are indicated to have mechanical dead-stop, provide heavy duty arms and brackets with an integral positive stop.
 - 2. Where closers are indicated to have mechanical hold open, provide heavy duty units with an additional built-in mechanical holder assembly designed to hold open against normal wind and traffic conditions. Holder to be manually selectable to on-off position.

3. Where closers are indicated to have a cushion-type stop, provide heavy duty arms and brackets with spring stop mechanism to cushion door when opened to maximum degree.
 - v. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates, and through-bolt or security type fasteners as specified in the door Hardware Sets.
 - vi. Hurricane and Tornado Resistance Compliance: Door closers to be U.L. listed for windstorm components where applicable. Provide the appropriate hurricane or tornado resistant products that have been independent third party tested, certified, and labeled to meet state and local windstorm building codes applicable to project.
- b. Door Closers, Surface Mounted (Large Body Cast Iron): ANSI/BHMA A156.4, Grade 1 surface mounted, heavy duty door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control. Provide high impact, non-corrosive plastic covers standard.
 - i. Acceptable Manufacturers:
 1. LCN Closers (LC) - 4041XP Series x TBWMS screw pack for all closers.
- c. Door Closers, Surface mounted (Standard Duty): ANSI/BHMA 156.4 certified Grade 1 standard duty door closers with closers with complete spring power adjustment, sizes 1 thru 6. Closers to have fully concealed body in the frame head and track assembly in the door, rack and pinion type construction, either offset or center hung applications, with separate and independent valves for closing speed, latch speed, and backcheck adjustments. Overhead concealed closers require a minimum 4-inch frame head for mounting.
 - i. Acceptable Manufacturers:
 1. LCN Closers (LC) - 1461 Series x TBWMS screw pack for all closers.
- d. Door Closers, Overhead Concealed (Heavy Duty): ANSI/BHMA 156.4 certified Grade 1 heavy duty door closers with closers with complete spring power adjustment, sizes 1 thru 6. Closers to have fully concealed body in the frame head and track assembly in the door, rack and pinion type construction, either offset or center hung applications, with separate and independent valves for closing speed, latch speed, and backcheck adjustments. Overhead concealed closers require a minimum 4-inch frame head for mounting.
 - i. Acceptable Manufacturers:

1. LCN Closers (LC) - 2010 Series.

25. AUTOMATIC DOOR OPERATORS

- a. General: Provide operators of size recommended by manufacturer for door size, weight, and movement; for condition of exposure; and for compliance with UL 325. Coordinate operator mechanisms with door operation, hinges, and activation devices.
 - i. Fire-Rated Doors: Provide door operators for fire-rated door assemblies that comply with NFPA 80 for fire-rated door components and are listed and labeled by a qualified testing agency.
- b. Electromechanical Door Operators: Self-contained units powered by permanent magnet DC motor, with closing speed controlled mechanically by gear train, connections for power, activation and safety device wiring, and manual operation including spring closing when power is off.
- c. Electrohydraulic Door Operators: Self-contained low-pressure units with separate cylinders for power and checking, connections for power, activation, and safety device wiring and manual operation including spring closing when power is off.
- d. Brackets and Reinforcements: Manufacturer's standard, fabricated from aluminum with nonferrous shims for aligning system components.
- e. Standard: Certified ANSI/BHMA A156.19.
 - i. Performance Requirements:
 - 1. Opening Force if Power Fails: Not more than 15 lbf required to release a latch if provided, not more than 30 lbf required to manually set door in motion, and not more than 15 lbf required to fully open door.
 - 2. Entrapment Protection: Not more than 15 lbf required to prevent stopped door from closing or opening.
- f. Configuration: Surface mounted. Door operators to control single swinging and pair of swinging doors.
- g. Operation: Power opening and spring closing operation capable of meeting ANSI A117.1 accessibility guideline. Provide time delay for door to remain open before initiating closing cycle as required by ANSI/BHMA A156.19. When not in automatic mode, door operator to function as manual door closer with fully adjustable opening and closing forces, with or without electrical power.
 - i. On-off switch to control power to be key switch operated.
- h. Features: Operator units to have full feature adjustments for door opening and closing force and speed, backcheck, motor assist acceleration from 0 to 30

seconds, time delay, vestibule interface delay, obstruction recycle, and hold open time from 0 up to 30 seconds.

