

**SECTION 14 24 23**  
**HYDRAULIC ELEVATORS – PASSENGER**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Hydraulic passenger elevator system
  - 1. Commercial standard pre-engineered hydraulic passenger elevators.
  - 2. Elevator car enclosures, signal equipment, hoist-way entrances including doors and frames.
  - 3. Operation and control systems.
  - 4. Jacks
  - 5. Accessibility provisions for physically disabled persons.
  - 6. Equipment, machines, controls, systems and devices as required for safely operating the specified elevators at their rated speed and capacity.
  - 7. Materials and accessories as required for a complete working elevator installation to meet this specification and all applicable Codes.

**1.2 RELATED SECTIONS**

- A. 01 72 29 Cutting and Patching: Walls floors, etc. as necessary for proper installations of elevator, equipment, materials, signals, anchors, sleeves, and anything related to the elevator installation.
- B. 01 50 00 Temporary Construction Facilities: Temporary enclosures or other protection from open hoist ways during the elevator(s) installation.
- C. 31 20 00 Earth Moving: Proper trenching and backfilling for any underground piping or conduit.
- D. 03 30 00 Cast-in-Place Concrete: Elevator pit, motor, pump, equipment supports and foundations.
- E. 04 20 00 Masonry Unit: Hoist way enclosure, building-in and grouting hoist way doorframes, and grouting thresholds.
- F. 05 50 00 Metal Fabrications: Hoist beams, pit ladders, steel framing, auxiliary support steel, divider beams for supporting guide-rail brackets, steel angle sill supports, and miscellaneous steel required for proper installation of elevator.
- G. 07 14 00 Fluid Applied Waterproofing: Waterproof pit and hoist way as required.
- H. 09 65 00 Resilient Flooring: Finishing floor covering for elevator cab.
- I. 09 90 00 Painting:
- J. Division 22: Sump pit, sump pump, and oil separator; see M. 4. A. i) below.
- K. Division 23: Heating and ventilation of hoist way and machine room, maintain machine room temperature between 50°F and 90°F.
- L. Division 28: Card Access System
- M. Division 26:
  - 1. Provide electrical service for elevator, hoist way, machine room, and equipment.
    - a. Provide dry and isolated contact set and wiring between elevator controller and disconnect, Auxiliary contact closed when disconnect switch is in ON position and open when in OFF position.
    - b. Provide wiring and power to controller for cab lighting and ventilation.
  - 2. Provide equipment to automatically discount main power supply to elevator prior to sprinkler activation in machine room with self-resetting ability.
  - 3. Provide wiring for interconnection of elevator control system to fire alarm and security system, emergency communication to elevator controller, and heat and smoke sensing devices per ASME A17.1.
  - 4. On all elevator pits:

- a. Provide pump, float switch in the elevator sump pit connected to the Energy Management System (EMS).
  - i) Connect the pump to an oil separator and discharge water indirectly to the sanitary system.
  - ii) The EMS shall monitor the pump, if the pump fails send an alarm to the EMS monitoring station to notify operator of the pump failure.
  - iii) See section 22 20 00 for oil-water separator specifications.
  - iv) The oil separator shall be equipped with a sensor that will stop operation of the sump pump to preclude discharge of oil or oil laden water to the storm sewer system. This sensor shall also report through the EMS system.
  - v) The oil separator and all related piping that may convey oil laden water shall be equipped with secondary containment when installed within a well field protection zone.
- b. General contractor shall coordinate the installation of the float switch raceway system.
- c. General contractor shall coordinate with the elevator inspector.

### 1.3 REFERENCES

- A. ASME A17.1 - Safety Code for Elevators and Escalators
- B. ASTM A36/A36M - Standard Specification for Carbon Structural Steel
- C. ASTM A167 - Standard Specification for Stainless and Heat Resisting Chromium Nickel Steel Plate, Sheet, and Strip
- D. ASTM A269 - Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service
- E. ASTM A276 - Standard Specification for Stainless Steel Bars and Shapes
- F. ASTM A568/A568M – Standard Specification for Steel, Sheet, Carbon, Structural, and High Strength, Low Alloy, Hot Rolled and Cold Rolled, General Requirements for
- G. ASTM B36/B36M – Standard Specification for Brass Plate, Sheet, Strip, and Rolled Bars
- H. ASTM B43 – Standard Specification for Seamless Red Brass Pipe, Standard Sizes
- I. ASTM B209 – Standard Specification for Aluminum Alloy Sheet and Plate
- J. ASTM B221 – Standard Specification for Aluminum and Aluminum Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
- K. ASTM B455 – Standard Specification for Copper Zinc Lead Alloy (Leaded Brass) Extruded Shapes
- L. ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials
- M. AWS – American Welding Society D1.1
- N. FBC - Florida Building Code
- O. FFPC – Florida Fire Prevention Code
- P. FFPC - Florida Fire Protection Code
- Q. NEC - National Electrical Code (NFPA 70)
- R. NFPA 80 – Standard for Fire Doors and Fire Windows
- S. UL Underwriters Laboratories 10B Fire Test of Door Assemblies

