

## SECTION 14210 – ELECTRIC TRACTION ELEVATORS

### PART 1 - GENERAL

#### 1.01 SUMMARY

- A. This Section specifies electric traction elevators.
- B. Related Sections: The following sections contain requirements that relate to this section and are performed by other trades.
  - 1. Section 02200 - Earthwork: excavation for elevator pit.
  - 2. Section 03300 - Cast-In-Place Concrete: elevator pit, elevator machine foundation, and grouting thresholds.
  - 3. Section 09265 – Gypsum Board Shaft Wall Assemblies: for elevator shaft walls.
  - 4. Section 05500 - Metal Fabrications: pit ladder, divider beams, support for entrances and rails, hoisting beam at top of elevator machine room.
  - 5. Section 07131 – Self-Adhering Sheet Waterproofing: waterproofing of elevator pit.
  - 6. Section 09681 – Carpet tile for floor finish in Passenger elevators.
  - 7. Section 09651 – Resilient Floor Tile for floor finish in Service elevators.
  - 8. Division 15 for: ventilation and temperature control of elevator equipment room.
  - 9. Division 16 for: electrical service to main disconnect in elevator machine room; electrical power for elevator installation and testing; electrical-disconnecting device to elevator equipment prior to activation of sprinkler system; electrical service for machine room; machine room and pit receptacles with ground-fault current protection; lighting in machine room and pit; wiring for telephone service to machine room.
  - 10. Division 16 for: emergency generator for elevator operation.
  - 11. Division 16 for: fire and smoke detectors and interconnecting devices; fire alarm signal lines to contacts in the machine room.
  - 12. Division 16 for: ADAAG-required emergency communications equipment.

#### 1.02 REFERENCES

- A. Comply with applicable building codes and elevator codes at the project site, including but not limited to the following:
  - 1. ANSI A117.1, Buildings and Facilities, Providing Accessibility and Usability for Physically Handicapped People.
  - 2. ADAAG, Americans with Disabilities Act Accessibility Guidelines.
  - 3. ANSI/NFPA 70, National Electrical Code.
  - 4. ANSI/NFPA 80, Fire Doors and Windows.
  - 5. ASME/ANSI A17.1, Safety Code for Elevators and Escalators.
  - 6. ANSI/UL 10B, Fire Tests of Door Assemblies.
  - 7. Model Building Codes.
  - 8. All other local applicable codes.

#### 1.03 SYSTEM DESCRIPTION

- A. Performance Requirements for Elevators:
  - 1. Quantity & Elevator Numbers: 4 total

2. Type: Geared Electric Traction Machine with Variable Voltage Variable Frequency A. C. Drive Machine Located above Hoistway: Front opening only.
3. Number of Stops:
  - a. Elevator No. 1 (Service Elevator): 6 stops
  - b. Elevator No. 2 (Service Elevator): 5 stops
  - c. Elevator No. 3 (Passenger) and No. 4 (Passenger): 5 stops.
4. Rise: As indicated on the Drawings  
Roping: 2:1
5. Rated Capacity/Speed:
  - a. Elevator No. 1 and 2 (Service): 7000 pound and 350 fpm
  - b. Elevator No. 3 and 4 (Passenger): 3500 pound and 350 fpm
6. Minimum Car Inside:
 

Front Opening:

  - a. Elevator No. 1 and No. 2 (Service): 7'-2" wide x 9'-1" deep
  - b. Elevator No. 3 and No. 4 (Passenger): 6'-8" wide x 5'-6" deep
7. Inside Cab Height: 8'0"  
Height Under Ceiling: 7'-3 1/2"
8. Entrance Width & Type:
  - a. Elevators No. 1 and No. 2 (Service): Center-open doors 5'-0" x 7'-0"
  - b. Elevators No. 3 and No. 4 (Passenger): Center-open doors 3'-6" x 7'-0"
9. Main Power Supply: 480 Volts + or - 5% of normal, 3 Phase, with a separate equipment grounding conductor.
  - a. Motor HP for the basis of design product is 23HP for Elevators 3 & 4 (Passenger) and 45HP for Elevators 1 & 2 (Service). If other than basis of design product is provided, the manufacturer is to coordinate HP and power requirements with Electrical Contractor. Any additional cost will be borne by the Elevator Contractor.
10. Lighting Power Supply: 120 Volts, 1 Phase, 15 Amp, 60 Hz.
11. Speed:  $\pm$  2% of contract speed under any loading condition or direction of travel.
12. Stopping Accuracy:  $\pm$ 1/4" (6.4 mm) under any loading condition or direction of travel.
13. Door Opening Time for 7' satin stainless steel car and entrance door:
  - a. 3500# 1.6 seconds for center opening
  - b. 7000# 3.75 seconds for center opening
15. Floor-to-Floor Time: 6 seconds (for 12 ft. floor height).