- i. Provide outputs and relays on board the operator to allow for coordination of exit device latch retraction, electric strikes, magnetic locks, card readers, safety and motion sensors and specified auxiliary contacts.
- j. Activation Devices: Provide activation devices in accordance with ANSI/BHMA A156.19 standard, for condition of exposure indicated and for long term, maintenance free operation under normal traffic load operation. Coordinate activation control with electrified hardware and access control interfaces. Activation switches are standard SPST, with optional DPDT availability.
- k. Signage: As required by cited ANSI/BHMA A156.19 standard for the type of operator.
- l. Acceptable Manufacturers:
 - i. LCN Closers (LC) - 4640 Series x TBWMS screw pack for all closers

26. SURFACE MOUNTED CLOSER HOLDERS

- a. Single Point Closer Holders: Single point closer holder designed to hold open fire or smoke rated doors until interruption of signal from fire alarm, smoke detector or remote release switch. Pull side, push side, or double egress mounting applications available with non-handed track and closer body and dual voltage input (24V/120V). Voltage to be 24VDC unless otherwise specified. Pull side mounted closers to have minimum adjustable hold-open range of 85 to 110 degrees. Auxiliary door stops are required at hold open point.
 - i. Acceptable Manufacturers:
 - 1. LCN Door Closers (LC) - 4040SE Series x TBWMS screw pack for all closers.
- b. Electromagnetic Door Holders: Certified ANSI A156.15 electromagnetic door holder/releases with a minimum 20 to 40 pounds holding power and single coil construction able to accommodate 12VDC, 24VAC, 24VDC and 120VAC. Coils to be independently wound, employing an integral fuse and armatures to include a positive release button.
 - i. Acceptable Manufacturers:
 - 1. Rixson (RF) - 980/990 Series.
 - 2. Sargent Manufacturing (SA) - 1560 Series.
- c. Electrified Holders: Electrified door holders are designed to provide single point hold open for fire and smoke labeled doors and must be used in conjunction with a opposite side mounted U.L. listed door closer. Single track arm is non-handed with detector or non-detector option.

- i. Acceptable Manufacturers:
 - 1. Rixson (RF) - Checkmate 99 Series.

27. ARCHITECTURAL TRIM

a. Door Protective Trim

- i. General: Door protective trim units to be of type and design as specified below or in the Hardware Sets.
- ii. Size: Fabricate protection plates (kick, armor, or mop) not more than 2" less than door width (LDW) on stop side and not more than 1" less than door width on pull side. Coordinate and provide proper width and height as required where conflicting hardware dictates. Height to be as specified in the Hardware Sets.
- iii. Metal Protection Plates: ANSI/BHMA A156.6 certified metal protection plates (kick, armor, or mop), beveled on four edges (B4E), fabricated from the following.
 - 1. Stainless Steel: .050-inch thick, with countersunk screw holes (CSK).
 - 2. Brass or Bronze: .050-inch thick, with countersunk screw holes (CSK).
 - 3. Laminate Plastic or Acrylic: 1/8-inch thick, with countersunk screw holes (CSK).
- iv. Fasteners: Provide manufacturer's designated fastener type as specified in the Hardware Sets.
- v. Metal Door Edging: Door protection edging fabricated from a minimum .050-inch thick metal sheet, formed into an angle or "U" cap shapes, surface or mortised mounted onto edge of door. Provide appropriate leg overlap to account for protection plates as required. Height to be as specified in the Hardware Sets.
- vi. Acceptable Manufacturers:
 - 1. McKinney Architectural Hardware (MK).
 - 2. Rockwood Manufacturing (RO).

28. DOOR STOPS AND HOLDERS

- a. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.