### 1.4 QUALITY ASSURANCE

- A. An approved manufacturer regularly engaged in manufacturing, installing and servicing elevators of the type required by these specifications, shall furnish the elevator.
  1. To ensure strict quality control, the elevator contractor shall be the manufacturer of the power unit, controller, jack, signal fixtures, door operator, cab, entrances, and all other major parts of the elevator operating equipment.
  2. The major parts of the elevator equipment shall be manufactured in the United States, and not be an assembled system.

3. The elevator manufacturer shall have an ongoing quality assurance program implemented and documented.
  - B. The installer shall have minimum of five years experience in the installation and service of this type system, and either work for the elevator company or be a manufacturer approved installer.
  - C. Prior to start of work under this section, this contractor shall have a coordination meeting with the Architect, Owner, and other Contractors related to the installation of the elevator system.
  - D. Inspection and testing: Elevator Installer shall obtain and pay for all required inspections, tests, permits and fees for elevator installation.
    1. Arrange for inspections and make required tests.
    2. Deliver to the Owner upon completion and acceptance of elevator work.
- 1.5 DELIVERY, STORAGE, AND HANDLING
- A. Deliver elevator materials, components, and equipment in manufacturer's original packaging.
  - B. Protect and store materials and equipment in accordance with the manufacturer's requirements.
- 1.6 SUBMITTALS
- A. Product data: When requested, submit product data for the following:
    1. Elevator car enclosures and hoist way entrances.
    2. Operation, control, and signal systems.
  - B. Shop drawings:
    1. Show equipment arrangement in the machine room, pit and hoist way. Provide plans, elevations, sections and details of assembly, erection, anchorage, and equipment location.
    2. Indicate elevator system capacities, sizes, performances, safety features, finishes and other pertinent information.
    3. Show floors served, travel distances, maximum loads imposed on the building structure at points of support and all similar considerations of the elevator work.
    4. Indicate electrical power requirements and branch circuit protection device recommendations.
  - C. Color selection: Submit color charts of exposed finishes and materials for color selection.
    1. When requested, submit samples of exposed finishes and materials selected for the elevator system materials and components.
  - D. Certificates: Inspection and acceptance certificates of elevator system installation.
  - E. Operation and maintenance data. Include the following:
    1. Operation and maintenance instructions.
    2. Parts list, with recommended parts inventory.
  - F. Provide two copies of "as-built" plans, to have same detail as the shop drawings.
    1. One placed in secure location in the elevator equipment room, other to Building Department.
- 1.7 MAINTENANCE
- A. The elevator contractor shall furnish maintenance and call back service for a period of 12 months on each elevator after final acceptance.
    1. This service consists of periodic examinations of the equipment, adjustment, lubrication, cleaning, supplies and parts to keep the elevator in proper operations, as required by the manufacturer's specifications.
    2. Trained employees of the elevator contractor shall do all work during regular working hours of the trade.
  - B. Include parts catalog and show evidence of local parts inventory with complete list of recommended spare parts.
    1. Use parts produced by manufacturer of original equipment.

- C. Show evidence of bidder's insurance coverage, certificate of insurance outlining limits of liability.
- D. 24-hour minor emergency repair call back service shall be included.

1.8 WARRANTY

- A. The elevator manufacturer warrant shall cover the equipment installed under these specifications against defects in materials and workmanship and any defects not due to ordinary wear or tear or improper use or care for 5-years from the date of Substantial Completion.
- B. Substantial Completion includes the elevator (s) passing an inspection by the State of Florida, and placed in operation.

