

SECTION 14 24 00 – Hydraulic Elevators

PART 1 - GENERAL

1.01 Summary

- A. This section specifies hydraulic 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, elevator motor and pump foundation, and grouting thresholds.
 - 3- Section 04 20 00 – Unit Masonry: masonry hoistway enclosure, building-in and grouting hoistway doorframes, and grouting of sills.
 - 4- Section 05 50 00 – Metal Fabrications: pit ladder, divider beams, supports for entrances and rails, and hoisting beam at top of elevator hoistway.
 - 5- Section 07 16 00 – Cementitious Waterproofing: waterproofing of elevator pit.
 - 6- Section 23 50 00 – Heat Generation Equipment: ventilation and temperature control of elevator equipment areas.
 - 7- Section 26 05 00 – Common Work Results for Electrical:
 - a. Main disconnects for each elevator.
 - b. Electrical power for elevator installation and testing.
 - c. Disconnecting device to elevator equipment prior to activation of sprinkler system.
 - d. The installation of dedicated GFCI receptacles in the pit and overhead.
 - e. Lighting in controller area, machine area and pit.
 - f. Wiring for telephone service to controller.
 - 8- Section 26 30 00 – Emergency (Standby) Power Supply Systems: emergency generator for elevator operation.
 - 9- Section 27 30 00 – Voice Communications: ADAAG-required emergency communications equipment.
 - 10- Section 28 31 00 – Fire Alarm Systems: fire and smoke detectors at required locations and interconnecting devices; fire alarm signal lines to contacts in the machine area.
 - 11- Section 31 10 00 – Site Clearing: excavation for cylinder well casing.

1.03 References

- A. Comply with applicable building and elevator codes at the project site, including but not limited to the following:
 - 1- ASME A17.1/CSA B44, Safety Code for Elevators and Escalators.
 - 2- ASME A17.7/CSA B44, Performance-Based Safety Code for Elevators and Escalators.
 - 3- ADAAG, American Disabilities Act Accessibility Guidelines.
 - 4- ANSI A117.1, Building and Facilities, Providing Accessibility and Usability for Physically Handicapped People.
 - 5- ANSI/NFPA 70, (NEC) National Electrical Code.
 - 6- CAN/CSA C22.1, (CEC) Canadian Electrical Code.
 - 7- ANSI/UL 10B, Standard for Fire Test of Door Assemblies.
 - 8- CAN/ULC-S104-10, Standard Method for Fire Test of Door Assemblies.
 - 9- ANSI/NFPA 80, Standard for Fire Doors and Other Opening Protectives.
 - 10- Building Codes IBC or NBCC.
 - 11- All Local Jurisdictional applicable codes.

1.04 System Description

- A- Equipment Description: Hole-less Hydraulic elevator with machine-room less application
- B- Equipment Control: Elevonic® Control System.
- C- IoT Connectivity: Elevator connected to Otis ONE IoT Platform
- C. Quantity of Elevators: 1
- D. Elevator Stop Designations: 2, 1
- E. Stops: 2
- F. Openings: Front Only
- G. Travel: 13'-2"
- H. Rated Capacity: 2500
- I. Rated Speed: 100 fpm
- J. Platform Size: 6'-6 3/4" W x 5'-6 1/8" D
- K. Clear Inside Dimensions: 6' 6 3/4" x 4' 4 1/8"
- L. Cab Height: 93"
- M. Clear Cab Height: 7'-4 5/16" (2243 mm)
- N. Entrance Type and Width: Single Slide - 3'6"
- O. Entrance Height: 84"
- P. Main Power Supply: 480 volts \pm 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: No machine-room required, tank and controller in hoistway pit.
- S. Signal Fixtures: Manufacturer's standard with metal button targets (excluding CA).
- T. Controller Location: In a machine space or closet
- U. Operation :**Simplex Collective Operation**: 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.

V. Operation Features – Standard

- 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 (USA only); or Special Emergency Service Phase I and II – Emergency Recall and In-Car Emergency Operation (Canada only).
- 7- Top of Car Inspection.

W. Operation Features – Optional

- 1- Zoned Access at Bottom Landing.
- 2- Zoned Access at Upper Landing.
- 3- Express Priority Service with key-switch(es)
- 4- Emergency Hospital Service.
- 5- Automatic Rescue Operation
- 6- Automatic Standby Power Operation with Manual Override.

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: No

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 redeliver to the job site shall not be at the expense of the elevator contractor.

1.08 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.

1.09 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 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.

PART 2 - PRODUCTS

2.01 Manufacturer

- A. Manufacturer: Design based upon Otis HydroFit™ machine room-less elevator system.