- B. Duplex Collective Operation: Using a microprocessor-based controller, the operation shall be automatic by means of the car and hall buttons. In the absence of system activity, one car can be made to park at the pre-selected main landing. The other (free) car shall remain at the last landing served. Only one car shall respond to a hall call. If either car is removed from service, the other car shall immediately answer all hall calls, as well as its own car calls.

- C. Car Operating Features
1. Full Collective Operation.
  2. Anti-nuisance.
  3. Fan and Light Protection.
  4. Load Weighing Bypass.
  5. Independent Service.
  6. Firefighters' Service Phase I and Phase II.
  7. Top of Car Inspection.
  8. Moderate Outgoing Traffic Operation.
  9. Car to Lobby Operation.
  10. Zoned Access at Bottom Landing.
  11. Zoned Access at Upper Landing.
  12. Car Secure Access.
  13. Provision for Card Reader in Car (Card Reader provided and Installed by others).
  14. Express Priority Service with keyswitch(es) at all levels
  15. Emergency Hospital Service.
  16. Automatic Standby Power Operation with Manual Override.

This operation shall return each car automatically to a designated landing when the system is initially switched to standby power. One or more cars are returned at a time. Preference is given to loaded cars over empty cars in order to reduce passenger wait times. A car must respond by beginning to move toward the designated landing within a pre-determined time. If a car does not respond, it is automatically placed in a "Not Available" mode while other cars are moved. If a car was not returned to the designated landing on the first try, a second attempt is made. If the second attempt is not successful, the car will remain in a "Not Available" mode and can only be moved by manual means. Once each car has returned to the designated landing, the doors will remain open for a predetermined amount of time.

When all cars have successfully returned to the designated landing or have attempted to move twice, automatic selection of the car(s) to run on normal operation will occur.

If for any reason a car selected for normal operation under standby power is delayed for 60 seconds, the car will be placed in a "Not Available" mode and another car will be selected for normal operation based on the priorities listed above.

Manual Override of Standby Power Operation is achieved by a manual input for each car via a strip switch. A manually selected car may be run either in a return operation to a designated landing or in normal operation under standby power. If a manually selected car has not yet returned to the designated landing, it will perform this operation first then immediately go into normal operation.

If a manually selected car is delayed, no other car can be selected in the group unless it is manually selected.

If car selection is changed by Manual Override while a car is running in return or normal operation under standby power, the newly selected car will not be permitted to run until the car that had been running has stopped, opened its doors, and gone into the Standby Power Wait state.

- D. Door Control Features:

1. Door control to open doors automatically when car arrives at a landing in response to a normal hall or car call.
2. Elevator doors shall be provided with a reopening device that will stop and reopen the car door(s) and hoistway door(s) automatically should the door(s) become obstructed by an object or person.

Primary door protection shall consist of a two dimensional, multi-beam array projecting across the car door opening. Under normal operation and for any door position, the system shall detect as a blockage an opaque object that is equal to or greater than 1.3 inches (33 mm) in diameter when inserted between the car doors at vertical positions from within 1 inch (25 mm) above the sill to 71 inches (1800 mm) above the sill. Under degraded conditions (one or more blocked or failed beams), the primary protection shall detect opaque objects that are equal to or greater than 4" (100 mm) in diameter for the same vertical coverage. If the system performance is degraded to the point that the 4" object cannot be detected, the system shall maintain the doors open or permit closing only under nudging force conditions.

The door reopening device shall also include a secondary, three dimensional, triangular infrared multi-beam array projecting across the door opening and extending into the hoistway door zone. The door opening device will cause the doors to reopen when it detects a person(s) or object(s) entering or exiting the car in the area between the hoistway doors or the entryway area adjacent to the hoistway doors.

