

University of Houston Master Specification

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SECTION 14 2400 - HYDRAULIC ELEVATORS

Maintain Section format, including the UH master spec designation and version date in bold in the center columns of the header and footer. Complete the header and footer with Project information.

Edit and finalize this Section, where prompted by Editor's notes, to suit Project specific requirements. Make selections for the Project at text identified in bold.

Verify that Section titles referenced in this Section are correct for this Project's Specifications; Section titles may have changed.

Delete hidden text after this Section has been edited for the Project.

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. The Contractor's attention is specifically directed, but not limited, to the following documents for additional requirements:
 1. The current version of the *Uniform General Conditions for Construction Contracts, State of Texas*, available on the web site of the Texas Facilities Commission.
 2. The University of Houston's *Supplemental General Conditions and Special Conditions for Construction*.

1.2 SUMMARY

- A. This Section includes hydraulic **[passenger]** **[and]** **[freight]** elevators.
- B. Allowances: Provide finished elevator cars under the Elevator Car Allowance specified in Section 01 2100 "Allowances." Allowance includes furnishing and installing wall¹, **floor**, and ceiling finishes; car door finishes; light fixtures; handrails; and trim. Allowance also includes cutouts and other provisions for installing elevator signal equipment in cars.
- C. Unit Prices: Rock excavation for jack hole will be paid based on the unit price indicated in the Contract and as specified in Section 01 2200 "Unit Prices."

1.3 DEFINITIONS

- A. Defective Elevator Work: Operation or control system failures; performances below specified ratings; excessive wear; unusual deterioration or aging of materials or finishes; unsafe

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conditions; the need for excessive maintenance; abnormal noise or vibration; and similar unusual, unexpected, and unsatisfactory conditions.

1.4 ACTION SUBMITTALS

- A. Product Data: Include capacities, sizes, performances, operations, safety features, finishes, and similar information.
- B. LEED Action Submittals (Projects authorized for LEED certification):
 - 1. Building Product Disclosure and Optimization:
 - a. Leadership Extraction Practices
 - 1) Extended Producer Responsibility (EPR): Submit documentation indicating that manufacturers have a take back or recycling program for the product purchased.
 - 2) Wood Products: Certified by Forest Stewardship Council or USGBC approved equivalent.
 - a) Chain-of-Custody Certificates: For certified wood products. Include statement of costs.
 - b) Chain-of-Custody Qualification Data: For manufacturer and vendor.
 - 3) Provide details of biobased material per Sustainable Agriculture Network's Sustainable Agriculture Standard or USDA certified biobased product. Indicate cost, location of extraction, manufacture, and purchase of material.
 - 4) Recycled Content: For products having recycled content, indicate percentages by weight of post-consumer and pre-consumer recycled content.
 - a) Include statement indicating costs for each product having recycled content.
 - b. Sourcing of Raw Materials: For products that are required to comply with requirements for regional materials, indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material.
 - 1) Include statement indicating distance to Project, cost for each regional material and the fraction by weight that is considered regional.
 - 2) Product Certificates: For materials manufactured within 100 miles of Project, indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include distance to Project and cost for each raw material.
 - 2. Indoor Environmental Quality, Low Emitting Materials: Building Products must be tested and compliant with the California Department of Public-Health (CDPH) Standard Method V1.1-2010, using the applicable exposure scenario.

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- a. Paints, and Coatings: For wet applied on site products, include printed statement of VOC content, showing compliance with the applicable VOC limits of the California Air Resources Board (CARB) 2007, Suggested Control Measure (SCM) for Architectural Coatings, or the South Coast Air Quality Management District (SCAQMD) Rule 1113, effective June 3,-2011.
- b. Adhesives and Sealants: For wet applied on site products, submit printed statement showing compliance with the applicable chemical content requirements of SCAQMD Rule 1168, effective July 1, 2005 and rule amendment date of January 7, 2005.
 - 1) Product Data: For installation adhesives, indicating VOC content.
- c. Alternative tests for VOC above include ASTM D2369-10; ISO 11890 part 1; ASTM D6886-03; or ISO 11890-2.
- d. Methylene Chloride and perchloroethylene may not be added to paints, coating, adhesive or sealants.
- e. Composite Wood: Submit documentation showing that wood used in the project has low formaldehyde emissions that meet the California Air Resources Board ATCM for formaldehyde requirements for ultra-low emitting formaldehyde (ULEF) resins or no added formaldehyde resins.
- f. Provide General Emissions Evaluation certificates for adhesives, sealants showing compliance with California Department of Public Health v1.1 emissions testing or equivalent.

3. Laboratory Test Reports: For installation adhesives indicating compliance with requirements for low-emitting materials.

