

**SECTION 14 21 00****ELECTRIC TRACTION ELEVATORS****PART 1 - GENERAL****1.01 SUMMARY**

- A. Section Includes: Electric Traction Elevators.
- B. Products Supplied But Not Installed Under this Section:
  - 1. Hoist Beam
  - 2. Pit Ladder
  - 3. Inserts mounted in block walls for rail attachments
- C. Work Supplied Under Other Sections:
  - 1. Temporary lighting, including temporary lighting in hoistway for machine space with switch located in hoistway on the strike jamb side of top landing door.
  - 2. Main line disconnects for each elevator.
    - a. One fused three phase permanent power in building electrical distribution room
  - 3. Hoistway ventilation shall be in accordance with local and national building code requirements.
  - 4. Guide Rail Support shall be structurally adequate to extend from pit floor to top of hoistway, with spans in accordance with requirements of authority having jurisdiction and final layouts.
  - 5. Removable barricades at all hoistway openings, in compliance with OSHA 29 CFR 1926.502 in addition to any local code requirements.
  - 6. Lifeline attachments capable of withstanding 5000 lb load in accordance with OSHA 29 CFR 1926.502. Provide a minimum of 2 at the top, front of each hoistway.
  - 7. Pit lighting: Fixture with switch and guards. Provide illumination level equal to or greater than that required by ASME A17.1/CSA B44 2000, or applicable version.
  - 8. Control space lighting with switch. Coordinate switch with lighting for machine space as allowable by code.
  - 9. Access Doors: As required for access to governor. Access door shall be self-closing, self-locking if necessary and operable from the inside without a key.
- D. Related sections:
  - 1. Section 01 50 00 - Temporary Facilities and Controls
  - 2. Section 03 30 00 - Cast-in-Place Concrete:
  - 3. Section 05 50 00 - Metal Fabrications
  - 4. Section 07 14 00 - Fluid-Applied Waterproofing
- E. Industry and government standards:
  - 1. ICC/ANSI A117.1 Accessible and Usable Buildings and Facilities
  - 2. ADAAG - Accessibility Guidelines for Buildings and Facilities
  - 3. ANSI/NFPA 70, National Electrical Code
  - 4. ANSI/NFPA 80, Standard for Fire Doors and Fire Windows
  - 5. ASME/ANSI A17.1, Safety Code for Elevators and Escalators.

**1.02 DESCRIPTION OF ELEVATOR NO 1**

- A. Elevator Equipment: MonoSpace 500 gearless traction elevator
- B. Equipment Control: KCM831
- C. Drive: Non-Regenerative
- D. Quantity of Elevators: 1
- E. Landings: 4
- F. Openings: 4 Front Openings, 4 Back Openings
- G. Travel: 44' 0"
- H. Rated Capacity: 5000 lb.
- I. Rated Speed: 150 fpm
- J. Clear Inside Dimensions (W x D): 5' 7" x 8' 9"
- K. Cab Height: 8' 0"
- L. Clear height under suspended ceiling: 7' 6"
- M. Entrance Width and Type: 3' 6" and Front/Back Right Opening
- N. Entrance Height: 7' 0"
- O. Main Power Supply: 480 Volts + 5%, three-phase
- P. Operation: Simplex
- Q. Machine Location: Inside the hoistway mounted on car guide rail
- R. Control Space Location: Integrated Control System (ICS)
- S. Elevator Equipment shall conform to the requirements of seismic zone: non-seismic
- T. Maintenance Service Period: 12

**1.03 DESCRIPTION OF ELEVATOR NO 2**

- A. Elevator Equipment: MonoSpace 500 gearless traction elevator
- B. Equipment Control: KCM831
- C. Drive: Non-Regenerative
- D. Quantity of Elevators: 1
- E. Landings: 4
- F. Openings: 4 Front Openings, 4 Back Openings
- G. Travel: 44' 0"
- H. Rated Capacity: 3500 lb.
- I. Rated Speed: 150 fpm
- J. Clear Inside Dimensions (W x D): 6' 6" x 5' 7"
- K. Cab Height: 8' 0"
- L. Clear height under suspended ceiling: 7' 6"
- M. Entrance Width and Type: 3' 6" and Front/Back Right Opening
- N. Entrance Height: 7' 0"
- O. Main Power Supply: 480 Volts + 5%, three-phase
- P. Operation: Simplex
- Q. Machine Location: Inside the hoistway mounted on car guide rail

