

**SECTION 14240 - HYDRAULIC ELEVATORS****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

**1.2 SUMMARY**

- A. This Section includes the following elevator work:
1. Elevator demolition work:
    - a. Removal of existing hydraulic elevator machine, motor, controller, plunger and cylinder, roller guide assemblies, buffers and pit equipment, car platform, sling and box, car doors, and hall control stations.
    - b. Removal of sections of concrete elevator pit floor as required to remove existing plunger and cylinder.
  2. Elevator work to remain:
    - a. Guide rails.
    - b. Hoistway doors and frames.
  3. New elevator work:
    - a. Plunger, cylinder and PVC cylinder casing with welded bottom on steel casing.
    - b. Hydraulic elevator machine and motor.
    - c. Roller guide assemblies.
    - d. Motor power control.
    - e. Buffers.
    - f. Car including platform and frame, car doors, car control station, car finishes and handrail.
    - g. Emergency telephone.
    - h. Hall control stations.
    - i. Position indicators at all floors.
    - j. Replace and/or extend wiring from existing fused disconnect switch located in the Elevator Equipment Room through the controller to the motor.
    - k. Replace and/or extend the 120 volt cab lighting and cab power wiring from existing power source to the new elevator.
    - l. Replace existing telephone wiring.
    - m. Replacement of sections of concrete elevator pit floor.
- B. Related Sections include the following:
1. Section 01010 "Summary of Work."
  2. Section 03300 "Cast-In-Place Concrete" for concrete for pit floor.

- C. Alternates:
  - 1. Provide alternate price in the Proposal Form for elevator manufacturer's standard car construction as specified in this Section.
  - 2. Provide alternate price in the Proposal Form for a holeless hydraulic elevator in lieu of the holed hydraulic unit specified.

### **1.3 DEFINITIONS**

- A. Defective Elevator Work: Operation or control system failures; performances below specified ratings; excessive wear; unusual deterioration or aging of materials or finishes; unsafe conditions; the need for excessive maintenance; abnormal noise or vibration; and similar unusual, unexpected, and unsatisfactory conditions.

### **1.4 REFERENCES**

- A. ASME A17.1 – Safety Code for Elevators and Escalators. Most current edition as adopted and amended by the State of Michigan in “Elevator Laws and Rules” by the State of Michigan, Department of Labor and Economic Growth, Bureau of Construction Codes and Fire Safety, as well as rules and regulations promulgated by the State Elevator Safety Board.
- B. Americans with Disabilities Act (ADA).
- C. Underwriters Laboratory (U.L).

### **1.5 SYSTEM DESCRIPTION**

- A. All elevator equipment shall be manufacturer's best equipment designed for a minimum service life of 30 years.
- B. Speed, Size and Capacity Limitations:
  - 1. Minimum Speed: Speed shall match existing.
  - 2. Size and Capacity: Use standard size platforms which reflect industry standard size for cars, depending on elevator type, use and speed. Refer to N.E.I.I. layout book, latest edition.
    - a. Field verify size of existing hoistways and elevator and hoistway door openings.
  - 3. Limitations: All replacement equipment shall use existing power capacity unless noted on the Contract documents or as required by code.
- C. Segregation of Elevator Equipment and Services: Provide clearance around elevator equipment in elevator machine room per the National Electrical Code.

## 1.6 SUBMITTALS

- A. Product Data: Include capacities, sizes, performances, operations, safety features, finishes, and similar information.
- B. Shop Drawings: Show plans, elevations, sections, and large-scale details indicating service at each landing, machine room layout, coordination with building structure, relationships with other construction, and locations of equipment and signals. Indicate variations from specified requirements, maximum dynamic and static loads imposed on building structure at points of support, and maximum and average power demands.
- C. Samples: For exposed finishes of cars, car doors, and signal equipment; 3-inch- square samples of sheet materials; and 4-inch lengths of running trim members.
- D. Manufacturer Certificates: Signed by elevator manufacturer certifying that hoistway, pit, and machine room layout and dimensions, as shown on Drawings, and electrical service, as shown and specified, are adequate for elevator system being provided.
- E. Maintenance Materials: Provide information sufficiently complete such that a skilled elevator mechanic can maintain and adjust the machines and their control systems. Include diagnostic and repair information available to Installer's and Owner's maintenance personnel. Submit for Owner's information at Project closeout, the following:
  - 1. Three (3) sets each of as-built wiring diagrams, definitions of symbols, etc., for each single elevator.
  - 2. Two (2) copies of recommended maintenance parts lists to be stocked for maintenance.
  - 3. Three (3) sets of standard metal samples.
  - 4. Copy of inspection report required by the State of Michigan – Field Testing Data Report.
- F. State Certificate of Inspection is required upon completion of the work. All the above documents and accessories shall be supplied at the time of the State Final Inspection. Any changes made in the field shall be reflected on a new set of as-built documents turned over to the Owner within 30 days after Final Inspection.

## 1.7 QUALITY ASSURANCE

- A. Installer Qualifications: Elevator manufacturer or an experienced installer approved by elevator manufacturer who has completed elevator installations similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.
- B. Regulatory Requirements: In addition to local governing regulations, comply with applicable provisions in ASME A17.1, "Safety Code for Elevators and Escalators."