1.9 JACK HOLE (IF "HOLED" UNIT PROVIDED)

- A. Provide the hole for the jack unit as required, based upon excavation through normal soil or clay that is removable by manual digging or with a standard truck-mounted drilling unit.
  - 1. If determined that a casing is required to retain the walls of the hole, furnish one.
  - 2. Removal of excavation spoils deposited at the elevator pit will be by the Contractor.
- B. If any physical obstruction or hindrance is encountered below the surface of the ground, including but not limited to boulders, rock, gravel, wood, metal, pilings, sand, water, quick sand, caves, public utilities or any other foreign material, provide the elevator contractor with a written authorization to proceed with excavation utilizing any required special excavation equipment.
  - 1. The elevator contractor shall maintain a daily log of time and material cost.
  - 2. Compensate is at current billing rates for time and material basis related to additional cost incurred subsequent to encountering the physical obstruction or hindrance including cost of the special excavation equipment.
- C. Provide unobstructed access and egress for excavation equipment with adequate workspace at the elevator pit.

**PART 2 PRODUCTS**

2.1 APPROVED MANUFACTURERS

- A. Kone, Inc
- B. Otis Elevator Company
- C. Thyssenkrupp Elevator
- D. Pre-approved equal.

2.2 ELEVATOR DESCRIPTION

- A. Elevator Minimum Requirements:
  - 1. Quantity: As shown on the plans.
  - 2. Capacity: 3000 pounds
  - 3. Clear Inside: 6'-8" wide by 4'-9" deep.
  - 4. Car height of 8'-0" nominal
  - 5. Entrance Size:
    - a. Height: 7'-0"
    - b. Width: 3'-6"
  - 6. Speed: 100 fpm.
  - 7. Net Elevator Travel: As per plans.
  - 8. Openings:
    - a. Front: As per plans.
    - b. Rear: As per plans.
  - 9. Door Type: As per plans.
  - 10. Power Characteristics: V277/480-VAC, 3-PHASE, 60-HZ.

B. Special Features:

1. Baked Enamel: Electrostatically applied, oven baked to match selected color.
2. Paint: Except as otherwise specified, properly paint all metal work fabricated by the elevator contractor with the manufacturer's standard paint.
3. Floor finish as scheduled.

2.3 MATERIALS, GENERAL

A. Colors, patterns, and finishes, as selected by the Architect from manufacturer's range of standard colors, patterns, and finishes.

B. Steel

1. Steel shapes, bars, and plates complying ASTM A36/A36M.
2. Sheet Steel Exposed Work: Stretcher leveled, cold rolled, commercial-quality carbon steel complying with ASTM A568/A568M.
3. Sheet Steel Un-Exposed Work: Hot rolled, commercial-quality carbon steel complying with ASTM A568/A568M.

C. Stainless Steel

1. Type 304 with #4 (satin) or #8 (polished) finishes to comply with ASTM A167 and NAAMM.
2. Shapes and bars shall comply with ASTM A276, Type 300.
3. Tubing shall comply with ASTM A269, Type 300.

D. Bronze:

1. Drawn pipe shall comply with ASTM B43; alloy UNS C23000, red brass.
2. Sheet shall comply with ASTM B36/B36M; alloy UNS C28000, muntz metal.
3. Extrusions shall comply with ASTM B455; alloy UNS C38500, architectural bronze.

E. Aluminum

1. Sheet and plate shall comply with ASTM B209, alloy 6063-T52.
2. Extrusions shall comply with ASTM B221, alloy 6063-T52.

F. Plastic Laminate, Decorative high-pressure type complying with NEMA LD3 and ASTM E84.

2.4 HOISTWAY EQUIPMENT

A. Platform: Fabricated frame of formed or structural steel shapes, gusseted and rigidly welded with a wood sub floor.

1. Fireproof platform underside.
2. The platform shall have a Class A rating.

B. Sling: Steel stiles properly affixed to a steel crosshead and bolster channels with bracing members, to remove all strain from the car enclosure.

C. Guide Rails: Formed steel properly fastened to the building structure with steel brackets.

D. Guide Shoes: Top and bottom rigid type with metal body and removable non-metallic liners.

E. Guide Rail Lubricators: Provide a leak proof reservoir mounted on top of upper guide shoes.

1. Wood felt wiper shall apply and even, uniform flow of lubricant which shall thoroughly cover face of guide rail.

F. Buffers: Provide substantial buffers in the elevator pit.

1. Mount on continuous channels fastened to the elevator guide rail or securely anchored to the pit floor with substantial extensions if required by job conditions.

G. Jack: Provide a jack unit of sufficient size to lift the gross loads the height specified and factory test to insure adequate strength and freedom from leakage.