- b. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 certified door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.
 - i. Acceptable Manufacturers:
 - 1. McKinney Architectural Hardware (MK).
 - 2. Rockwood Manufacturing (RO).
 - 3. Trimco (TC).
- c. Overhead Door Stops and Holders: ANSI/BHMA A156.6, Grade 1 certified overhead stops and holders to be surface or concealed types as indicated in Hardware Sets. Track, slide, arm and jamb bracket to be constructed of extruded bronze and shock absorber spring of heavy tempered steel. Provide non-handed design with mounting brackets as required for proper operation and function.
 - i. Acceptable Manufacturers:
 - ii. Rixson Door Controls (RF).
 - iii. Sargent Manufacturing (SA).

29. ARCHITECTURAL SEALS

- a. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.
- b. 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.
 - i. Provide smoke labeled perimeter gasketing at all smoke labeled openings.
- c. 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-10C.
 - i. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and UBC 7-2, Fire Tests of Door Assemblies.

- d. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated, based on testing according to ASTM E 1408.
- e. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.
 - i. Acceptable Manufacturers:
 - 1. McKinney Weatherstripping Products (MW).
 - 2. Pemko Manufacturing (PE).
 - 3. Zero International (ZE).

30. ELECTRONIC ACCESSORIES

- a. Key Switches: Key switches furnished standard with stainless steel single gang face plate with a 12/24VDC bi-color LED indicator. Integral backing bracket permits integration with any 1 1/4" or 1 1/2" mortise type cylinder. Key switches available as momentary or maintained action and in narrow face plate options.
 - i. Acceptable Manufacturers:
 - 1. Security Door Controls (SD) - 800 Series.
 - 2. Securitron Door Controls (SU) - MK Series.
- b. Push-Button Switches: Industrial grade momentary or alternate contact, back-lighted push buttons with stainless-steel switch enclosures. 12/24 VDC bi-color illumination suitable for either flush or surface mounting.
 - i. Acceptable Manufacturers:
 - 1. Security Door Controls (SD) - 400 Series.
 - 2. Securitron Door Controls (SU) - PB Series.
- c. Request-to-Exit Motion Sensor: Request-to-Exit Sensors motion detectors specifically designed for detecting exiting through a door from the secure area to a non-secure area. Include built-in timers (up to 60 second adjustable timing), door monitor with sounder alert, internal vertical pointability coverage, 12VDC or 24VDC power and selectable relay trigger with fail safe/fail secure modes.
 - i. Acceptable Manufacturers:
 - 1. Security Door Controls (SD) - MD-31D Series.
 - 2. Securitron Door Controls (SU) - XMS Series.

- d. Door Position Switches: Door position magnetic reed contact switches specifically designed for use in commercial door applications. On recessed models the contact and magnetic housing snap-lock into a 1" diameter hole. Surface mounted models include wide gap distance design complete with armored flex cabling. Provide SPDT, N/O switches with optional Rare Earth Magnet installation on steel doors with flush top channels.
 - i. Acceptable Manufacturers:
 - 1. Security Door Controls (SD) - DPS Series.
 - 2. Securitron Door Controls (SU) - DPS Series.
- e. Wiegand Test Unit: Test unit verifies proper Wiegand output integrated card reader lock installation in the field by testing for proper wiring, card reader data integrity, and lock functionality including lock/unlock, door position, and request-to-exit status. 12 or 24VDC voltage adjustable operating as Fail Safe or Fail Secure.
 - i. Acceptable Manufacturers:
 - ii. Sargent Manufacturing (SA) - WT1 Wiegand Test Unit.
- f. Power Supplies: Provide Nationally Recognized Testing Laboratory Listed 12VDC or 24VDC (field selectable) filtered and regulated power supplies. Include battery backup option with integral battery charging capability in addition to operating the DC load in event of line voltage failure. Provide the least number of units, at the appropriate amperage level, sufficient to exceed the required total draw for the specified electrified hardware and access control equipment.
 - i. Acceptable Manufacturers:
 - 1. Security Door Controls (SD) - 630 Series.
 - 2. Securitron Door Controls (SU) - BPS 12/24 Series.

31. FABRICATION

- a. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.

32. FINISHES

- a. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.
- b. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's

standards, but in no case less than specified by referenced standards for the applicable units of hardware.

