

## SECTION 142100 – ELECTRIC TRACTION ELEVATORS

### PART 1 - GENERAL

#### 1.01 Summary

- A. This section specifies electric traction elevators.
- B. Work Required
  - 1- The work required under this section consists of all labor, materials and services required for the complete installation (including operational verification) of all the equipment required for the elevator(s) as herein specified.
  - 2- All work shall be performed in a first class, safe and workmanlike manner.
  - 3- In all cases where a device or part of the equipment is herein referred to in the singular, it is intended that such reference shall apply to as many of such devices or parts as are required to make complete installation.

#### 1.02 Related Sections

- A. The following sections contain requirements that relate to this section and are performed by trades other than the elevator manufacturer/installer.
  - 1- Section 01 50 00 – Temporary Facilities and Controls: protection of floor openings and personnel barriers; temporary power and lighting.
  - 2- Section 03 30 00 – Cast-In-Place Concrete: elevator pit and elevator machine foundation.
  - 3- Section 04 20 00 – Concrete Unit Masonry: masonry hoistway enclosure, building-in and grouting hoistway doorframes, and grouting of sills.
  - 4- Section 26 05 00 – Common Work Results for Electrical:
  - 5- Main disconnects for each elevator.
  - 6- Electrical power for elevator installation and testing.
  - 7- Disconnecting device to elevator equipment prior to activation of sprinkler system.
  - 8- The installation of dedicated GFCI receptacles in the pit and overhead.
  - 9- Lighting in controller area, machine area and pit.
  - 10- Wiring for telephone service to controller.
  - 11- Section 28 31 01 – Fire Alarm Systems: fire and smoke detectors at required locations and interconnecting devices; fire alarm signal lines to contacts in the machine area.
  - 12- Section 31 10 00 – Site Clearing: excavation for elevator pit.

#### 1.03 References

- 1- Comply with applicable building and elevator codes at the project site, including but not limited to the following:
- 2- ASME A17.1/CSA B44, Safety Code for Elevators and Escalators.
- 3- ASME A17.7/CSA B44, Performance-Based Safety Code for Elevators and Escalators.
- 4- ADAAG, American Disabilities Act Accessibility Guidelines.
- 5- ANSI A117.1, Building and Facilities, Providing Accessibility and Usability for Physically Handicapped People.

- 6- ANSI/NFPA 70, (NEC) National Electrical Code.
- 7- CAN/CSA C22.1, (CEC) Canadian Electrical Code.
- 8- ANSI/UL 10B, Standard for Fire Test of Door Assemblies.
- 9- CAN/ULC-S104-10, Standard Method for Fire Test of Door Assemblies.
- 10- ANSI/NFPA 80, Standard for Fire Doors and Other Opening Protectives.
- 11- Building Codes IBC or NBCC.
- 12- All Local Jurisdictional applicable codes.

1.04 System Description for 3500 lbs- Unit 1

- A. Equipment Description: Gen2® gearless elevator where the controller resides in a machine room.
- B. Equipment Control: Elevonic® Control System.
- C. Drive: Regenerative
- D. Quantity of Elevators: 1 of 1
- E. Elevator Stop Designations:
  - Lower Level (Lower),
  - Rear- Lower Level (Upper), 1<sup>st</sup> Floor, 2<sup>nd</sup> Floor, 3<sup>rd</sup> Floor
- F. Stops: 5
- G. Openings: Front and Rear
- H. Travel: 40 ft 1.75 in
- I. Rated Capacity: 3500 lbs.
- J. Rated Speed: 200 fpm (1.02 mps)
- K. Clear Hoistway Size: 7'-5 1/4" W x 9'-1" D
- L. Clear Inside Dimensions: 5'-6 1/8" W x 6'-5 9/16" D
- M. Cab Height: High Cab
- N. Entrance Type and Width: Two-Speed Doors- 42"
- O. Entrance Height: 7'-0" (2134 mm)
- P. Main Power Supply: 208 or 480 volts as indicated on the plans ☐ 5% of normal, three-phase, with a separate equipment grounding conductor.
- Q. Car Lighting Power Supply: 120 volts, single-phase, 15 amps, 60 Hz.
- R. Machine Location: Inside and at the top of the hoistway.
- S. Signal Fixtures: Manufacturer's standard with metal button targets
- T. Controller Location: In a machine room.
- U. Performance:
  - 1- Car Speed: ☐ 3 % of contract speed under any loading condition or direction of travel.
  - 2- Car Capacity: Safely lower, stop and hold up to 120% of rated load (code required).