1. Do not use brittle material, such as grey cast iron, in the jack construction.
2. The jack unit shall consist of the following parts:

- a. Single post conventional (in ground). Single polished steel hydraulic plunger housed in a steel sealed casing with sufficient clearance space to allow for alignment during installation.
  - b. The casing shall have a dished end cap and safety bulkhead as required by ASME A17.1 code.
  - c. The plunger shall have a high-pressure sealing system which will not allow for seal movement or displacement during the course of operation.
  - d. The jack system will be supplied with schedule 40 PVC or an HDPE protection system complying with ASME A17.1 code requirements to prevent in ground corrosion of the casing.
  - e. The jack casing shall have a bleeder valve to discharge any air trapped in the jack.
  3. Double wrap the jack cylinder and any underground piping with an approved coating designed to help protect it from electrolytic and chemical corrosion.
  - H. Automatic Terminal Limits: Place electric limit switches in the hoist way near the terminal landings designed to cut off the electric current and stop the car should it run beyond either terminal landing.
  - I. Automatic Self-Leveling: Provide the elevator with a self-leveling feature that will automatically bring the car to the floor landings and correct for over travel or under travel.
    1. The self-leveling shall, within its zone, be entirely automatic and independent of the operating device.
    2. Maintain the car approximately level with the landing irrespective of the load.
  - J. Failure Protection: Design electrical control circuit so that if a malfunction occurs, due to motor starter failure, oil becoming low in the system, or the car failing to reach landing in the up direction with a pre-determined time, the elevator car will automatically descend to the lowest terminal landing.
    1. If using power-operated doors, the doors shall automatically open when the car reaches that landing to allow passengers to depart.
    2. The doors will then automatically close and all control buttons, except the "door open" button in the car station are inoperative.
  - K. Wiring, Piping, and Oil:
    1. Provide and install all necessary wiring in the hoist way in accordance with the NEC.
    2. All necessary pipe and fittings to connect the power unit to the jack unit.
    3. Provide Biodegradable oil of the proper grade.
      - a. ISO Grade 32, Chevron clarity hydraulic oil AW or equal.
  - L. Emergency Terminal Stopping Device: Provide an emergency terminal stopping device for speeds over 100-FPM which operates independently of the normal terminal stopping device should it fail to slow down the car at the terminal as intended.
    1. Stopping devices shall function at all times, even if there is a single short circuit caused by a combination of grounds, or by other conditions.
    2. The normal and emergency terminal stopping devices shall not control the same controller switches unless two or more separate and independent switches are furnished, two of which shall be closed in either direction of travel to complete the circuit to the control valve solenoids in the down direction and to complete the circuit to the pump motor for the up direction of travel.
- 2.5 POWER UNIT
- A. Provide a compact and neatly designed Power Unit (Oil Pumping and Control Mechanism) with all of the components listed below combined in a self-contained unit.

1. Oil reservoir with tank cover and controller compartment with cover.
  2. An oil-hydraulic pump.
  3. An electric motor, oil control unit with the following components built into a single housing.
  4. A high-pressure relief valve.
  5. A check valve.
  6. An automatic unloading up start valve.
  7. A lowering and leveling valve.
  8. A magnetic controller.
- B. Provide a pump specifically designed and manufactured for oil-hydraulic elevator service.
1. It shall be of the positive displacement type, inherently designed for steady discharge with minimum pulsations to give smooth and quiet operation.
  2. Discharge of pump shall not vary more than 10% between no load and full load on the elevator car.
- C. Drive shall be by direct coupling with the pump and motor submerged in the oil reservoir or by multiple V-belts and sheaves of number and size to insure maximum factor of safety.
1. Drive type shall be determined based primarily on the load on the car, travel and speed.
- D. Provide a motor specifically designed for oil-hydraulic elevator service, of standard manufacturer, and of duty rating to comply with herein specified speeds and loads.
- E. Oil Control unit shall consist of the following components, all built into a single housing.
1. Welded manifolds with separate valves to accomplish each function will not be acceptable under this specification.
  2. All adjustments shall be readily accessible and made without removing the assembly from the oil line.
  3. Provide an externally adjustable relief valve capable of bypassing the total oil flow without increasing backpressure by more than 10% above that required to barely open the valve.
  4. Up start and stop valve shall be externally adjustable, and designed to bypass oil flow during start and stop of motor pump assembly.
    - a. Valve shall close slowly, gradually diverting oil to or from the jack unit, insuring smooth up starts and up stops.
  5. Provide check valve designed to close quietly without permitting any perceptible reverse flow.
  6. Provide externally adjustable lowering valve and leveling valve for drop-away speed, lowering speed, leveling speed and stopping speed to insure smooth DOWN starts and stops.
    - a. Provide a leveling valve designed to level the car to the floor in the direction the car is traveling when slowdown is initiated.
- F. Power controller shall contain all necessary electrical contractors; electro-mechanical switches and thermal overload relays.
1. All components shall be mounted in a NEMA I enclosure.
  2. Logic control system shall be microprocessor based and protected from environmental extremes and excessive vibrations.
- G. Reduced Voltage Starting:
1. Provide a solid-state starter to limit current inrush during starting and to provide gradual acceleration of the motor.
  2. Do not initiate motor starting by mechanical contacts.
  3. The starter shall include a current limit adjustment range of 200% to 450% of the overload adjustment range.
  4. Do not provide an integral fault detection and diagnostic system.