- c. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- d. Antimicrobial Finishes: Where specified, finishes on locksets, latchsets, exit devices and push/pull trim to incorporate an FDA recognized. Silver Ion, antimicrobial coating (MicroShield™) listed for use on equipment as a suppressant to the growth and spread of a broad range of bacteria, algae, fungus, mold and mildew.

33. EXAMINATION

- a. Examine scheduled openings, 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. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

34. PREPARATION

- a. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series. B. Wood Doors: Comply with ANSI/DHI A115-W series.

35. INSTALLATION

- a. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.
 - i. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.
- b. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:
 - i. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
 - ii. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
 - iii. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."

- iv. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.
- c. Retrofitting: Install door hardware to comply with manufacturer's published templates and 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.
- d. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."
- e. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

36. FIELD QUALITY CONTROL

- a. Field Inspection: Supplier will perform a final inspection of installed door hardware and state in report whether work complies with or deviates from requirements, including whether door hardware is properly installed, operating and adjusted.

37. 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.

38. CLEANING AND PROTECTION

- a. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.
- b. Clean adjacent surfaces soiled by door hardware installation.
- c. Clean operating items as necessary to restore proper finish. and provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

39. DEMONSTRATION

- a. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

40. DOOR HARDWARE SCHEDULE

- a. The hardware sets 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. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.

Hardware Set 1 – Typical Out Swing Classroom Door

Qty.	Item	Description / Model No.	Finish	Man.
3	Hinges	TA2714 4 ½ X 4 ½ NRP	652	MC
1	Lockset	LC 8216 LNL	630	SA
1	Mortise Cylinder	As Required	626	ME
3	Door Silencers	S1M		MC
1	Door Stop	480	626	RO
1	Kick Plate	KP50 10" x 2" LDW x B4E x CSK	630	MC

Hardware Set 2 – Typical Out Swing Classroom Door – Fire Rated

Qty.	Item	Description / Model No.	Finish	Man.
3	Hinges	TA2714 4 ½ X 4 ½ NRP	652	MC
1	Lockset	LC 8216 LNL	630	SA
1	Mortise Cylinder	As Required	626	ME
1	Closer	4041 TBWM REG/PA	689	LC
3	Door Silencers	S1M		MC
1	Door Stop	480	626	RO
1	Kick Plate	KP50 10" x 2" LDW x B4E x CSK	630	MC

Hardware Set 3 – Typical In-Swing Classroom Door

Qty.	Item	Description / Model No.	Finish	Man.
3	Hinges	TA2714 4 1/2 X 4 1/2	652	MC
1	Lockset	LC 8216 LNL	630	SA
1	Mortise Cylinder	As Required	626	ME
3	Door Silencers	S1M		MC
1	Door Stop	480	626	RO
1	Kick Plate	KP50 10" x 2" LDW x B4E x CSK	630	MC

Hardware Set 4 – Typical In-Swing Classroom Door – Fire Rated

Qty.	Item	Description / Model No.	Finish	Man.
3	Hinges	TA2714 4 1/2 X 4 1/2	652	MC
1	Lockset	LC 8216 LNL	630	SA
1	Mortise Cylinder	As Required	626	ME
1	Closer	4041 TBWM REG/PA	689	LC
3	Door Silencers	S1M		MC
1	Door Stop	480	626	RO
1	Kick Plate	KP50 10" x 2" LDW x B4E x CSK	630	MC

Hardware Set 5 – Typical Office In-swing Office – Fire Rated.

Qty.	Item	Description / Model No.	Finish	Man.
3	Hinges	TA2714 4 ½ X 4 ½	652	MC
1	Lockset	LC 8255 LNL	630	SA
1	Mortise Cylinder	As Required	626	ME
1	Closer	4041 TBWM REG/PA	689	LC
1	Door Stop	480	626	RO
1	Gasketing	S88 C		PE
3	Door Silencers	S1M		MC

Hardware Set 6 – Typical Office Out Swing – Fire Rated.