C. Shop Drawings: Show plans, elevations, sections, and large-scale details indicating service at each landing, machine room layout, coordination with building structure, relationships with other construction, and locations of equipment and signals. Indicate variations from specified requirements, if any; maximum dynamic and static loads imposed on building structure at points of support; and maximum and average power demands.

D. Samples: For exposed finishes of cars, hoistway doors and frames, and signal equipment:

1. 3-inch square samples of sheet materials; and
2. 4-inch lengths of running trim members.

1.5 INFORMATIONAL SUBMITTALS

- A. Manufacturer Certificates: Signed by elevator manufacturer certifying that hoistway, pit, and machine room layout and dimensions, as shown on Drawings, and electrical service, as shown and specified, are adequate for elevator system being provided.
- B. Continuing Maintenance Proposal: Comply with part 1.9.B below.

Retain paragraph and associated subparagraphs below if Project is to be LEED certified.

- C. LEED Informational Submittals:

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1. Building Product Disclosure and Optimization - Sourcing of Raw Materials:
 - a. Raw Material Sources and Extraction Reporting: Submit Raw materials supplier corporate Sustainability Reports (CSRs); documenting responsible extraction; including extraction locations, long term ecologically responsible land use, commitment to reducing environmental harms from extraction and manufacturing processes, and a commitment to meeting applicable standards or programs that address responsible sourcing criteria
 - 1) Submit manufacturers' self-declared reports
 - 2) Submit third party verified corporate sustainability reports (CSR) using one of the following frameworks"
 - a) Global Reporting Initiative (GRI) Sustainability Report
 - b) Organization for Economic Co-operation and Development (OECD)
 - c) Guidelines for Multinational Enterprises
 - d) UN Global Compact
 - e) ISO 26000
 - f) USGBC approved program.
2. Building Product Disclosure and Optimization - Material Ingredients
 - a. Material Ingredient Optimization: Submit manufacturer's Environmental Product Declaration (EPD) or at least one of the following:
 - 1) GreenScreen V1.2 Benchmark: Third party report prepared by a licensed GreenScreen List Translator, or a full GreenScreen Assessment.
 - 2) Cradle to Cradle: Manufacturer's published literature for the product bearing the Cradle to Cradle logo.
 - 3) International Alternative Compliance Path - REACH Optimization
 - 4) Declare: Manufacturer's completed Product Declaration Form
 - 5) Other programs approved by USGBC
 - b. Product Manufacturer Supply Chain Optimization: Submit documentation from manufacturers for products that go beyond material ingredient optimization as follows:
 - 1) Are sourced from product manufacturers who engage in validated and robust safety, health, hazard, and risk programs which at a minimum document at least 99 percent (by weight) of the ingredients used to make the building product or building material, and
 - 2) Are sourced from product manufacturers with independent third party verification of their supply chain that at a minimum verifies:
 - a) Processes are in place to communicate and transparently prioritize chemical ingredients along the supply chain according to available hazard, exposure and use information to identify those that require more detailed evaluation
 - b) Processes are in place to identify, document, and communicate information on health, safety and environmental characteristics of chemical ingredients

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- c) Processes are in place to implement measures to manage the health, safety and environmental hazard and risk of chemical ingredients
- d) Processes are in place to optimize health, safety and environmental impacts when designing and improving chemical ingredients
- e) Processes are in place to communicate, receive and evaluate chemical ingredient safety and stewardship information along the supply chain
- f) Safety and stewardship information about the chemical ingredients is publicly available from all points along the supply chain.

D. Closeout Submittals:

1. Maintenance Manuals: Include operation and maintenance instructions, parts listing with sources indicated, recommended parts inventory listing, emergency instructions, and similar information. Include diagnostic and repair information available to manufacturer's and Installer's maintenance personnel. Submit for Owner's information at Project closeout as specified in Division 01 "General Requirements."
2. Inspection and Acceptance Certificates and Operating Permits: As required by authorities having jurisdiction for normal, unrestricted elevator use.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Elevator manufacturer or an experienced installer approved by elevator manufacturer who has completed elevator installations similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.
- B. Regulatory Requirements: In addition to local governing regulations, comply with applicable provisions in ASME A17.1, "Safety Code for Elevators and Escalators."
 1. Seismic Risk Zone: Project is located in Seismic Zone 0.
- C. Accessibility Requirements: In addition to local governing regulations, comply with Section 4.10 in the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines (ADAAG)" and Chapter 4, part 407, in the 2012 Texas Accessibility Standards.
- D. Urea-Formaldehyde Limits: Use composite wood products that contain no added urea-formaldehyde resins.