The size of the secondary protection zone shall vary as the door positions vary during opening and closing. The width of the zone shall be approximately one-third the size of the separation between the doors (or door and strike plate for single-slide doors) and shall be approximately centered in the door separation. In order to minimize detection of hallway passers-by who are not entering the elevator, the maximum zone penetration into the entryway shall not exceed 20" for any door separation. Normal penetration depth into the entryway from the car doors shall be ~14" for a door separation of 42". The penetration shall reduce proportionally as the doors close. At door separations of 18" or less the secondary protection system may cease its normal operation since the depth of the zone recedes to where it is inside the hoistway doors. The vertical coverage of the secondary protection shall be ~19" (480 mm) above the sill to ~55" (1400 mm) above the sill (mid-thigh to shoulder of a typical adult).

The secondary protection shall have an anti-nuisance feature which will ignore detection in the secondary zone after continual detection occurs for a significant time period in the secondary zone without corresponding detection in the primary protection zone; i.e. a person/object is in the entryway but does not enter. Normal secondary protection shall be re-enabled whenever detection occurs in the primary zone.

The reaction time of the door detector sub-system shall not exceed 60 milliseconds when both primary and secondary protection capabilities are active; nor 40 milliseconds when the secondary protection is disabled.

3. Door nudging operation to occur if doors are prevented from closing for an adjustable period of time.

E. Provide equipment according to seismic: Design Category C.

#### 1.04 SUBMITTALS

- A. Product Data: Submit manufacturer's product data for each system proposed for use. Include the following:
1. Signal and operating fixtures, operating panels and indicators.
  2. Cab design, dimensions and layout.
  3. Hoistway-door and frame details.
  4. Electrical characteristics and connection requirements.
  5. Expected heat dissipation of elevator equipment in machine room.
- B. Shop Drawings: Submit approval layout drawings. Include the following:
1. Car, guide rails, buffers and other components in hoistway.
  2. Maximum rail bracket spacing.
  3. Maximum loads imposed on guide rails requiring load transfer to building structure.
  4. Loads on hoisting beams.
  5. Clearances and travel of car.
  6. Clear inside hoistway and pit dimensions.
  7. Location and sizes of access doors, hoistway entrances and frames.
- C. Operations and Maintenance Manuals: Provide manufacturer's standard operations and maintenance manual.

#### 1.05 QUALITY ASSURANCE

- A. Manufacturer: Provide elevators manufactured by a firm with a minimum of 10 years experience in fabrication of elevators equivalent to those specified. Elevator manufacturer shall be ISO 9002 certified.
- B. Installer: Elevators shall be installed by the manufacturer.
- C. Regulatory Requirements: Elevator system design and installation shall comply with the latest versions of ASME A17.1 and applicable local codes.
1. Elevator shall be designed in response to Americans with Disabilities Act Accessibility Guidelines (ADAAG).
  2. Seismic code requirements per 2003 International Building Code (IBC).
- D. Permits and Inspections: Provide licenses and permits and perform required inspections and tests.

#### 1.06 DELIVERY, STORAGE AND HANDLING

- A. Should the building or the site not be prepared to receive the elevator equipment at the agreed upon date, the General Contractor will be responsible to provide a proper and suitable storage area on or off the premises.

Should the storage area be off-site and the equipment not yet delivered, then the elevator contractor, upon notification from the General Contractor, will divert the elevator equipment to the storage area. If the equipment has already been delivered to the site, then the General

Contractor shall transport the elevator equipment to the storage area. The cost of elevator equipment taken to storage by either party, storage, and redeliver to the job site shall not be at the expense of the elevator contractor.

#### 1.07 WARRANTY

- A. The elevator contractor's acceptance is conditional on the understanding that their warranty covers defective material and workmanship. The guarantee period shall not extend longer than one (1) year from the date of completion or acceptance thereof by beneficial use, whichever is earlier, of each elevator. The guarantee excludes: ordinary wear and tear or improper use, vandalism, abuse, misuse, or neglect or any other causes beyond the control of the elevator contractor and this express warranty is in lieu of all other warranties, express or implied, including any warranty of merchantability or fitness for a particular purpose.