Qty.	Item	Description / Model No.	Finish	Man.
3	Hinges	TA2714 4 ½ X 4 ½ NRP	652	MC
1	Lockset	LC 8255 LNL	630	SA
1	Mortise Cylinder	As Required	626	ME
1	Closer	4041 TBWM REG/PA	689	LC
1	Door Stop	480	626	RO
1	Gasketing	S88 C		PE
3	Door Silencers	S1M		MC

Hardware Set 7 – Typical Office Out Swing – Non Rated.

Qty.	Item	Description / Model No.	Finish	Man.
3	Hinges	TA2714 4 ½ X 4 ½ NRP	652	MC
1	Lockset	LC 8255 LNL	630	SA
1	Mortise Cylinder	As Required	626	ME
3	Door Silencers	S1M		MC
1	Door Stop	480	626	RO

Hardware Set 8 – Typical Office Suite Entry Out Swing - Rated

Qty.	Item	Description / Model No.	Finish	Man.
3	Hinges	TA2714 4 ½ X 4 ½ NRP	652	MC
1	Lockset	LC 8216 LNL	630	SA
2	Mortise Cylinder	As Required	626	ME
1	Closer	4041 TBWM REG/PA	689	LC
1	Door Stop	480	626	RO
3	Door Silencers	S1M		MC

Hardware Set 9 – Typical Office Suite Entry – Non Rated

Qty.	Item	Description / Model No.	Finish	Man.
3	Hinges	TA2714 4 ½ X 4 ½ NRP	652	MC
1	Lockset	LC 8216 LNL	630	SA
2	Mortise Cylinder	As Required	626	ME
3	Door Silencers	S1M		MC
1	Door Stop	480	626	RO

Hardware Set 10 – Typical Privacy In Swing– Rated.

Qty.	Item	Description / Model No.	Finish	Man.
3	Hinges	TA2714 4 1/2 X 4 1/2	652	MC
1	Privacy Set	49 8265 LNL	626	SA
1	Closer	4041 TBWM REG/PA	689	LC
1	Wall Stop	WS03	626	MC
1	Gasketing	S88 C		PE
3	Door Silencers	S1M		MC

Hardware Set 11 – Typical Privacy – Non Rated.

Qty.	Item	Description / Model No.	Finish	Man.
3	Hinges	TA2714 4 1/2 X 4 1/2	652	MC
1	Privacy Set	49 8265 LNL	626	SA
3	Door Silencers	S1M		MC
1	Wall Stop	WS03	626	MC

Hardware Set 12 – Typical Multi-User Toilet Room- Out Swing

Qty.	Item	Description / Model No.	Finish	Man.
3	Hinges	TA2714 4 1/2 X 4 1/2	652	MC
1	Push Plate	P055 CTC	630	MC
1	Door Pull	DP08	630	MC
1	Deadbolt	4878	630	SA
1	Mortise Cylinder	As Required	626	ME
1	Closer	4041 E TBWM REG/PA	689	LC
1	Door Stop	480	626	RO
1	Kick Plate	KP50 10" x 2" LDW x B4E x CSK	630	MC
1	Mop Plate	KP50 4" x 1" LDW x B4E x CSK	630	MC
3	Door Silencers	S1M		MC

Hardware Set 13 – Typical Multi-User Toilet Room- In Swing.

Qty.	Item	Description / Model No.	Finish	Man.
3	Hinges	TA2714 4 1/2 X 4 1/2	652	MC
1	Push Plate	P055 CTC	630	MC
1	Door Pull	DP08	630	MC
1	Deadbolt	4878	630	SA
1	Mortise Cylinder	As Required	626	ME
1	Closer	4041 TBWM REG/PA	689	LC
1	Door Stop	480	626	RO
1	Kick Plate	KP50 10" x 2" LDW x B4E x CSK	630	MC
1	Mop Plate	KP50 4" x 1" LDW x B4E x CSK	630	MC
3	Door Silencers	S1M		MC

Hardware Set 14 – Typical Janitor Closet – Out Swing

Qty.	Item	Description / Model No.	Finish	Man.
3	Hinges	TA2714 4 1/2 X 4 1/2 NRP	652	MC
1	Lockset	LC 8204 LNL	630	SA
1	Mortise Cylinder	As Required	626	ME
1	Closer	4041 SC TBWM	689	LC
1	Kick Plate	KP50 10" x 2" LDW x B4E x CSK	630	MC
3	Door Silencers	S1M		MC