- R. Control Space Location: Integrated Control System (ICS)
- S. Elevator Equipment shall conform to the requirements of seismic zone: non-seismic
- T. Maintenance Service Period: 12

#### **1.04 PERFORMANCE REQUIREMENTS**

- A. Car Performance
  - 1. Car Speed  $\pm 5\%$  of contract speed under any loading condition or direction of travel.
  - 2. Car Capacity: Safely lower, stop and hold (per code) up to 125% of rated load.
- B. System Performance
  - 1. Vertical Vibration (maximum): 15 mg ISO187338/ISO 8041 system pk -pk
  - 2. Horizontal Vibration (maximum): 12 mg ISO187338/ISO 8041 system pk -pk
  - 3. Jerk Rate (maximum): 3.3 ft/sec<sup>3</sup>
  - 4. Acceleration (maximum) 1.3 ft/sec<sup>2</sup>
  - 5. In Car Noise: = 55 dB(A)
  - 6. Leveling Accuracy:  $\pm 0.2$  inches
  - 7. Starts per hour (maximum): 240

#### **1.05 SUBMITTALS**

- A. Comply with Section 01 30 00 - Administrative Requirements
- B. Product Data: Submit manufacturer's product literature for each proposed system.
  - 1. Cab design, dimensions and layout.
  - 2. Layout, finishes, and accessories and available options.
  - 3. Controls, signals and operating system.
  - 4. Color selection charts for cab and entrances.
- C. Shop Drawings:
  - 1. Clearances and travel of car.
  - 2. Clear inside hoistway and pit dimensions.
  - 3. Location and layout of equipment and signals.
  - 4. Car, guide rails, buffers and other components in hoistway.
  - 5. Maximum rail bracket spacing.
  - 6. Maximum loads imposed on building structure.
  - 7. Hoist beam requirements.
  - 8. Location and sizes of access doors.
  - 9. Location and details of hoistway door and frames.
  - 10. Electrical characteristics and connection requirements.
- D. Operation and maintenance data:
  - 1. Provide manufacturer's standard maintenance and operation manual.
- E. Diagnostic Tools
  - 1. Prior to seeking final acceptance for the completed project as specified by the Contract Documents, the Elevator Contractor shall deliver to the Owner any specialized tool(s) that may be required to perform diagnostic evaluations, adjustments, and/or parametric software changes and/or test and inspections on any piece of control or monitoring equipment installed. This shall include any specialized tool(s) required for monitoring, inspection and/or maintenance where the means of suspension other than conventional wire ropes are furnished and installed by the Elevator Contractor. Any and all such tool(s) shall become property of the Owner. Any diagnostic tool provided to the Owner by the Elevator Contractor shall be configured to perform all levels of diagnostics, systems adjustment and parametric software changes which are available to the Elevator

Contractor. In those cases where diagnostic tools provided to the Owner require periodic recalibration/or re-initiation, the Elevator Contractor shall perform such tasks at no additional cost to the Owner for a period equal to the term of the maintenance agreement from the date of final acceptance of the completed project. During those intervals in which the Owner might find it necessary to surrender a diagnostic tool for re-calibration, re-initiation, or repair, the Elevator Contractor shall provide a temporary replacement for the tool at no additional cost to the Owner. The Elevator Contractor shall deliver to the Owner, printed instructions for the proper use of any tool that may be necessary to perform diagnostic evaluations, system adjustment, and/or parametric software changes on any unit of microprocessor-based elevator control equipment and means of suspension other than standard elevator steel cables furnished and install by the Elevator Contractor. Accompanying the printed instructions shall be any and all access codes, password, or other proprietary information that is necessary to interface with the microprocessor-control equipment.

#### **1.06 QUALITY ASSURANCE**

- A. Manufacturer: Minimum of fifteen years experience in the fabrication, installation and service of elevators of the type and performance of the specified. The manufacturer shall have a documented quality assurance program.
- B. Installer: The equipment manufacturer shall install the elevator.
- C. Inspection and Testing: In accordance with requirements of local jurisdiction, obtain required permits, inspections and tests.