5. Remove power from the motor if the internal fault detection system detects a failure.
- 2.6 OIL-HYDRAULIC SILENCER
- A. Provide and install an oil-hydraulic silencer (muffler device) at the power unit location.
    1. It shall contain pulsation absorbing material inserted in a blowout proof housing arranged for inspecting interior parts without removing unit from oil line.
    2. Rubber hose without blowout proof features will not be acceptable.
- 2.7 VIBRATION PADS
- A. Provide and mount vibration pads under the power unit assembly to isolate the unit from building structure.
- 2.8 SOUND INSULATING PANELS
- A. Where pump and motor are not submerged, provide panels manufactured of reinforced 14-ga steel with a 1"-thick 1½ lb. fiberglass core affixed to interior and mounted on all four open sides of the power unit frame.
- 2.9 SOUND ISOLATING COUPLINGS
- A. Where pump and motor are not submerged, provide and mount a minimum of two couplings in the oil line in the machine room between pump and jack.
- 2.10 CAR ENCLOSURE
- A. Walls: Cab type DLP, durable wood core finished on both sides with high-pressure plastic laminate.
    1. Reveals: Finish the exposed surface of cab shell in Baked Enamel.
  - B. Canopy: Reinforced 14-ga cold roll steel with hinged exit openable from car top only. Finish shall be two coats factory applied reflective baked enamel.
  - C. Ceiling: Suspended type, LED lighting with translucent diffuser mounted in a metal baked enamel frame at 7'-4" above the finished floor.
  - D. Cab Columns, Front and Transom: Stainless steel: ASTM A167, Type 300 stainless steel panels, # 4 satin finish.
  - E. Doors: Horizontal sliding car doors reinforced with steel for panel rigidity.
    1. Hang doors on sheave type hangers with polyurethane tires that roll on a polished steel track, and guided at the bottom by non-metallic shoes sliding in a smooth threshold groove.
    2. Door Finish: Stainless steel: ASTM A167, Type 300 stainless steel panels, # 4 satin finish.
    3. Cab Sills: Extruded, with grooved surface, ¼" thickness, and ASTM B221 aluminum mill finish.
  - F. Ventilation: Mount a two-speed exhaust fan on the car top.
  - G. Pad Buttons: Provide pad buttons on cab front(s) and walls.
    1. Protection Pads: Provide one set of vinyl pads.
  - H. Base: No base.
  - I. Finished Floor: See Finish Schedule.
  - J. Hand Rail: Stainless steel flat bar stock spaced from wall 2"; placed at rear wall only.
- 2.11 CAR OPERATING STATION
- A. Car Operating Station, General:
    1. The main car control in each car shall contain the devices required for specific operation mounted in an integral swing return panel requiring no applied faceplate.
    2. Swing return shall have a brushed stainless steel finish.
    3. The main car operating panel shall be mounted in the return and comply with all Accessibility Code requirements.
    4. Pushbuttons that illuminate using long lasting LED's shall be included for each floor served, and emergency buttons and switches shall be provided per code.
    5. Switches for car light and accessories shall be provided



- B. Emergency Light:
  - 1. Provide an emergency light and capacity plate integrated into a module.
  - 2. The emergency light shall illuminate automatically upon loss of the building's normal power supply.
- C. Column Mounted Car Riding Lantern: Install a car-riding lantern in the elevator cab and located in the entrance.
  - 1. The lantern, when illuminated, will indicate the intended direction of travel.
  - 2. The lantern will illuminate and a signal will sound when the car arrives at a floor where it will stop.
  - 3. The lantern shall remain illuminated until the door(s) begin to close.
- D. Provide an emergency communications device complying with requirements specified in the FBC and FFPC.
  - 1. Elevator vender shall provide the box, phone by others.
- E. Special Accessories:
  - 1. Two speed fan/light switch.
  - 2. Telephone jack.
  - 3. Certificate frame.