Hardware Set 15 – Typical Storage Room Hazardous Area– Out Swing

Qty.	Item	Description / Model No.	Finish	Man.
3	Hinges	TA2714 4 1/2 X 4 1/2 NRP	652	MC
1	Lockset	76 LC 8204 LNL	630	SA
1	Mortise Cylinder	As Required	626	ME
1	Closer	4041 SC TBWM	689	LC
1	Kick Plate	KP50 10" x 2" LDW x B4E x CSK	630	MC
3	Door Silencers	S1M		MC

Hardware Set 16 – Typical Stair Door

Qty.	Item	Description / Model No.	Finish	Man.
3	Hinges	TA2714 4 1/2 X 4 1/2 NRP	26D	MC
1	Exit Device	16 43 LC 8813 F ETL	32D	SA
1	Mortise Cylinder	As Required	626	ME
1	Rim Cylinder	As Required	626	ME
1	Closer	4041 TBWM REG/PA	AL	LC
1	Wall Stop	WS03	US26D	MC
1	Protection Plate	K1050 10" x 2" LDW x B4E x CSK	US32D	RO
3	Door Silencers	S1M		MC

Hardware Set 17 – Typical Cross Corridor Pair – Held Open

Qty.	Item	Description / Model No.	Finish	Man.
6	Hinges	TA2714 4 1/2 X 4 1/2 NRP	652	MC
1	Exit Device	12 43 LC 8713 F ETL	630	SA
1	Exit Device	12 43 LC 8710 F ETL-DT	630	SA
1	Rim Cylinder	As Required	626	ME
2	Mortise Cylinder	As Required	626	ME
2	Closer	4041 TBWM REG/PA	689	LC
2	Magnetic Holder	990 Series	689	RX
1	Kick Plate	KP50 10" x 1" LDW x B4E x CSK	630	MC
2	Meeting Stile Set	18041 CNB		PE
2	Gasket Set	S88 C		PE

Hardware Set 18 – Typical Passage – Non Rated

Qty.	Item	Description / Model No.	Finish	Man.
3	Hinges	TA2714 4 1/2 X 4 1/2	652	MC
1	Passage Set	8215 LNL	626	SA
3	Door Silencers	S1M		MC
1	Wall Stop	WS03	626	MC

Hardware Set 19 – Typical Passage In Swing– Rated

Qty.	Item	Description / Model No.	Finish	Man.
3	Hinges	TA2714 4 1/2 X 4 1/2	652	MC
1	Privacy Set	8215 LNL	626	SA
1	Closer	4041 TBWM REG/PA	689	LC
1	Wall Stop	WS03	626	MC
3	Door Silencers	S1M		MC

Hardware Set 20 – Typical Mechanical Room – Out Swing

Qty.	Item	Description / Model No.	Finish	Man.
3	Hinges	TA2714 4 1/2 X 4 1/2 NRP	652	MC
1	Lockset	86 LC 8204 LNL	630	SA
1	Mortise Cylinder	As Required	626	ME
1	Closer	4041 SC TBWM	689	LC
1	Kick Plate	KP50 10" x 2" LDW x B4E x CSK	630	MC
3	Door Silencers	S1M		MC

Hardware Set 21 – Typical Out Swing Laboratory Door

Qty.	Item	Description / Model No.	Finish	Man.
3	Hinges	TA2714 4 ½ X 4 ½ NRP	652	MC
1	Lockset	LC 8216 LNL	630	SA
1	Mortise Cylinder	As Required	626	ME
3	Door Silencers	S1M		MC
1	Door Stop	480	626	RO
1	Kick Plate	KP50 10" x 2" LDW x B4E x CSK	630	MC