3- Ride Quality:

- a. Vertical Vibration (maximum): 20 milli-g
- b. Horizontal Vibration (maximum): 12 milli-g
- c. Vertical Jerk (maximum): 4.59  $\square$  1.0 ft./ sec<sup>3</sup> (1.4  $\square$  0.3 m/ sec<sup>3</sup>)
- d. Acceleration/Deceleration (maximum): 2.62 ft./ sec<sup>2</sup> (0.8 m/ sec<sup>2</sup>)
- e. In Car Noise: 55 – 60 dB(A)
- f. Stopping Accuracy:  $\square$ 0.375 in. ( $\square$ 10 mm) max,  $\square$ 0.25 in. ( $\square$ 6 mm) Typical
- g. Re-leveling Distance:  $\square$ 0.5 in. ( $\square$ 12 mm)

V. Operation: Simplex Collective: Using a microprocessor-based controller, operation shall be automatic by means of the car and hall buttons. If all calls in the system have been answered, the car shall park at the last landing served.

W. Operation 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- Zoned Access at Bottom Landing
- 9- Zoned Access at Upper Landing
- 10- Car Secure Access
- 11- Automatic Rescue Operation.

X. 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.
- 3- Door protection shall consist of a two dimensional, multi-beam array projecting across the car door opening.
- 4- Door nudging operation to occur if doors are prevented from closing for an adjustable period of time.

Y. Provide equipment for seismic conditions.

1.05 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 hoistway (BTU).
  - 6- Color selection chart for Cab and Entrances.
- 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- Clearances and travel of car.
  - 5- Clear inside hoistway and pit dimensions.
  - 6- Location and sizes of access doors, hoistway entrances and frames.
- C. Operations and Maintenance Manuals: Provide manufacturer's standard operations and maintenance manual.
- 1.06 Quality Assurance
- A. Manufacturer: Elevator manufacturer shall be ISO 9001 certified.
- B. Manufacturer shall have a minimum of fifteen years of experience in the fabrication, installation and service of elevators.
- C. Installer: Elevators shall be installed by the manufacturer.
- D. Permits, Inspections and Certificates: The Elevator Contractor shall obtain and pay for necessary Municipal or State Inspection and permit as required by the elevator inspection authority, and make such tests as are called for by the regulations of such authorities. These tests shall be made in the presence of such authorities or their authorized representatives.
- 1.07 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.
- B. 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 redelivery to the job site shall not be at the expense of the elevator contractor.
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- 1.11 Warranty
- A. The elevator contractor's acceptance is conditional on the understanding that their warranty covers defective material and workmanship. The warranty 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 warranty excludes: ordinary wear and tear, 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.

## 1.12 Maintenance and Service

- A. Maintenance service consisting of regular examinations and adjustments of the elevator equipment shall be provided by the elevator contractor for a period of 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. 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.
- B. The periodic lubrication of elevator components shall not be required, including: Sheaves, Rails, Belts, Ropes, Car and CWT guides, etc.
- C. The elevator control system must:
  - 1- Provide in the controller the necessary devices to run the elevator on inspection operation.
  - 2- Provide on top of the car the necessary devices to run the elevator in inspection operation.
  - 3- Provide in the controller an emergency stop switch. This emergency stop switch when opened disconnects power from the brake and prevents the motor from running.
  - 4- Provide in the event of a power outage, means from the controller to electrically lift and control the elevator brake to safely bring the elevator to the nearest available landing.
  - 5- Provide the means from the controller to reset the governor over speed switch and also trip the governor.
  - 6- Provide the means from the controller to reset the emergency brake when set because of an unintended car movement or ascending car over speed.
  - 7- (Optional) Provide the means from the controller to reset elevator earthquake operation.
- D. Provide system capabilities to enable a remote expert to create a live, interactive connection with the elevator system to enable the following functions:
  - 1- Remotely diagnose elevator issues with a remote team of experts
  - 2- Remotely return an elevator to service
  - 3- Provide real-time status updates via email
  - 4- Remotely make changes to selected elevator functions including:
    - a. Control building traffic: Restrict floor access, remove car from group operation, shut down elevator, select up peak/down peak mode and activate independent service.
    - b. Conserve energy: Activate cab light energy save mode, activate fan energy save mode, shut down car(s).
    - c. Improve passenger experience: Extend door open times, change parking floor, activate auto car full, activate anti-nuisance, advance door opening, door nudging, extend specific floor extended opening time, release trapped passengers.