1.7 COORDINATION

- A. Coordinate installation of sleeves, block outs, and items that are embedded in concrete or masonry for elevator equipment. Furnish templates and installation instructions and deliver to Project site in time for installation.

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B. Coordinate locations and dimensions of other work relating to hydraulic elevators including pit ladders, sumps, and floor drains in pits; entrance subsills; and electrical service, electrical outlets, lights, and switches in pits and machine rooms.

1.8 WARRANTY

A. Special Manufacturer's Warranty: Written warranty, signed by manufacturer agreeing to repair, restore, or replace defective elevator work within specified warranty period.

1. Warranty Period: 12 months from date of Substantial Completion.

1.9 MAINTENANCE SERVICE

A. Initial Maintenance Service: Beginning at Substantial Completion, provide 12 months of full maintenance service by skilled employees of the elevator Installer. Include monthly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper elevator operation at rated speed and capacity. Provide parts and supplies as used in the manufacture and installation of original equipment.

1. Perform maintenance, including emergency callback service, during normal working hours.
 - a. Response Time: Two hours or less.
 - b. Provide maintenance/ repair records promptly after each visit.

B. Continuing Maintenance Proposal: Provide a continuing maintenance proposal for the non-proprietary equipment and controls from Installer to Owner, in the form of a standard yearly (or other period) maintenance agreement, starting on date initial maintenance service period is concluded. State services, obligations, conditions, and terms for agreement period and for future renewal options.

PART 2 - PRODUCTS

2.1 MANUFACTURERS AND INSTALLERS

A. Acceptable Manufacturers: Subject to compliance with requirements, provide hoisted hydraulic elevators by one of the following:

1. MEI Total Elevator Solutions
2. Elevator Equipment Corporation (EECO)
3. Smartrise Elevator
4. Vantage
5. Maxton
6. Substitutions: Not allowed.

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- B. Acceptable installers include, but are not limited to, the following:
 - 1. K&M Elevator
 - 2. ERS (Elevator Repair Services)
 - 3. Fujitec Elevator
 - 4. Allied Elevator
 - 5. VTS
 - 6. Installers must be able to meet all Owner requirements.
- C. Equipment and software installed MUST be non-proprietary such that equipment and software used in the design and controls remain 100% accessible to any Owner-approved elevator vendor and the Owner's Elevator Shop.
- D. Hydraulic elevators are permitted only for installations with a maximum of four (4) stops.

2.2 MATERIALS AND COMPONENTS

- A. General: Provide manufacturer's standard elevator systems. Where components are not otherwise indicated, provide standard components, published by manufacturer as included in standard pre-engineered elevator systems and as required for a complete system.
- B. Pump Units: Positive-displacement type with a maximum of 10 percent variation between no load and full load and with minimum pulsations.
 - 1. Provide submersible pump, with submersible squirrel-cage induction motor, suspended inside tank from vibration isolation mounts. Provide oil cooler.
 - a. Products: Subject to compliance with requirements, provide submersible power units by MEI Total Elevator Solutions.
 - b. No substitutions.
 - 2. Provide motor with [**wye-delta**] [**or**] [**solid-state**] starting.
 - 3. Provide variable-voltage variable-frequency motor control.
- C. Hydraulic Silencers: Provide hydraulic silencer containing pulsation-absorbing material in a blowout-proof housing at pump unit.
- D. Hydraulic Oil: Use Grade 32 with a viscosity index greater than 180, petroleum-based/synthetic hydraulic oil only. Vegetable-based or water-based hydraulic fluids are not allowed.
- E. Piping: Provide size, type, and weight piping recommended by manufacturer, and provide flexible connectors to minimize sound and vibration transmissions from power unit.
 - 1. Provide dielectric couplings at plunger/cylinder units.
 - 2. Casing for Underground Piping: PVC pipe complying with ASTM D 1785 joined with PVC fittings complying with ASTM D 2466 and solvent cement complying with ASTM D 2564.