2.02 Design and Specifications

- A- Provide hydraulic 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- The entire hydraulic system and the controller shall be located inside the hoistway. No extra machine room or control closet space is required.
 - 2- LED lighting standard in ceiling lights and elevator fixtures.
 - 3- Sleep mode operation for LED ceiling lights and car fan.
- B. Approved Installer: Otis Elevator Company

2.03 Equipment: Machine Components

- A. The hydraulic system shall be of compact design suitable for operation under the required pressure. The power component shall be mounted in the hydraulic-fluid storage tank. The control valve shall control flow for up and down directions hydraulically and shall include an integral check valve. A control section including control solenoids shall direct the main valve and control: up and down starting, acceleration, transition from full speed to leveling speed, up and down stops, pressure relief and manual lowering. All of these functions shall be fully adjustable for maximum smoothness and to meet contract conditions. System to be provided with a low-pressure switch and a shut-off valve.
- B. The entire hydraulic system with hydraulic-fluid storage tank, power component and valves shall be located in the hoistway pit and be easily accessible for maintenance through an access door in the hoistway wall.
- C. A microprocessor-based controller shall be provided, including necessary starting switches together with all relays, switches, solid-state components and hardware required for operation, including door operation, as described herein. A three (3) phase overload device shall be provided to protect the motor against overloading.
- D. The controller shall be located together with the hydraulic system in the hoistway pit and be easily accessible for maintenance through the same access door that is also used for the hydraulic system. The controller will be located in the optional remote machine room if selected.
- E. A manual lowering feature shall permit lowering the elevator at slow speed in the event of power failure or for adjusting purposes.
- F. Pressure Switch
- G. Tank Heater- Optional
- H. Low-oil control (where required)

2.04 Equipment: Hoistway Components

- A. Plunger(s) and Cylinder(s): Each cylinder shall be constructed of steel pipe of sufficient thickness and suitable for the operating pressure. The top of each cylinder shall be equipped with a cylinder head with a drip ring to collect any oil seepage as well as an internal guide ring and self-adjusting packing. Each plunger shall be constructed of selected steel tubing or pipe of proper diameter machined true and smooth with a fine polished finish. Each plunger shall be provided with a stop ring electrically welded to it to prevent the plunger from leaving

the cylinder. Each plunger and cylinder shall be installed plumb and shall operate freely with minimum friction.

- B. Car Guide Rails: Tee-section steel rails with brackets and fasteners.
- C. Polyurethane type buffers shall be used.
- D. Wiring: Wiring for hoistway electrical devices included in scope of the elevator system, hall panels, pit emergency stop switch, and the traveling cable for the elevator car.
- E. 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
 - 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- Entrance Finish: Satin Stainless Steel
 - 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. Cab: Steel Shell Cab with stainless steel wall panels
Brushed Stainless Steel finished vertical trim pieces are optional.
- B. Car Front Finish: Brushed Stainless Steel.
- C. Car Door Finish: Brushed Stainless Steel.
- D. Ceiling Type: Dropped ceiling with LED lights
- E. Car Front Finish: Brushed Stainless Steel.
- F. Car Door Finish: Brushed Stainless Steel.
- G. Ceiling Finish: Brushed Steel Finish
- H. 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 in the event of building power failure.
- I. Fan: A one-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.
- J. Handrails: Brushed steel finish, 3/8" x 2" flat tubular bar handrails shall be provided on the side walls.
- K. Threshold: Aluminum
- L. Emergency Exit Contact: An electrical contact shall be provided on the car-top exit.
- M. 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.

Note: Below are optional.

- N. Certificate frame: Provide a Certificate frame with a Brushed Stainless Steel finish.
- O. Otis cab UVC light purification device
- P. Otis cab air purifier

2.06 Equipment: Signal Devices and Fixtures

- 1- 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. Door open and door close buttons.
 - c. Inspection key-switch.
 - d. Elevator Data Plate marked with elevator capacity and car number.
 - e. 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.
 - f. Display Screen: Include display screen located near the top of the COP. The display screen shall display the car position indicator, travel direction arrows, elevator status jewels, and provide emergency text communication.
 - g. Camera: Include camera located above display screen for emergency video communication. This camera is for emergency communication only.
 - h. 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.

Note: Below are Standard for USA and optional in Canada.

- i. In car stop switch (toggle or key unless local code prohibits use)
- j. Firefighter's hat (standard USA)
- k. Firefighter's Phase II Key-switch (standard USA)
- l. Call Cancel Button (standard USA)

Note: Below are optional.

- m. Firefighter's Phase II Emergency In-Car Operating Instructions: worded according to A17.1 2000, Article 2.27.7.2.
- n. Please Exit Symbol: provided with emergency hospital service, or express priority in the hall.
- 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.
 - 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. Buttons shall be in vertically mounted fixture. Fixture shall be Brushed Stainless Steel finish.
 - 2- Button: Flat flush mounted, Brushed Stainless Steel button with blue or white LED illuminating halo
 - 3- 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.

- D. Access key-switch at top floor in entrance jamb.
- E. Access key-switch at lowest floor in entrance jamb.
- F. Card Reader Provision is Optional

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.

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Updated- 2/22/2023