Hardware Set 22 – Typical Out Swing Laboratory Door – Fire Rated

Qty.	Item	Description / Model No.	Finish	Man.
3	Hinges	TA2714 4 ½ X 4 ½ NRP	652	MC
1	Lockset	LC 8216 LNL	630	SA
1	Mortise Cylinder	As Required	626	ME
1	Closer	4041 TBWM REG/PA	689	LC
3	Door Silencers	S1M		MC
1	Door Stop	480	626	RO
1	Kick Plate	KP50 10" x 2" LDW x B4E x CSK	630	MC

Hardware Set 23 – Typical In-Swing Laboratory Door

Qty.	Item	Description / Model No.	Finish	Man.
3	Hinges	TA2714 4 1/2 X 4 1/2	652	MC
1	Lockset	LC 8216 LNL	630	SA
1	Mortise Cylinder	As Required	626	ME
3	Door Silencers	S1M		MC
1	Door Stop	480	626	RO
1	Kick Plate	KP50 10" x 2" LDW x B4E x CSK	630	MC

Hardware Set 24 – Typical In-Swing Laboratory Door – Fire Rated

Qty.	Item	Description / Model No.	Finish	Man.
3	Hinges	TA2714 4 1/2 X 4 1/2	652	MC
1	Lockset	LC 8216 LNL	630	SA
1	Mortise Cylinder	As Required	626	ME
1	Closer	4041 TBWM REG/PA	689	LC
3	Door Silencers	S1M		MC
1	Door Stop	480	626	RO
1	Kick Plate	KP50 10" x 2" LDW x B4E x CSK	630	MC

Hardware Set 25 – Typical Out Swing Electronic Access Door

Qty.	Item	Description / Model No.	Finish	Man.
2	Hinges	TA2714 4 ½ X 4 ½ NRP	652	MC
1	Hinges	TA2714 4 ½ X 4 ½ QC6	652	MC
1	Lockset	LC 8270/71 LNL	630	SA
1	Mortise Cylinder	As Required	626	ME
3	Door Silencers	S1M		MC
1	Door Stop	480	626	RO
1	Kick Plate	KP50 10" x 2" LDW x B4E x CSK	630	MC

Hardware Set 26 – Typical Out Swing Electronic Access Door – Fire Rated

Qty.	Item	Description / Model No.	Finish	Man.
2	Hinges	TA2714 4 ½ X 4 ½ NRP	652	MC
1	Hinges	TA2714 4 ½ X 4 ½ QC6	652	MC
1	Lockset	LC 8270/71 LNL	630	SA
1	Mortise Cylinder	As Required	626	ME
1	Closer	4041 TBWM REG/PA	689	LC
3	Door Silencers	S1M		MC
1	Door Stop	480	626	RO
1	Kick Plate	KP50 10" x 2" LDW x B4E x CSK	630	MC

Hardware Set 27 – Typical In-Swing Electronic Access Door

Qty.	Item	Description / Model No.	Finish	Man.
2	Hinges	TA2714 4 1/2 X 4 1/2	652	MC
1	Hinges	TA2714 4 1/2 X 4 1/2 QC6	652	MC
1	Lockset	LC 8270/71 LNL	630	SA
1	Mortise Cylinder	As Required	626	ME
3	Door Silencers	S1M		MC
1	Door Stop	480	626	RO
1	Kick Plate	KP50 10" x 2" LDW x B4E x CSK	630	MC

Hardware Set 28 – Typical In-Swing Electronic Access Door – Fire Rated

Qty.	Item	Description / Model No.	Finish	Man.
2	Hinges	TA2714 4 1/2 X 4 1/2	652	MC
1	Hinges	TA2714 4 1/2 X 4 1/2 QC6	652	MC
1	Lockset	LC 8270/71 LNL	630	SA
1	Mortise Cylinder	As Required	626	ME
1	Closer	4041 TBWM REG/PA	689	LC
3	Door Silencers	S1M		MC
1	Door Stop	480	626	RO
1	Kick Plate	KP50 10" x 2" LDW x B4E x CSK	630	MC