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- F. Inserts: Furnish required concrete and masonry inserts and similar anchorage devices for installing guide rails, machinery, and other components of elevator work where installation of devices is specified in another Specification section.
- G. Protective Cylinder Casings: PVC pipe casings complying with ASME A17.1, of sufficient size to provide not less than 1-inch clearance from cylinder, and extending above pit floor.
- H. Corrosion Protective Filler: A solventless, petroleum-based gel formulated for filling the space between hydraulic cylinders and protective casings. Filler shall be heavier than water, electrically nonconductive, and liquefy at approximately 150 deg F.
 - 1. Acceptable Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Diversified Enterprises; No-Ox-Id R-R #6110A.
 - b. Pacific Standard Chemical Co.; Union-Gard 160.
- I. Car Frame and Platform: Welded steel units.
 - 1. For freight elevators, provide special heavy-duty units where indicated for power truck loading, designed to withstand impacts and wheel loadings indicated.
- J. Finish Materials: Provide the following materials and finishes for exposed parts of elevator car enclosures, car doors, hoistway entrance doors and frames, and signal equipment as indicated:
 - 1. Satin Stainless Steel: ASTM A 666, Type 304, with No. 4, directional satin finish.
 - 2. Nickel Silver Extrusions: ASTM B 151, alloy UNS No. C74500.
 - 3. Plastic Laminate: High-pressure type complying with NEMA LD 3; color, texture, and pattern as selected by Architect from plastic-laminate manufacturer's full range of products.
 - 4. Aluminum-Alloy Rolled Tread Plate: ASTM B 632, Pattern 1, alloy 6061-T6.
 - 5. Substitutions: Not allowed.

2.3 OPERATION SYSTEMS

- A. Passenger Elevators: Provide operation systems for each elevator or group of elevators as required to provide type of operation system indicated.
 - 1. Single Elevator, Two Stops: Provide "automatic operation" as defined in ASME A17.1.
 - 2. Single Elevator: Provide "selective collective automatic operation" as defined in ASME A17.1.
 - 3. Multiple-Car Group: Provide "group automatic operation" as defined in ASME A17.1.
- B. Freight Elevators: Provide operation system for "single automatic operation" as defined in ASME A17.1.
- C. Elevator Controllers:
 - 1. Subject to compliance with requirements, provide Smartrise Hydraulic Controllers.

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2. Substitutions: Not allowed.
- D. Auxiliary Operations: In addition to primary operation system features, provide the following operational features for elevators where indicated.
 1. Standby Power Operation: On activation of standby power, cars are returned to a designated floor and parked with doors open. Only one car may be moved upward at a time, with priority given to loaded cars. If a car cannot be returned after two attempts, each of a preselected length of time, it is removed from the system. When all cars have been returned or removed from the system, one car is automatically placed in service. If car selected for service cannot operate within 60 seconds, the system removes car from service and places another car in service. Cars can be manually put in service on standby power, either for return operation or for regular operation, by switches in control panel located at main lobby. Manual operation causes automatic operation to cease.
 2. Battery-Powered Lowering: If power fails, cars that are at a floor remain at that floor, open their doors, and shut down. Cars that are between floors are lowered to a preselected floor, open their doors, and shut down. Cars that are below the preselected floor are lowered to the next lower floor, open their doors, and shut down. System includes rechargeable battery and automatic recharging system.
 3. Priority Service: Service is initiated by a card reader at designated floors. One elevator is removed from group operation and directed to the floor where service was initiated. On arriving at the floor, elevator opens its doors and parks. Car is placed in operation by selecting a floor and pressing door close button or by operating keyswitch to put car in independent service. After responding to floor selected or being removed from independent service, car is returned to group operation. If car is not placed in operation within a preset time after being called, it is returned to group operation.
 4. Touchless Operation: System allows elevator to function in automatic shuttle mode between landings so that passengers do not need to press buttons inside or outside the elevator. Shuttle mode may be switched on or off.
 5. Independent Service: Keyswitch in car control station removes car from group operation and allows it to respond only to car calls. Key cannot be removed from keyswitch when car is in independent service. When in independent service, doors close only in response to the door close button.
 6. Loaded-Car Bypass: When car load exceeds a predetermined weight, car will respond only to car calls, not to hall calls. Predetermined weight can be adjusted.
 7. Automatic Dispatching of Loaded Car: When car load exceeds a predetermined weight, doors will begin closing.
 8. Nuisance Call Cancel: When car calls exceed a preset number while car load is less than a predetermined weight, all car calls are canceled. Preset number of calls and predetermined weight can be adjusted.
 9. Load-Weighing Device (Freight Elevators): When car load exceeds 80 percent of rated capacity, a signal light is lit in the car control station; when car load exceeds rated capacity, car will not respond to car or hall calls.
- E. Security Features: In addition to above operational features, provide the following security features, where indicated. Security features shall not affect emergency firefighters' service.