## PART 2 - PRODUCTS

### 2.01 Manufacturer

- A. Manufacturer: Design based upon Otis Elevator's Gen2™ machine room-less elevator system.

## 2.02 Design and Specifications

- A. Provide Gen2™ traction passenger elevators from Otis Elevator Company. The control system and car design based on materials and systems manufactured by Otis Elevator Company. Specifically, the system shall consist of the following components:
  - 1- Controller located in a machine room.
  - 2- An AC gearless machine using embedded permanent magnets mounted at the top of the hoistway.
  - 3- Polyurethane Coated-Steel Belts for elevator hoisting purposes.
  - 4- Regenerative drive that captures normally wasted energy and feeds clean power back into the building's power grid.
  - 5- LED lighting standard in ceiling lights and elevator fixtures.
  - 6- Sleep mode operation for LED ceiling lights and car fan.
- B. Approved Installer: Otis Elevator Company

## 2.03 Equipment: Controller 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 shall be protected from accidental contact when 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"
  - 5- Controller located inside a control room.
  - 6- Drive: A Variable Voltage Variable Frequency AC drive system shall be provided. The drive shall be set up for regeneration of AC power back to the building grid.

## 2.04 Equipment: Hoistway Components

- A. Machine: AC gearless machine, with a synchronous permanent-magnet motor, dual solenoid service and emergency disc brakes, mounted at the top of the hoistway.
- B. Governor: The governor shall be a tension type car-mounted governor.
- C. Buffers, Car, and Counterweight: Polyurethane type buffers shall be used for speeds of 150 and 200 feet per minute. Oil buffers shall be used for a speed of 350 feet per minute.
- D. Hoistway Operating Devices:
  - 1- Emergency stop switch in the pit.
  - 2- Terminal stopping switches.
- E. Positioning System: Consists of an encoder, reader box, and door zone vanes.

- F. Guide Rails and Attachments: Guide rails shall be Tee-section steel rails with brackets and fasteners. Side counterweight arrangements shall have a dual-purpose bracket that combines both counterweight guide rails, and one of the car guide rails to building fastening.
- G. Coated-Steel Belts: Polyurethane coated belts with high-tensile-grade, zinc-plated steel cords and a flat profile on the running surface and the backside of the belt. All driving sheaves and deflector sheaves should have a crowned profile to ensure center tracking of the belts. A continuous 24/7 monitoring system using resistance based technology has to be installed to continuously monitor the integrity of the coated steel belts and provide advanced notice of belt wear.
- H. Governor Rope: The Governor rope shall be steel and shall consist of at least eight strands wound about a sisal core center.
- I. Fascia: Galvanized sheet steel shall be provided at the front of the hoistway.
- J. 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 of UL fire rated steel.
  - 2- Sills Shall Be: Extruded Aluminum Sills
  - 3- Doors: Entrance doors shall be of metal construction with vertical channel reinforcements.
  - 4- Fire Rating: Entrance and doors shall be UL fire rated for 1-1/2 hour
  - 5- Frame and Entrance Finishes:
    - Brushed Stainless Steel Frames and Entrances
  - 6- Entrance Marking Plates: Entrance jambs shall be marked with 4" x 4" (102 mm x 102 mm) plates having raised floor markings with Braille located adjacent to the floor marking. Marking plates shall be provided on both sides of the entrance.
  - 7- Sight Guards: Sight guards will be furnished with all doors painted to match with painted doors, painted black for stainless steel doors.