END OF SECTION

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DIVISION 8 – OPENINGS

SECTION 08 8000 - GLAZING

1. General: This section outlines the requirements for interior and exterior glazing.
2. Design Criteria:
 - a. Design to withstand wind loading as specified by applicable code for parts/portions of buildings.
 - b. Statistical probability of breakage: 8 per 1000, maximum, at 60-second wind load.
 - c. Low-E glass is preferred at exterior locations.
 - d. Provide requirements for certification by Contractor, installer, glass fabricator, and/or manufacturer that glass thickness and heat treatment have been selected to provide the strength required to meet specified structural performance requirements.
3. Warranty: Review project specific requirements with NU Project Manager during the design phase.
4. Insulated Glass Units (IGU):
 - a. Sealed insulating units.
 - b. Total Thickness: 1 inch, nominal.
 - c. Review options for low-e coatings, frit patterns, and insulating glass unit construction with the NU Project Manager during the design phase.
5. Closeout Documents – Glazing Schedule: Architect/Engineer shall require that the Contractor provide, at completion of the project, a schedule listing size, type, location, and installation method of all installed glass.

END OF SECTION

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DIVISION 8 – OPENINGS

SECTION 08 9200 – GLAZED ALUMINUM CURTAIN WALL SYSTEM

1. General: This section outlines the requirements for glazed aluminum curtain wall systems for exterior applications:
2. Quality Assurance: Architect shall review the following Contractor Required Quality Assurance and Field Quality Control Testing requirements with the NU Project Manager during the design phase of the project.
 - a. Engineering Design: Structural engineering shall be performed by a professional engineer licensed in the State of Illinois and employed by the system manufacturer.
 - b. Mock-up Testing: The following testing is mandatory unless manufacturer can submit acceptable reports of previously performed tests on products equivalent to those to be provided. For standard, stock products, tests performed on the same product for other projects will be accepted.
 - c. Perform the following tests on a full-size mock-up in the order indicated:
 - i. Verify air infiltration resistance by testing in accordance with ASTM E 283; report result as cubic feet per minute per unit of measurement indicated, at pressure differential indicated.
 - ii. Verify water penetration resistance by testing in accordance with ASTM E 331 and AAMA 501.1; report result at pressure differential indicated.
 - iii. Perform the following tests on mock-up of the size specified by the test method:
 1. Verify thermal transmittance by testing in accordance with AAMA 1503.1; report result as U-value (Btu per hour per square foot per degree F).
 2. Verify condensation resistance by testing in accordance with AAMA 1503.1; report result as CRF.
 - iv. Test mock-up(s) in laboratory of testing agency or in manufacturer's plant under supervision of testing agency.
 - v. Fabricate mock-up(s) from materials matching those proposed for use, using personnel who will perform field installation.
 - vi. Furnish shop drawing of mock-up to testing agency.
 - vii. Provide reports certified by the testing agency.
 - viii. Do not use materials from test mock-up on project.

- d. Testing Laboratory Qualifications:
 - i. Independent testing agency
 - ii. Firm having experience in the testing specified and having the capability to do the testing specified within the time frame required by the contractor, as shown by information supplied as required by ASTM E 699
 - iii. Firm approved by the University
 - e. Mock-up: Provide field-constructed mock-ups to serve as the standard of quality for appearance and workmanship to be expected in the completed work.
 - i. Construct mock-ups of each system, at least 2 stories high by 2 bays wide.
 - ii. Locate mock-ups where indicated on drawings.
 - iii. Maintain mock-ups in good condition during construction.
 - iv. Demolish mock-ups when directed, and remove from site.
3. Field Quality Control:
- a. Perform field testing of installed wall for water penetration resistance.
 - i. Perform testing before covering up of inside face of wall assembly.
 - ii. Perform AAMA 501.3 ("static") test on the first area of wall to be completed; at least 2 bays wide by 2 stories high.
 - b. Repair deficiencies discovered by testing and modify installation procedures before installing remainder of wall, to prevent these deficiencies.
 - c. Perform AAMA 501.2 ("hose") test on at least 2 additional areas of a similar size at higher levels.
 - i. Repair deficiencies discovered by testing, including similar conditions in areas not tested.
4. Continue to test an additional area and make repairs on entire installation until an area not previously tested tests without deficiencies.

END OF SECTION