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1. Keyswitch Feature: Car and hall push buttons are activated and deactivated by security keyswitches. Key is removable only in deactivated position.
2. Car-to-Lobby Feature: Feature activated by a key switch at main lobby that causes all cars in a group to return immediately to lobby and open doors for inspection. On deactivation by keyswitch, cars complete calls registered before keyswitch activation and resume normal operation.
3. Card-Reader Operation: For access to restricted landings. Provide required conductors in traveling cable and panel in machine room for interconnecting card readers, other security access system equipment, and elevator controllers. Allow space in car as indicated for card reader.
 - a. When system is activated, car calls to restricted landings do not register until card is accepted by security access system. Security access system determines which landings are restricted and which of those are accessible to cardholder.
 - b. Card readers and other security access system equipment are specified in Division 28 "Electronic Safety and Security."
4. Primary elevator travel cable: Include additional capacity for potential card reader devices. Secondary elevator travel cable: Include transmission capacity for security cameras, future growth. Cat6a, shielded pair, PoE capable.
 - a. Basis of design for secondary elevator travel cable: Satisfy performance equal to Draka EHC - (P/N 20491089), Product code CWS20-C6A.
 - b. Assumption: Total length of travel cable is less than 285 ft. If longer, fiber will be required.

2.4 SIGNAL EQUIPMENT

- A. General: Provide signal equipment for each elevator or group of elevators with hall-call and car-call buttons that light when activated and remain lit until call has been fulfilled. Fabricate lighted elements of acrylic or other permanent, nonyellowing translucent plastic.
- B. Swing-Return Car Control Stations: Provide car control stations fully recessed in hinged return panel adjacent to car door.
 1. Include call buttons for each landing served and other buttons, switches, and controls required for specified car operation.
 2. Mark buttons and switches with manufacturer's standard identification for required use or function that complies with ASME A17.1.
- C. Mount controls at heights complying with the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines (ADAAG)" and the 2012 Texas Accessibility Standards.
 1. Where indicated, equip each freight elevator with auxiliary car control station mounted on side of car at height to facilitate operation by forklift truck operator without leaving truck.

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D. Emergency Communication System: Provide system that complies with ASME A17.1, the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines (ADAAG)" and 2012 Texas Accessibility Standards. On activation, system dials preprogrammed number of monitoring station and identifies elevator location to monitoring station. System provides two-way voice communication without using a handset and provides visible signals that indicate when system has been activated and when monitoring station has responded. System is contained in flush-mounted cabinet, with identification, instructions for use, and battery backup power supply.

E. Car Position Indicator: For passenger elevator cars, provide illuminated-signal type, digital-display type, or segmented type, located above car door or above car control station. Also provide audible signal to indicate to passengers that car is either stopping at or passing each of the floors served.

1. Include travel direction arrows if not provided in car control station.

F. Hall Push-Button Stations: Provide one hall push-button station at each landing for each elevator or group of elevators, but not less than one station for each four elevators in a group. For each group of passenger elevators, locate between two elevators at center of group or at location most convenient for approaching passengers.

1. Provide units with direction-indicating buttons; two buttons at intermediate landings; one button at terminal landings.
2. Provide units with buttons for registering destination that incorporate a visual and audible signaling system to verify floor selection and to direct passenger to assigned car and a button to indicate that passenger has disabilities so control system can allow extra room in assigned car. Provide for connecting units to building security access system so a card reader can be used to register call and designate destination.

G. Hall Lanterns: Provide units with illuminated arrows, but provide single arrow at terminal landings.

1. Place lanterns either above or beside each hoistway entrance, unless otherwise indicated. Mount at a minimum of 72 inches above finished floor.
2. With each lantern, provide audible signals indicating car arrival and direction of travel. Signals sound once for up and twice for down.
 - a. At manufacturer's option, audible signals may be placed on each car.

H. Corridor Call Station Pictograph Signs: Provide signs matching hall push-button stations with text and graphics according to ASME A17.1, Appendix H.

2.5 DOOR OPERATOR

A. Provide heavy duty, harmonic door operator capable of opening doors at not less than 1½" fps and accomplishing reversal in 2-1/2 inch maximum door movement. Doors shall open automatically when car arrives at floor to permit transfer of passengers; after timed interval,

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doors shall automatically close. Arrange operator so doors can be opened by hand from inside car in case of power failure, if car is within leveling zone.

1. Subject to compliance with requirements, provide MOVFR II door operator by GAL Manufacturing Company LLC.
2. Substitutions: Not allowed.

B. Door operation shall be a closed loop system that gives constant feedback of the position and velocity of the elevator doors. System shall automatically overcome door resistance by increasing the power supply to the motor and increasing the torque required to maintain velocity. If a service tool is needed to make digital adjustments, provide the Owner with the service tool and all required manuals.

C. For freight elevators, provide a dual heavy duty, bi-parting door operator capable of opening the doors at each opening. Provide a power operated, two-piece gate on the car.

2.6 DOOR REOPENING DEVICES

- A. Infrared Array: Provide door reopening devices with a uniform array of 36 or more microprocessor-controlled, infrared light beams projecting across car entrance. Interruption of one or more of the light beams shall cause doors to stop and reopen.
 1. Nudging Feature: After car doors are prevented from closing for a predetermined adjustable time, through activating door reopening device, a loud buzzer shall sound and doors shall begin to close at reduced kinetic energy.