#### **1.07 DELIVERY, STORAGE AND HANDLING**

- A. If the construction site is not prepared to receive the elevator equipment at the agreed ship date, the General Contractor shall be responsible to provide a safe, dry, and easily accessible storage area on or off the premises. Additional labor costs for double handling will be the responsibility of the general contractor.
- B. Delivered elevator materials shall be stored in a protected environment in accordance with manufacturer recommendations. A minimum storage area of 10 feet by 20 feet is required adjacent to the hoistway.

#### **1.08 WARRANTY**

- A. Provide manufacturer warranty for a period of one year. The warranty period is to begin upon Substantial Completion of the Contract. Warranty covers defects in materials and workmanship. Damage due to ordinary use, vandalism, improper or insufficient maintenance, misuse, or neglect do not constitute defective material or workmanship.

#### **1.09 MAINTENANCE SERVICE**

- A. The elevator manufacturer shall provide maintenance service consisting of regular examinations and adjustments of the elevator equipment for a period of 12 after date of substantial completion. Replacement parts shall be produced by the original equipment manufacturer.
- B. Maintenance service be performed during regular working hours of regular working days and shall include regular time call back service.
- C. Maintenance service shall not include adjustments, repairs or replacement of parts due to negligence, misuse, abuse or accidents.

## **PART 2 - PRODUCTS**

### **2.01 MANUFACTURER**

- A. Provide AC gearless machine room-less elevator systems subject to compliance with the design and performance requirements of this specification. Elevator manufacturers may include but are not limited to one of the following:
  - 1. Basis of Design: MonoSpace 500 traction elevators by KONE, Inc. ([www.kone.com](http://www.kone.com)).
  - 2. Other acceptable machine room-less products: manufacturer with minimum 15 years experience in manufacturing, installing, and servicing elevators of the type required for the project.

### **2.02 EQUIPMENT: CONTROL COMPONENTS AND CONTROL SPACE**

- A. Controller: Provide microcomputer based control system to perform all of the functions.
  - 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 and physically segregated from the rest of the controller.
  - 3. Provide a serial cardrack and main CPU board containing a non-erasable EPROM and operating system firmware.
  - 4. Variable field parameters and adjustments shall be contained in a non-volatile memory module.
- B. Drive: Provide Variable Voltage Variable Frequency AC drive system to develop high starting torque with low starting current.
- C. Controller Location: Locate controllers in the front wall integrated with the top landing entrance frame, machine side of the elevator. One non-fused three phase permanent power in hoist way at top landing. A separate control space should not be required.

### **2.03 EQUIPMENT: HOISTWAY COMPONENTS**

- A. Machine: AC gearless machine, with permanent magnet synchronous motor, direct current electro-mechanical disc brakes and integral traction drive sheave, mounted to the car guide rail at the top of the hoistway.
- B. Governor: Friction type over-speed governor rated for the duty of the elevator specified.
- C. Buffers, Car and Counterweight: Polyurethane buffer.
- D. Hoistway Operating Devices:
  - 1. Emergency stop switch in the pit
  - 2. Terminal stopping switches.
  - 3. Emergency stop switch on the machine
- E. Positioning System: System consisting of magnets and proximity switches.
- F. Guide Rails and Attachments: Steel rails with brackets and fasteners.

### **2.04 EQUIPMENT: HOISTWAY ENTRANCES**

- A. Hoistway Entrances
  - 1. Sills: Aluminum extruded.
  - 2. Doors: 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: Brushed Stainless Steel.
  - 5. Entrance Markings Jamb Plates: Provide standard entrance jamb tactile markings on both jambs, at all floors. Plate Mounting: Refer to manufacturer drawings.