#### 2.12 HALL STATIONS

- A. Provide one set of risers.
  - 1. Each terminal station shall contain an illuminating push-button.
  - 2. Each intermediate station shall consist of two illuminating push buttons, one for up direction and the other for the down direction.
  - 3. The buttons shall illuminate to indicate a call is registered at the floor and the direction.
  - 4. Phase-I firefighters service key switch, with instructions, shall be incorporated into the hall station at the designated level.
  - 5. Faceplate shall be stainless steel # 4.
- B. Floor Identification Pads:
  - 1. Provide doorjamb pads at each floor.
  - 2. Jamb pads shall comply with the requirements of FBC and FFPC.

#### 2.13 HOISTWAY ENTRANCES

- A. Doors and Frames: Provide and install complete hollow metal sliding type at each hoist way opening.
  - 1. Provide manufacturer's standard design bearing the proper UL fire rated labels.
    - a. They shall consist of 14-ga frames with 2" profile, 16-ga doors, hangers, hanger supports, hanger covers, fascia plates, sigh guards and all necessary hardware.
  - 2. The interface of the elevator wall with the hoist way entrance assembly shall be in strict compliance with the elevator manufacturer's requirements.
  - 3. Doors: Flush construction.
    - a. Stainless Steel: ASTM A 167, Type 300 stainless steel panels, # 4 satin finish.
  - 4. Frames: Formed construction.
    - a. Stainless Steel: ASTM A 167, Type-300 stainless steel panels, # 4 satin finish.
- B. Interlocks: Provide each hoist way entrance with an approved type interlock tested as required by Code.
  - 1. The interlock shall prevent operation of the car away from the landing until the doors are locked in the closed position as defined by Code and shall prevent opening the doors at any landing from the corridor side unless the car is at rest at that landing or is in the leveling zone and stopping at that landing.

- C. Door Hanger and Tracks: For each hoist way sliding door, furnish and install sheave type two point suspension hangers and tracks complete.
  - 1. Sheaves shall have polyurethane tires with ball bearings properly sealed to retain grease.
  - 2. Provide hangers with an adjustable slide to take the up-thrust of the doors.
  - 3. Tracks are to be drawn steel shapes, smooth surface and shaped to conform to the hanger sheaves.
- D. Hoist way Sills: Extruded, with grooved surface, ¼ inch thickness, ASTM B221 aluminum-mill finish.

## 2.14 OPERATION

- A. Controller:
  - 1. Provide a microprocessor based elevator control system with software oriented and linked together for purposes of communication by a serial communications link.
  - 2. Control of the elevator shall be automatic in operation by means of push buttons in the car numbered to correspond to floors served, for registering car stops, and by "up-down" push buttons at each intermediate landing and "call" push buttons at terminal landings.
    - a. Momentary pressing of one or more buttons shall dispatch the car to the designated landings in the order the car reaches the landing, irrespective of the sequence the buttons are pressed.
      - i) Cancel each landing when answered.
    - b. When the car is traveling in the up direction, it shall stop at all floors for which car buttons or "up" hall buttons are pressed.
      - i) The car shall not stop at floors where "down" button is pressed, unless the stop for that floor is registered by a car button or unless the down call is at the highest floor for any button pressed.
      - ii) Pressing the "up" button when the car is traveling in the down direction shall not intercept the travel unless the stop for that floor is registered by a car button or unless the up call is the lowest button pressed.
    - c. When the car responds to its highest or lowest stop and stops are registered for the opposite direction, the direction of travel shall reverse automatically and it shall answer the calls registered for that direction.
      - i) If both up and down calls are registered at an intermediate floor, cancel only the call corresponding to the direction of car travel upon the stopping of the car at the landing.
- B. Microprocessor: Locate the main microprocessor and car controller in the elevator machine room.
  - 1. Microprocessor door operator shall reside in the door operator and control all functions of the elevator door(s).
  - 2. Electronic selector shall reside on the car top and contain hall affect transducers that detect magnetic fields. Magnets, corresponding to floor positions and top/bottom of hoist way are mounted on a perforated metal tape that runs the length of the hoist way.
- C. Provide a key operated switch in the elevator for the purpose of removing the car from normal operation.
  - 1. When the switch is in the "independent service" position, the elevator will bypass all landing calls and answer only car calls.
  - 2. The operator will have complete control over the operation of the car.
- D. Emergency Power:

1. In the event of a normal power supply failure, program the elevator system to lower from an emergency power supply.
  2. The emergency power supply shall consist of a battery furnished by the elevator contractor.
  3. The elevator contractor shall provide circuitry so after normal power failure and establishment of emergency power, each elevator shall lower to a field adjustable return landing and after initial opening of doors to discharge any occupants, park with the doors closed.
  4. If the designated return landing is above the current position, the elevator shall run down to the next lower landing and park with the doors closed.
- E. When the hoist way doors are exposed to the weather, (no enclosure to protect the doors), program the system to have the car wait for a call at the upper most stop. This is to help protect the car and its controls from damage of water entering the hoist way.