2.7 PASSENGER ELEVATOR CAR ENCLOSURES

- A. General: Provide manufacturer's standard enameled-steel car enclosures with removable wall panels, suspended ceiling, trim, accessories, access doors, doors, power door operators, sills (thresholds), lighting, and ventilation.
 1. Floor finish is specified in part 2.11.A below.
 2. Metal Wall Panels: Flush hollow-metal construction, fabricated from metal indicated.
 3. Plastic-Laminate Wall Panels: Plastic laminate adhesively applied to 1/2-inch fire-retardant-treated particleboard with plastic-laminate panel backing complying with NEMA LD 3, Type BKV and manufacturer's standard protective edge trim. Panels shall have a flame-spread rating of 75 or less, when tested according to ASTM E 84.
 4. Fabricate car with recesses and cutouts for signal equipment.
 5. Fabricate car door frame integrally with front wall of car.
 6. Stainless-Steel Doors: Flush, hollow-metal construction, fabricated from stainless steel.
 7. Sills: Extruded metal, with grooved surface, 1/4 inch thick. Provide polished finish on nickel silver.
 8. Polished Metal Ceiling: Flush panels, of metal indicated, with LED downlights in each panel.

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9. Handrails: Manufacturer's standard handrails, of metal indicated.
10. Design Substitutions: Not allowed.

2.8 FREIGHT ELEVATOR CAR ENCLOSURES

- A. General: Provide car enclosures of freight loading classes, sizes, door types, and opening sizes indicated. Include ventilation, lighting, finishes, access doors, thresholds, trim, and accessories. Fabricate car with recesses and cutouts for signal equipment.
 1. Provide power door operators with linkages for hoistway door operation.
- B. Materials and Fabrication: Provide manufacturer's standard flush panel welded construction made from stainless-steel sheet with a nominal thickness of 0.0781 inch reinforced at 16-inch maximum spacing.
 1. Floor finish: Aluminum diamond plate, mill finish, medium pattern.
 2. Substitutions: Not allowed.

2.9 PASSENGER HOISTWAY ENTRANCES

- A. General: Provide manufacturer's standard horizontal-sliding, door-and-frame hoistway entrances complete with track systems, hardware, sills, and accessories. Provide frame size and profile to coordinate with hoistway wall construction.
 1. Where gypsum board wall construction is indicated, provide self-supporting frames with reinforced head sections.
- B. Materials and Fabrication: Provide manufacturer's standards but not less than the following:
 1. Stainless-Steel Frames: Formed stainless-steel sheet.
 2. Stainless-Steel Doors **[and Transoms]**: Flush, hollow-metal construction, fabricated from stainless steel.
 3. Sills: Extruded metal, with grooved surface, 1/4 inch thick. Provide polished finish on nickel silver.
 4. Non-shrink, Non-metallic Grout: Factory-packaged, non-staining, non-corrosive, nongaseous grout complying with ASTM C 1107.

2.10 FREIGHT HOISTWAY ENTRANCES

- A. General: Structural-steel frames and sills for hoistway entrances are specified in Section 05 5000 "Metal Fabrications." Unless otherwise indicated, provide hoistway entrance doors of type indicated below, with truckable sill bars and resilient, safety-meeting rail gaskets.
 1. Equip for power operation by means of coordinated linkage with power-operated car door.

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2. Where gypsum board wall construction is indicated, provide fire-resistance-rated, hollow-metal, door-and-frame hoistway entrances. Provide self-supporting frames with reinforced head sections.
- B. Materials and Fabrication: Provide selections indicated; provide manufacturer's standards but not less than the following:
 1. Metal Door Panels: Constructed of metal sheets, flush on room side, welded and reinforced in steel framing with vertical reinforcing spaced not more than 24 inches o.c. Fabricate panel faces from stainless-steel sheet with a nominal thickness of 0.1094 inch.