#### 1.08 MAINTENANCE SERVICE

- A. Maintenance service consisting of regular examinations, adjustments and lubrication of the elevator equipment shall be provided by the elevator contractor for a period of twelve (12) months after the elevator has been turned over for the customer's use. This service shall not be subcontracted but shall be performed by the elevator contractor. All work shall be performed by competent employees during regular working hours of regular working days and shall include emergency 24-hour callback service. This service shall not cover adjustments, repairs or replacement of parts due to negligence, misuse, abuse or accidents caused by persons other than the elevator contractor. Only genuine parts and supplies as used in the manufacture and installation of the original equipment shall be provided.

#### 1.09 PIT AND SHAFT COORDINATION

- A. The pit and shaft dimensions are based on the basis of design product. If other than the basis of design product is provided, the manufacturer shall coordinate dimensional changes with the contractor. Any additional cost relating to changes shall be borne by the Elevator Contractor.

### PART 2 - PRODUCTS

#### 2.01 ACCEPTABLE MANUFACTURER

- A. Provide geared traction elevators by Otis Elevator Company or approved equal.

#### 2.02 EQUIPMENT: MACHINE ROOM COMPONENTS

- A. Controller: A microcomputer based control system shall be provided to perform all of the functions of safe elevator operation. The system shall also perform car and group operational control.
1. All high voltage (110V or above) contact points inside the controller cabinet shall be protected from accidental contact in a situation where the controller doors are open.
  2. Controller shall be separated into two distinct halves; Motor Drive side and Control side. High voltage motor power conductors shall be routed so as to be physically segregated from the rest of the controller.
  3. Field conductor terminations points shall be segregated; high voltage (>30 volts DC and 110 VAC,) and low voltage (< 30 volts DC)

4. Controllers shall be designed and tested for Electromagnetic Interference (EMI) immunity according to the EN 12016 (May 1998): "EMC Product Family Standards for lifts, escalators, and passenger conveyors Part 2 – immunity"
- B. Machine: The machine shall be of the geared single-wrap traction type with the motor, brake, and traction sheave mounted on a continuous bedplate. Sound isolation pads shall be installed to reduce vibration and noise transmission to the building structure.
- C. Drive: A Variable Voltage Variable Frequency AC drive system shall be provided. The system shall be non-regenerative.
- D. Governor: The car safety shall be operated by a centrifugal speed governor located at the top of the hoistway in the machine room.

## 2.03 EQUIPMENT: HOISTWAY COMPONENTS

- A. Hoistway Operating Devices:
  1. Emergency stop switch in the pit.
  2. Terminal stopping switches.
  3. Car positioning vanes.
- B. Buffers: Oil type for car and counterweight at the bottom limits of travel.
- C. Guide Rails: Tee-section steel rails with brackets and fasteners.
- D. Ropes: The hoist ropes shall be of Lang lay (right hand) type made with traction steel. Governor ropes shall be steel. All ropes shall consist of at least eight strands wound about a sisal core center.
- E. Fascia: Galvanized sheet steel shall be provided at the front <and rear> of the hoistway.
- F. Hoistway Entrances:
  1. Frames: Entrance frames shall be of bolted construction for complete one-piece unit assembly. All frames shall be securely fastened to fixing angles mounted in the hoistway and shall be UL fire rated steel. Additional sill angle support will be provided.  
  
Sills shall be extruded nickel silver.
  2. Doors: Entrance doors shall be of hollow metal construction with vertical internal channel reinforcements.
  3. Fire Rating: Entrance and doors shall be UL fire rated for 1-1/2 hour.
  4. Entrance Finish: satin stainless steel.
  5. Entrance Markings: Entrance jambs shall be marked with 4" x 4" (102 mm x 102 mm) plates having raised floor markings with Braille adjacent. Markings shall be provided on both sides of the entrance.
  6. Sight Guards: Black sight guards will be furnished with any metal finish door. Powder coated matching sight guards will be furnished with powder coated doors.