#### 2.05 Equipment: Car Components

- A. Car Frame and Safety: A car frame 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 car frame and shall be Type "B", flexible guide clamp type.
- B. Cab: Premium, Steel Shell Cab
- C. Wall Panels: Raised rigidized-stainless steel
- D. Brushed Stainless Steel finished base plate located at top and bottom.
- E. Brushed Stainless Steel finished vertical trim pieces
- F. Car Front Finish: Satin Stainless Steel
- G. Car Door Finish: Satin Stainless Steel
- H. Ceiling Type: Flat Ceiling with 4 LED Lights



- I. Ceiling Finish: Brushed Steel Finish
  - J. Fan: A two-speed 120 VAC fan will be mounted to the ceiling to facilitate in-car air circulation, meeting A17.1 code requirements. The fan shall be rubber mounted to prevent the transmission of structural vibration and will include a baffle to diffuse audible noise. A switch shall be provided in the car-operating panel to control the fan. A variable speed fan will be available when Glassback cab option is selected.
  - K. Handrail: 3/8" x 2" (9.5 mm x 51 mm) Flat Tubular Bars with Brushed Steel Finished handrails shall be provided on the side walls.
  - L. Threshold: Extruded Aluminum
  - M. Emergency Exit Contact: An electrical contact shall be provided on the car-top exit.
  - N. Guides: The car shall have 3" diameter roller guides at top and bottom and the counterweight shall have slide type guides at the top and the bottom. Optional counterweight guides available.
  - O. Platform: The car platform shall be constructed of metal. Load weighing device shall be mounted on the belts at the top of the hoistway.
  - P. The LED ceiling lights and the fan should automatically shut off when the system is not in use and be powered back up after a passenger calls the elevator and pushes a hall button.
  - Q. Certificate frame: Provide a Certificate frame with a satin stainless steel finish.
- 2.06 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- A car operating panel shall be furnished. It shall contain a bank of round stainless steel, mechanical LED illuminated buttons. Flush mounted to the panel and marked to correspond to the landings served. All buttons to have raised numerals and Braille markings. The buttons shall be: Lexan 1/8" (3mm) projecting buttons, fully illuminated by a white LED.
    - 2- The car operating panel shall be equipped with the following features:
      - a. Raised markings and Braille to the left hand side of each push-button.
      - b. Car Position Indicator at the top of and integral to the car operating panel.
      - c. Door open and door close buttons.
      - d. Inspection key-switch.
      - e. Elevator Data Plate marked with elevator capacity and car number.
      - f. 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.

- g. 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. Car Position Indicator is at the top of and integral to the car operating panel.
  - h. In car stop switch (toggle or key unless local code prohibits use)
  - i. Firefighter's hat
  - j. Firefighter's Phase II Key-switch
  - k. Call Cancel Button
  - l. Firefighter's Phase II Emergency In-Car Operating Instructions: worded according to A17.1 2000, Article 2.27.7.2. - Optional
  - m. Please Exit Symbol: provided with emergency hospital service, Seismic Zones  $\geq 2$  or express priority in the hall. - Optional
- B. Car Position Indicator: A digital, LED 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. All Hall fixtures shall have a Brushed Stainless Steel Finish.
- 1- Integral Hall fixtures shall feature round stainless steel, mechanical buttons marked to correspond to the landings. Hall fixtures to be located in the entrance frame face or the wall. Buttons shall be in vertically mounted fixture. Fixture shall be satin stainless steel finish.
  - 2- Hall Buttons:  
Flat Flush Mounted satin stainless steel button with blue or white LED illuminating halo
- D. Car Lantern and Chime: A directional lantern visible from the corridor shall be provided in the car 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. Hall Position Indicators at: G
- F. Access key-switch at top floor in entrance jamb.
- G. Access key-switch at lowest floor in entrance jamb.

### 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.

END OF SECTION 142100