2.11 PASSENGER ELEVATORS

- A. Elevator Nos.: <Insert elevator numbers as shown on Drawings.>
 1. Type: Under-the-car single cylinder.
 2. Rated Load: [2000 lb] [2100 lb] [2500 lb] [3000 lb] [3500 lb] [4000 lb] [4500 lb] [5000 lb].
 3. Rated Speed: [100 fpm] [125 fpm] [150 fpm] [175 fpm] [200 fpm].
 - a. Starts per hour – 80, Academics, Residential
 - b. Starts per hour – 120, Athletics, Parking
 4. Operation System: [Selective collective automatic operation] [Group automatic operation, two-car group] [Group automatic operation].
 5. Auxiliary Operations:
 - a. Standby power operation.
 - b. Standby powered lowering.
 - c. Battery-powered lowering.
 - d. Independent service.
 - e. Loaded-car bypass.
 - f. Automatic dispatching of loaded car.
 - g. Nuisance call cancel.
 6. Security Features: Keyswitch feature. Car-to-lobby feature. Card-reader operation.
 7. Car Enclosures: As follows:
 - a. Inside Width: [64 inches] [68 inches] [80 inches] [92 inches].
 - b. Inside Depth: [51 inches] [57 inches] [65 inches] [87-1/2 inches] [90 inches] [93 inches] [93-1/2 inches] [96 inches] [101 inches] [102 inches].
 - c. Inside Height: [88 inches] [94 inches] [108 inches].
 - d. Front Walls: Satin stainless steel with integral car door frames.
 - e. Car Fixtures: Satin stainless steel
 - f. Side and Rear Wall Panels: Satin stainless steel. [Plastic laminate above the height of the handrails].
 - 1) Passenger elevator cabs serving student housing or student residential facilities shall be provided with full-height plastic laminate wall finishes.

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- g. Reveals: Satin stainless steel.
- h. Door Faces (Interior): Satin stainless steel.
- i. Door Sills: Nickel silver.
- j. Ceiling: Satin stainless steel.
- k. Lighting: LED light fixtures with white reflectors.
- l. Handrails: Satin stainless steel at side and rear walls.

Select one of the following floor finishes:

- m. Floor prepared to receive resilient tile (specified in Division 9).
- n. Floor recessed and prepared to receive **[terrazzo] [porcelain]** tile (specified in Division 9).
- o. Floor recessed and prepared to receive dimension stone tile (specified in Division 9). Provide **[cementitious backer units] [applied over] [5/8-inch underlayment grade, exterior plywood]**, screwed to car platform.

8. Hoistway Entrances: As follows:

- a. Width: **[36 inches] [42 inches] [48 inches] [54 inches]**.
- b. Height: **[84 inches] [96 inches]**.
- c. Type: **[Single-speed side sliding] [Two-speed side sliding] [Single-speed center opening] [Two-speed center opening]**.
- d. Frames: Satin stainless steel.
- e. Doors **[and Transoms]**: Satin stainless steel.
- f. Sills: Nickel silver.

9. Hall Fixtures: Satin stainless steel.

10. Additional Requirements: As follows:

- a. Provide inspection certificate in each car, mounted under acrylic cover with satin stainless-steel frame.
- b. Provide protective blanket hooks in each car and two complete sets of full-height blankets.
- c. At exterior hoistways not provided with environmental (temperature or humidity) control, furnish weather-resistant hoistway fixtures suitable for exterior conditions.

2.12 FREIGHT ELEVATORS

A. Elevator Nos.: **<Insert elevator numbers as shown on Drawings.>**

- 1. Type: Under-the-car single cylinder.
- 2. Type: Under-the-car dual cylinder.
- 3. Rated Load: **[2000 lb] [2500 lb] [3000 lb] [4000 lb] [5000 lb] [6000 lb] [8000 lb] [10000 lb]**.
- 4. Freight Loading Class: Class **[A] [B] [C1] [C2] [C3]**.
- 5. Rated Speed (Up): **[75 fpm] [100 fpm]**.

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6. Operational Speed (Down): Same as rated speed (up).
7. Auxiliary Operations: **[Battery-powered lowering] [Standby powered lowering] [Keyswitch feature] [Card-reader operation] [Load-weighing device].**
8. Security Features: Keyswitch feature. Car-to-lobby feature. Card-reader operation.
9. Signal Equipment: Satin stainless-steel, single-button hall stations with position indicator.
10. Car Enclosures: As follows:
 - a. Platform Width: **[60 inches] [64 inches] [66 inches] [76 inches] [78 inches] [88 inches] [100 inches] [102 inches] [124 inches] [126 inches].**
 - b. Platform Depth: **[72 inches] [84 inches] [96 inches] [120 inches] [144 inches] [168 inches].**
 - c. Ceiling Height: 96 inches.
 - d. Walls and Ceiling: Satin stainless steel.
 - e. Floor: Aluminum diamond plate, mill finish.
 - f. Door Type: **[Vertical biparting] [Single-speed vertical lift] [Two-speed vertical lift].**
 - g. Car Gate Operation: Manual.
 - h. Car Gate Material: Satin stainless steel.
 - i. Car Sill: Steel angle.
 - j. Lighting: LED light fixtures with white reflectors.
11. Hoistway Entrances: As follows:
 - a. Width: **[56 inches] [60 inches] [62 inches] [72 inches] [96 inches] [98 inches] [120 inches] [122 inches].**
 - b. Height: **[84 inches] [96 inches].**
 - c. Door Type: **[Vertical biparting] [Single-speed vertical lift] [Two-speed vertical lift].**
 - d. Door Operation: **[Manual] [Power operated].**
 - e. Door Material: Satin stainless steel.
 - f. Sills specified in Section 05 5000 "Metal Fabrications."
12. Additional Requirements: As follows:
 - a. Provide inspection certificate in each car, mounted under acrylic cover with satin stainless-steel frame.
 - b. Door reopening device.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine elevator areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance. Verify critical dimensions,