## 2.04 EQUIPMENT: CAR COMPONENTS

- A. Carframe and Safety: A carframe fabricated from formed or structural steel members shall be provided with adequate bracing to support the platform and car enclosures. The car safety shall be integral to the carframe and shall be Type "B", flexible guide clamp type.
- B. Removable Panels Series 2 Cab walls to be made of 16-gauge sheet steel painted with black powder coated and are to have perforations for hardware to mount removable panels. Laminate to be chosen from the manufacturer's standard selection.
  - 1. Horizontal DP31 Cab Panel for Elevators No. 3 and 4 (Passenger) - horizontal panels in plastic laminate edged in matching PVC.
  - 2. Horizontal w/Stainless wainscoting [DP41 Cab Panel] for Elevators No. 1 and 2 (Service) - horizontal panels with top panel in plastic laminate and bottom panel in satin stainless steel, edged in matching PVC.
- C. Car Front Finish: satin stainless steel.
- C1. Car Door Finish: satin stainless steel.
- D. Car Top: shall be of ½" (12.7 mm) thick structural wood material clad on both sides with a 1/32" (0.79 mm) natural finish aluminum panel.
- E. Ceiling Type
  - 1. Perimeter Lighted [DC124 Ceiling] for Elevators No. 1, 2, 3, and 4: suspended laminated with natural satin stainless steel finish. Set with perimeter fluorescent lighting.
- F. Emergency Car Lighting: An emergency power unit employing a 6 volt, sealed rechargeable battery and totally static circuits shall be provided to illuminate the elevator car and provide current to the alarm bell in the event of building power failure.
- G. Emergency Pulsating Siren: Siren mounted on top of the car that is activated when the Alarm button in the car operating panel is engaged. Siren shall have a rated sound pressure level of 80 dba at a distance of 3.0 m from the device. Siren shall respond with a delay of not more than 1 second after the switch or push button has been pressed.
- H. Exhaust Fan: An exhaust fan shall be mounted on the car top.
- I. Utility Outlet: A 125V 15 amperes utility outlet with ground-fault circuit-interrupter protection shall be furnished in the cab.
- J. Handrail:
  - 1. Rectangular Tubular Metal Bar [DH50 Handrails] for elevators No. 3 and 4 (Passenger): 1/2" (13 mm) x 1-1/2" (38 mm satin finish stainless steel provided on the sides and rear of the car enclosure.
  - 2. Flat Solid Metal [DH51 Handrails] for elevators No. 1 and 2 (Service): 1/4" (6 mm) x 8" (203 mm) satin finish stainless steel provided on the sides and rear of the car enclosure.



- 3. Flat Solid Metal [DH51 Bumper Rail] for elevators No. 1 and 2 (Service): 1/4" (6 mm) x 8" (203 mm) satin stainless steel provided on the sides and rear of the car enclosure.
- K. Threshold: nickel silver.
- L. Protective pad hooks and quilted fire retardant protective pads. Pad Buttons will be provided with non-suspended ceiling.
- M. An electrical contact shall be provided on the car-top exit.
- N. Applied Base Finish: satin stainless steel.
- O. Roller Guides: Rubber roller guides shall be mounted on top and bottom of the car.
- P. Platform: The car platform shall be of all steel construction. It shall be equipped with an aluminum threshold. Load weighing devices shall be mounted under the platform.
  - 1. Platform overlay for heavy loading: constant for duties  $\geq$  4000 lb. The platform shall be provided with a 5/8" (16 mm) thick plywood overlay. Platform overlay allows the car platform to accommodate one-piece loads weighing up to 25% of the rated capacity, such as wheeled food carts, stretchers, x-ray equipment, etc.

2.05 EQUIPMENT: SIGNAL DEVICES AND FIXTURES

- A. Car-Operating Panel: A car operating panel shall be provided which contains all push buttons, key switches, and message indicators for elevator operation. The car operating panel shall have a satin stainless steel finish.
  - 1. Series 4 Fixtures for elevators No. 3 and 4 (Passenger): Hinged swing car operating panel shall be furnished. It shall contain a bank of round metal mechanical illuminated buttons. Flush mounted to the panel and marked to correspond to the landings served, an emergency call button, door open and door close buttons, and switches for lights, inspection and the exhaust fan. Pan shaped design in not acceptable. Car operating panel shall not contain plastic housing components. The emergency call button shall be connected to a bell that serves as an emergency signal. All buttons to have raised numerals and Braille markings. LED green halo illumination with Flat Flush targets. Target finishes: satin stainless steel.
  - 2. Series 4 Vandal- Resistant Fixtures for elevators No. 1 and 2 (Service): Hinged swing car operating panel shall be furnished. It shall contain a bank of round metal mechanical illuminated buttons. Flush mounted to the panel and marked to correspond to the landings served, an emergency call button, door open and door close buttons, and switches for lights, inspection and the exhaust fan. Pan shaped design in not acceptable. Car operating panel shall not contain plastic housing components. The emergency call button shall be connected to a bell that serves as an emergency signal. All buttons to have raised numerals and Braille markings. LED red halo illumination with Flat Flush targets. Target finish is satin stainless steel.