#### 2.15 DOOR OPERATION

- A. Provide and install a direct current motor driven heavy-duty operator designed to operate the car and hoist way doors simultaneously.
1. Provide a microprocessor based door operator linked to the main microprocessor through a serial communication link residing in the door operator controlling all functions of the door.
  2. Door movements shall electrically cushion at both limits of travel and arrange the door operating mechanism for manual operation in event of power failure.
  3. Doors shall open automatically when the car arrives at the landing and close automatically after an adjustable time interval or when called to another landing.
  4. Direct drive geared operators, AC controlled units with oil checks, or other deviations from the above are not acceptable.
- B. No Unnecessary Door Operation: The car door shall open only if the car is stopping for a car or hall call, answering a car or hall call at the present position or selected as the next car up.
- C. Door Open Time Saver: If a car is stopping in response to a car call assignment only (no coincident hall call), the current door hold open time is changed to a shorter field programmable time when the electronic door protection device is activated.
- D. Double Door Operation: When a car stops at a landing with concurrent up and down hall calls, no car calls, and no other hall call assignments, the car door opens to answer the hall call in the direction of the car's current travel. If an onward car call is registered before the door closes to within 6" of full closure, the preference will reverse and the door shall reopen to answer the other call.
- E. Nudging Operation: The doors remain open as long as the electronic detector senses the presence of a passenger or object in the door opening.
1. Obstructed door movement, for a field programmable time, causes a buzzer to sound and the doors close at reduced speed.
  2. If the infrared door protection system detects a person or object while closing, the doors shall stop and resume closing after removal of the obstruction.
- F. Limited Door Reversal:
1. If the doors are closing and an infrared beam interrupted, the doors shall reverse and re-open partially.
  2. After clearing the obstruction the doors will begin to close.
- G. Door Open Sentinel: If the doors are opening but do not fully open after a field adjustable time, the doors will recycle closed then open six times to try and correct the fault.
- H. Door Close Sentinel: If the doors are closing but do not fully close after a field adjustable time, the doors will recycle open then close six times to try and correct the fault.

- I. Door Close Assist: When the doors have failed to fully close and are in the recycle mode, the door drive motor shall have increased torque applied in an effort to possibly overcome any mechanical resistance or differential air pressure and allow the door to close.

#### 2.16 DOOR PROTECTION DEVICES

- A. Provide a solid-state electronic detector at the entrance of the elevator car.
  1. Also, provide an electro-mechanical reversal edge on the leading edge of the car doors.
  2. The doors will remain open as long as the electronic detector sense the presence of a passenger or object in the door opening.
  3. If door movement is obstructed for a predetermined time, the doors will resume normal closing operation.
  4. If the electro-mechanical reversal edge contacts a person or object while closing, the doors will immediately stop and reopen.
  5. Initiate closing after the passenger or object has moved from the opening.

#### 2.17 CAR TOP INSPECTION

- A. Provide a car top inspection station with an "emergency stop" switch and constant pressure "up-down" direction buttons to make the normal operating devices inoperative and give the inspector complete control of the elevator.
- B. The car top inspection station shall be mounted in the door operator assembly and not be a separate unit.

#### 2.18 ELEVATORS WITH UNPROTECTED HOIST WAY DOORS

- A. In elevator installation with hoist ways exposed to the weather, without a roofed enclosure protecting the hoist way doors, provide NEMA 4 rated equipment.
  1. Hall stations and lanterns exposed to weather.
  2. Elevator car operating stations, lanterns, controls and electronics.
  3. Door protection devices.
  4. Other electrical and electronic devices which maybe damaged from water intrusion.