and examine supporting structure and other conditions under which elevator work is to be installed. Proceed with installation only after unsatisfactory conditions have been corrected.

1. For the record, prepare a written report, endorsed by Installer, listing dimensional discrepancies and conditions detrimental to performance.

3.2 INSTALLATION

- A. Excavation for Jack: Drill excavation in each elevator pit to accommodate installation of a cylinder; comply with applicable requirements in Division 31 "Earthwork."
 1. Provide waterproof well casings to retain walls of well hole.
- B. Install cylinders in protective casings within well casing. Before installing protective casing, remove water and debris from well casing and provide permanent waterproof seal at bottom of well casing. Fill void space between protective casing and cylinder with corrosion-protective filler.
 1. Align cylinders and fill space between well casing and protective casing with fine sand.
- C. Install cylinders plumb and accurately centered for elevator car position and travel. Anchor securely in place, supported at pit floor. Seal between protective casing and pit floor with 4 inches of nonshrink, nonmetallic grout.
- D. Welded Construction: Provide welded connections for installing elevator work where bolted connections are not required for subsequent removal or for normal operation, adjustment, inspection, maintenance, and replacement of worn parts. Comply with AWS standards for workmanship and for qualifications of welding operators.
- E. Sound Isolation: Mount rotating and vibrating equipment on vibration-isolating mounts designed to effectively prevent transmission of vibrations to structure and thereby eliminate sources of structure-borne noise from elevator system.
- F. Install piping above the floor, where possible. Where not possible, install underground piping in Schedule 40 PVC pipe casing assembled with solvent-cement fittings.
- G. Install piping above the floor, where possible. Where not possible, cover underground piping with permanent protective wrapping before backfilling.
- H. Lubricate operating parts of systems as recommended by manufacturers.
- I. Alignment: Coordinate installation of hoistway entrances with installation of elevator guide rails for accurate alignment of entrances with cars. Where possible, delay installation of sills and frames until car is operable in shaft. Reduce clearances to minimum, safe, workable dimension at each landing.
- J. Leveling Tolerance: 1/4 inch, up or down, regardless of load and direction of travel.

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- K. Set sills flush with finished floor surface at landing. Fill space under sill solidly with nonshrink, nonmetallic grout.

3.3 FIELD QUALITY CONTROL

- A. Acceptance Testing: On completion of elevator installation and before permitting use (either temporary or permanent) of elevators, perform acceptance tests as required and recommended by ASME A17.1 and by governing regulations and agencies.
- B. Advise Owner, Architect, and authorities having jurisdiction in advance of dates and times tests are to be performed on elevators.

3.4 DEMONSTRATION

- A. Instruct Owner's personnel in proper use, operations, and daily maintenance of elevators. Review emergency provisions, including emergency access and procedures to be followed at time of operational failure and other building emergencies. Train Owner's personnel in procedures to follow in identifying sources of operational failures or malfunctions. Confer with Owner on requirements for a complete elevator maintenance program.
- B. Make a final check of each elevator operation with Owner's personnel present and before date of Substantial Completion. Determine that operation systems and devices are functioning properly.

3.5 PROTECTION

- A. Temporary Use: Do not use elevators for construction purposes unless cars are provided with temporary enclosures, either within finished cars or in place of finished cars, to protect finishes from damage.
 - 1. Provide full maintenance service by skilled, competent employees of elevator Installer for elevators used for construction purposes. Include preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper elevator operation at rated speed and capacity. Use same parts and supplies as used in the manufacture and installation of original equipment.
 - 2. Provide protective coverings, barriers, devices, signs, and other procedures to protect elevators. If, despite such protection, elevators become damaged, engage elevator Installer to restore damaged work so that no evidence remains of correction work. Return items that cannot be refinished in the field to the shop, make required repairs and refinish entire unit, or provide new units as required.

3.6 PROJECT CLOSE-OUT

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A. Submit maintenance manuals and certificates as described in 1.5 Informational Submittals above.

END OF SECTION 14 2400