The car operating panel shall be equipped with the following features:

Standard:

- 1) Raised markings and Braille shall be provided to the left hand side of each push-button.
- 2) Car Position Indicator at the top of and integral to the car operating panel.
- 3) Door open and door close buttons.
- 4) Light key-switch.
- 5) Fan key-switch.
- 6) Inspection key-switch.
- 7) Elevator Data Plate marked with elevator capacity and car number.
- 8) Illuminated alarm button with raised markings.
- 9) In car stop switch (key unless local code prohibits use)
- 10) Firefighter's hat
- 11) Firefighter's Phase II Key-switch
- 12) Call Cancel Button

1. Help Button – The help button shall initiate two-way communication between the car and a location inside the building, switching over to another location if the call is unanswered, where personnel are available who can take the appropriate action. Visual indicators are provided for call initiation and call acknowledgement.
2. Firefighter's Phase II emergency in-car operating instructions, worded according to A17.1 2000, Article 2.27.7.2.
3. Landing Passing Signal: A chime bell shall sound in the car to signal that the car is either stopping at or passing a floor served by the elevator.
4. Please exit symbol, provided with emergency hospital service, express priority in the hall.

B. Series 4 Car Position Indicator: A 16-segment, digital, vacuum fluorescent car position indicator shall be integral to the car operating panel.

C. Hall Fixtures: Hall fixtures shall be provided with necessary push buttons and key switches for elevator operation. Hall fixtures shall have a satin stainless steel finish.

1. Series 2 Fixtures for elevators No. 3 and 4 (Passenger): Hall fixtures shall feature round metal mechanical buttons in flush mount face frame. Buttons shall be flat flush in vertically mounted fixture. Hall lanterns and position indicators shall be illuminated by means of LED. Fixture shall be satin stainless steel finish.

2. Series 2 Vandal Resistant Fixtures for elevators No. 1 and 2 (Service): Hall fixtures shall feature round metal mechanical buttons in flush mount face frame with vandal resistant buttons. Buttons shall be flat flush in vertically mounted fixture. Hall lanterns and position indicators shall be illuminated by means of LED. Fixture shall be satin stainless steel finish.

D. Hall Lanterns and Chime: A directional lantern visible from the corridor shall be provided at each hall entrance. When the car stops and the doors are opening, the lantern shall indicate the direction in which the car is to travel and a chime will sound.

E. Telephone Cabinet: A telephone compartment shall be furnished in the return panel below the car operating panel. Necessary wires for the telephone shall be included in the compartment and connected to the car traveling cable. The telephone instrument shall be furnished by others.

F. Combination Hall Position Indicator and Hall Lantern at all levels.

G. Elevators No. 1 and 2 (Service) only: Hall call cutout key-switches to disable activation of hall buttons all levels.

- H. Access key-switch at top floor in entrance jamb.
- I. Access key-switch at lowest floor in entrance jamb.
- J. Coaxial cable (RG6) in traveling cable.
- K. Card reader provisions, 4 twisted shielded pairs in traveling cable.
- L. Emergency (standby) Power key-switch: Manual selection of each elevator in normal operation after automatic return in standby power operation has been initiated.

## PART 3 - EXECUTION

### 3.01 PREPARATION

- A. Take field dimensions and examine conditions of substrates, supports, and other conditions under which this work is to be performed. Do not proceed with work until unsatisfactory conditions are corrected.

### 3.02 INSTALLATION

- A. Installation of all elevator components except as specifically provided for elsewhere by others.

### 3.03 DEMONSTRATION

- A. The elevator contractor shall make a final check of each elevator operation with the Owner or Owner's representative present prior to turning each elevator over for use. The elevator contractor shall determine that control systems and operating devices are functioning properly.