#### 2.19 CONTROLLED ACCESS TO THE ELEVATOR

- A. Provide elevator control wiring, equipment, and programming to limit the access to the elevator by the programmed badges.
- B. Elevators shall have a card access device controlling the cab call and floor stops of each cab. This feature shall include key switch overrides of the access system to insure continuing operations of the elevators in case of a card access system failure.
- C. The elevator shall have a call station located outside of the elevator on each floor that calls the cab when activated, and shall have the following controls and functions.
  1. A key controlled override switch that when activated calls the cab and overrides the card access control system and the Off/On override switch.
    - a. The override is for use by the Fire Department or other emergency response forces.
    - b. In override mode the elevator cab shall be capable of performing all functions that are required by the elevator code.
  2. A key controlled switch that disables the call button when in the OFF position and will activate the call button in the ON position. Wire this switch to override the card access controls when in the on position.
  3. A button that will call the elevator cab.
  4. A card access card reader junction box mounted adjacent to the call station at ADA height with a ¾" conduit between the card reader junction box and the elevator call station box. The distances between the two boxes shall not be more than 12".

- D. The elevator shall have a control station located in the cab with the following controls and functions.
  - 1. Override key controlled switch that enables each elevator floor control button to be activated.
    - a. Label the switch as "Fire Department Use Only".
    - b. Providing complete control of the cab, taking priority over any other control device or system.
  - 2. A key controlled switch that will disable the floor control buttons when in the OFF position and overrides the card access control of the floor control buttons when in the ON position.
  - 3. Vendor installed card reader in the cab(s) of the elevator to control the access to each floor.
    - a. Districts Security Support Services Section shall provide the card reader.
  - 4. This elevator control station shall have a floor control button for each floor.
- E. The contractor shall coordinate the installation of the elevator and the security access system with the elevator vendor and the School Police Department.

### **PART 3 EXECUTION**

#### **3.1 EQUIPMENT AND TOOL STORAGE**

- A. Project Manager will assign a dry and protected area, conveniently located to the elevator hoist way, for the elevator contractor without cost, for storage of material and tools.
- B. If storage on site is not available at time of delivery, Purchaser will provide suitable storage, assume all costs incurred, and make the payments due for the equipment.

#### **3.2 EXAMINATION**

- A. Before starting the elevator installation, the Elevator Contractor shall inspect the hoist way, hoist way openings, pits and machine rooms, verify all critical dimensions, and examine supporting structures and all other conditions necessary for the elevator installation.
- B. Installation of the elevator constitutes acceptance of existing conditions and responsibility for satisfactory performance.

#### **3.3 INSTALLATION**

- A. Competent elevator installation personnel in accordance with ASME A17.1, manufacturer's instructions, approved shop drawings, and all codes shall perform work.
- B. Supply in ample time for installation by other trades, inserts, anchors, bearing plates, brackets, supports, and bracing including all setting templates and diagrams for placement.
- C. Jack unit excavation: Drill or otherwise excavate below elevator pit construction as required to install the jack unit.
  - 1. Install casing for jack unit.
  - 2. Set casing for jack unit assembly plumb.
- D. Set jack unit-cylinder assembly plumb, centered accurately and shimmed to proper elevation.
- E. Install all the elevator systems components, coordinate installation of hoist way wall construction, and adjust equipment to comply with required performance levels.
- F. Before permitting either temporary or permanent use of elevators, perform tests required by ASME A17.2 and governing agencies or regulations.

#### **3.4 PERMITS, TAXES AND LICENSES**

- A. The Elevator Contractor shall pay all applicable sales and use taxes, permits, fees and licenses, as of the date bids as part of the contract.

#### **3.5 TEMPORARY USE OF ELEVATOR**

- A. Temporary use of the elevator (before final acceptance) allowed only after the elevator contractor has a signed temporary acceptance from the user.

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1. The User shall pay for any work required to return the elevator in the condition prior to the temporary acceptance agreement.
2. The User shall provide fees, temporary enclosures, guard, or other protection of the hoist way openings, elevator operators, and any other item necessary to permit safe temporary operation of the elevator.

B. User shall provide protection for the cab walls, ceiling, and floor.

### 3.6 ACCEPTANCE OF INSTALLATION

A. Upon notice from the elevator contractor that the installation of the elevators is complete, the purchaser will arrange for a person duly authorized to make the final inspection and provide a written acceptance.

B. The mutually agreed date shall be not more than ten business days after the date the elevator contractor's notification of completion.

### 3.7 OWNER'S INFORMATION

A. Once Owner accepts the elevators, elevator contractor shall supply the Owner with two Owner's Manual containing parts list, general maintenance instructions, lubrication instructions, and other data relating to the installation.

END OF SECTION