**2.05 EQUIPMENT: CAR COMPONENTS**

- A. Car Frame: Provide car frame with adequate bracing to support the platform and car enclosure.
- B. Platform: Platform shall be all steel construction.
- C. Car Guides: Provide guide-shoes mounted to top and bottom of both car and counterweight frame. Each guide-shoe assembly shall be arranged to maintain constant contact on the rail surfaces. Provide retainers in areas with Seismic design requirements.
- D. Car Wall Finish: See Drawings.
  - 1. Side Walls: Non-removable vertical panels Pearl Silver laminate.
- E. Car Skirting Finish: See Drawings.
- F. Car Front Finish: See Drawings
- G. Car Door Finish: See Drawings
- H. Ceiling: Rectangular LED light panel, See Drawings
- I. Handrail: See Drawings
  - 1. Rails to be located on Side Walls of car enclosure.
- J. Threshold: Aluminum
- K. Flooring: By others. (Not to exceed 6lb/sqft and 1/2" finished depth.)
- L. Emergency Car Signals
  - 1. Emergency Siren: Siren mounted on top of cab that is activated when the alarm button in the car operating panel is engaged. Siren shall have rated sound pressure level of 80 dB(A) at a distance of three feet from device. Siren shall respond with a delay of not more than one second after activation of alarm button.
  - 2. Emergency Car Lighting: Provide emergency power unit employing a 12-volt sealed rechargeable battery and totally static circuits shall illuminate the elevator car and provide current to the alarm bell in the event of building power failure.
  - 3. Emergency Exit Contact: An electrical contact shall be provided on the car-top exit.
- M. Ventilation: Fan

**2.06 EQUIPMENT: SIGNAL DEVICES AND FIXTURES**

- A. Car Operating Panel: Provide car operating panel with all push buttons, key switches, and message indicators for elevator operation. Fixture finish to be: Brushed Stainless Steel
  - 1. Main Flush mounted car operating panel shall contain a bank of round, mechanical, illuminated buttons marked to correspond to landings served, emergency call button, door open button, door close button, and key switches for lights, inspection, and exhaust fan. Buttons have Amber illumination (halo). All buttons to have raised text and Braille marking on left hand side. The car operating display panel shall be Amber DOT-matrix. All texts, when illuminated, shall be Amber. The car operating panel shall have a Brushed Stainless Steel finish.
  - 2. Additional features of car operating panel shall include:
    - a. Car Position Indicator within operating panel (Amber).
    - b. Elevator Data Plate marked with elevator capacity and car number on car top.
    - c. Help buttons with raised markings.
    - d. In car stop switch per local code.
    - e. Call Cancel Button.
- B. Hall Fixtures: Wall mounted hall fixtures shall be provided with necessary push buttons and key switches for elevator operation. Wall mounted hall fixtures shall have a Brushed Stainless Steel.

1. Hall fixtures shall feature round, mechanical, buttons in applied mount face frame. Hall fixtures shall correspond to options available from that landing. Buttons shall be in a vertically mounted fixture. Hall fixtures shall not be jambmounted. Hall lanterns shall feature Amber illumination.
- C. 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. The chime will sound once for up and twice for down. The car riding lantern face plate shall have a Brushed Stainless Steel finish

## **2.07 EQUIPMENT: ELEVATOR OPERATION AND CONTROLLER**

- A. Elevator Operation
1. 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.
  2. Zoned Car Parking.
  3. Relative System Response Dispatching.
- B. Standard Operating Features to include:
1. Full Collective Operation
  2. Fan and Light Control.
  3. Load Weighing Bypass.
  4. Ascending Car Uncontrolled Movement Protection
  5. Top of Car Inspection Station.
- C. Additional Operating Features to include:
1. Provision for Card Reader in Car (Card Reader provided and Installed by others).
- D. Elevator Control System for Inspections and Emergency
1. Provide devices within controller to run the elevator in inspection operation.
  2. Provide devices on car top to run the elevator in inspection operation.
  3. Provide within controller an emergency stop switch to disconnect power from the brake and prevents motor from running.
  4. Provide the means from the controller to mechanically lift and control the elevator brake to safely bring car to nearest available landing when power is interrupted.
  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. Provide the means for the control to reset elevator earthquake operation.

## **2.08 EQUIPMENT: DOOR OPERATOR AND CONTROL**

- A. Door Operator: A closed loop permanent magnet VVVF high-performance door operator shall be provided to open and close the car and hoistway doors simultaneously. Door movement shall be cushioned at both limits of travel. Electro-mechanical interlock shall be provided at each hoistway entrance to prevent operation of the elevator unless all doors are closed and locked. An electric contact shall be provided on the car at each car entrance to prevent the operation of the elevator unless the car door is closed.
- B. The door operator shall be arranged so that, in case of interruption or failure of electric power, the doors can be readily opened by hand from within the car, in accordance with applicable code. Emergency devices and keys for opening doors from the landing shall be provided as required by local code.

- C. Doors shall open automatically when the car has arrived at or is leveling at the respective landings. Doors shall close after a predetermined time interval or immediately upon pressing of a car button. A door open button shall be provided in the car. Momentary pressing of this button shall reopen the doors and reset the time interval.
- D. Door hangers and tracks shall be provided for each car and hoistway door. Tracks shall be contoured to match the hanger sheaves. The hangers shall be designed for power operation with provisions for vertical and lateral adjustment. Hanger sheaves shall have polyurethane tires and pre-lubricated sealed-for-life bearings.
- E. Electronic Door Safety Device. The elevator car shall be equipped with an electronic protective device extending the full height of the car. When activated, this sensor shall prevent the doors from closing or cause them to stop and reopen if they are in the process of closing. The doors shall remain open as long as the flow of traffic continues and shall close shortly after the last person passes through the door opening.

### **PART 3 - EXECUTION**

#### **3.01 EXAMINATION**

- A. Field measure and examine substrates, supports, and other conditions under which elevator work is to be performed.
- B. Do not proceed with work until unsatisfactory conditions are corrected.
- C. Prior to start of Work, verify hoistway is in accordance with shop drawings. Dimensional tolerance of hoistway from shop drawings: -0 inches +2 inches. Do not begin work of this section until dimensions are within tolerances.
- D. Prior to start of Work, verify projections greater than 2 inches (4 inches if ASME A17.1/CSA B44 2000 applies) must be beveled not less than 75 degrees from horizontal.
- E. Prior to start of Work, verify landings have been prepared for entrance sill installation. Traditional sill angle or concrete sill support shall not be required.
- F. Prior to start of Work, verify elevator pit has been constructed in accordance with requirements, is dry and reinforced to sustain vertical forces, as indicated in approved submittal. Verify that sumps or sump pumps located within pit will not interfere with installed elevator equipment.
- G. Prior to start of Work, verify control space has been constructed in accordance with requirements, with access coordinated with elevator shop drawings, including Sleeves and penetrations.
- H. Verify installation of GFCI protected 20-amp in pit and adjacent to each signal control cabinet in control space.

#### **3.02 PREPARATION**

- A. Coordinate installation of anchors, bearing plates, brackets and other related accessories.

#### **3.03 INSTALLATION**

- A. Install equipment, guides, controls, car and accessories in accordance with manufacturer installation methods and recommended practices.
- B. Properly locate guide rails and related supports at locations in accordance with manufacturer's recommendations and approved shop drawings. Anchor to building structure using isolation system to minimize transmission of vibration to structure.
- C. All hoistway frames shall be securely fastened to fixing angles mounted in the hoistway. Coordinate installation of sills and frames with other trades.

- D. Lubricate operating system components in accordance with manufacturer recommendations.
- E. Perform final adjustments, and necessary service prior to substantial completion.

### **3.04 CONSTRUCTION**

#### **A. Interface with Other Work:**

- 1. Guide rail brackets attached to steel shall be installed prior to application of fireproofing.
- 2. Coordinate construction of entrance walls with installation of door frames and sills. Maintain front wall opening until elevator equipment has been installed.
  - a. Ensure adequate support for entrance attachment points at all landings.
  - b. Coordinate wall openings for hall push buttons, signal fixtures and sleeves. Each elevator requires sleeves within the hoistway wall.
  - c. Coordinate emergency power transfer switch and power change pending signals as required for termination at the primary elevator signal control cabinet in each group.
  - d. Coordinate interface of elevators and fire alarm system.
  - e. Coordinate interface of dedicated telephone line.
  - f. Coordinate the installation of the non fused three phase permanent power disconnect in hoist way at top landing

### **3.05 TESTING AND INSPECTIONS**

- A. Perform recommended and required testing in accordance with authority having jurisdiction.
- B. Obtain required permits and provide originals to Owner's Representative.

### **3.06 DEMONSTRATION**

- A. Prior to substantial completion, instruct Owner's Representative on the proper function and required daily maintenance of elevators. Instruct personnel on emergency procedures.

**END OF SECTION**