- C. Accessibility Requirements: In addition to local governing regulations, comply with Section 4.10 in the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines (ADAAG)." And State of Michigan Barrier Free Rules

## **1.8 COORDINATION**

- A. Field verify size of existing elevator shafts, pits, machine rooms, and existing hoistway entrances to remain.
- B. Coordinate locations and dimensions of other work relating to hydraulic freight elevator including pit ladders and sumps in pits; entrance subsills; and electrical service, electrical outlets, lights, and switches in pits and machine rooms.

## **1.9 WARRANTY**

- A. Special Manufacturer's Warranty: Written warranty, signed by manufacturer agreeing to repair, restore, or replace defective elevator work within specified warranty period.
  - 1. Warranty Period: 365 days from date of Substantial Completion.

## **1.10 MAINTENANCE SERVICE**

- A. Maintenance Service: Beginning at Substantial Completion, provide 90 days full maintenance service by skilled employees of the elevator Installer. During this period the Contractor shall inspect the total installation at least twice a month in the company of a EMU Physical Plant Elevator Shop employee. Include repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper elevator operation at rated speed and capacity. Provide parts and supplies as used in the manufacture and installation of original equipment.
  - 1. Perform maintenance during normal working hours.
  - 2. Include 24-hour-per-day, 7-day-per-week emergency callback service for equipment failures. If failure is caused by misuse or other conditions not under the control of the contractor or manufacturer, the Contractor will be paid for their services at normal billing rates.
    - a. Response Time: Two hours or less.
- B. Any elevator controller requiring repair or replacement within the initial 365 day warranty period due to reoccurring problems from faulty original design or installation shall have the warranty extended 365 days from time of correction.

## **PART 2 - PRODUCTS**

### **2.1 FABRICATORS/INSTALLERS**

- A. Fabricators/Installers: Subject to compliance with requirements, provide hydraulic elevator installed by one of the following:

1. Detroit Elevator Company.
2. Schindler Elevator Corp.
3. Thyssen Krupp Elevator Company.

## 2.2 MATERIALS AND COMPONENTS - GENERAL

- A. Plunger and Cylinder: Construct according to ANSI A 17.1 of sufficient size to lift the gross load to the height specified and as follows:
1. Plunger shall be of heavy seamless steel tubing accurately turned and polished to an extremely smooth finish, a stop plate welded to plunger bottom to positively prevent plunger from leaving its cylinder, an adjustable packing gland, packing of suitable design and quality, a drip ring around the cylinder top, and an outer cylinder made of steel tubing and provided with a pipe connection to proper size.
  2. The exposed surface of the outer cylinder shall be treated with a rust inhibitor and corrosion resistant compound and double wrapped with Tape-Coat or Scotch Wrap.
  3. Means shall be provided to bleed air from the jack unit. The plunger head shall be isolated from the platen to prevent electrolytic corrosion.
- B. Protective Cylinder Casings: PVC pipe casings complying with ASME A17.1, of sufficient size to provide not less than 1-inch clearance from cylinder, and flush with pit floor.
- C. Hydraulic Tank Pump Unit: Unit shall be compactly and neatly designed. Provide with submersible squirrel-cage induction motor, suspended inside tank from vibration isolation mounts, unless where, due to size of motor and pump, an overhead tank with pump, motor, valve and muffler below may be used.
1. Motor Starter: Shall be solid state, reduced voltage upon starting motor.
  2. Power Supply: Shall be 208 volts, 3-wire, 3-phase, 60 hertz. Provide phase monitor for all electrical equipment.
  3. Vibration Control: Provide suitable rubber isolation pads to isolate the machine and prevent transfer to vibration.
  4. Heating Unit: Provide heating unit in tank to insure a constant temperature of at least 100 degrees F.
  5. Muffler: Provide a blowout-proof muffler between pump unit and jack to minimize noise and vibration.
  6. Pump: Designed for submersible installation and for use in oil hydraulic elevator service, of positive displacement type, designed for steady discharge to give smooth and quiet operation.
    - a. Output of pump shall not vary more than 10 percent between no-load and full load.
  7. Motor: Shall be polyphase induction type, designed and built expressly for oil-hydraulic elevator service, and for reduced voltage starting.
    - a. Motor shall be sized for 80 starts per hour or continuous duty, based on power capacity of existing building.

- D. Hydraulic Valves: Provide a one-piece hydraulic valve with all necessary features to meet ANSI A 17.1 and State codes.
1. Manufacturer: Provide hydraulic valves by one of the following:
    - a. Maxton Manufacturing Co.; (775) 782-1700.
    - b. Owner approved equal
- E. Piping and Oil: Provide all necessary piping and fittings, including shut-off valves to connect the power plant to the plunger. All materials for which there is a listing by Underwriter's Laboratories, Inc., shall conform to the applicable requirements of Underwriter's Laboratories, Inc.
1. Piping: Schedule 80, with threaded or zero flex "Victaulic" type. Flexible pressure hoses are not acceptable.
  2. Provide an oil line shut-off valve in both the machine room and in pit adjacent to the jack unit.
  3. Oil: Biodegradable type oil, use for both testing and regular service operations.
- F. Buffers: Provide size and type buffers for car in accordance with ASME A-17.1 requirements.
- G. Guide Rails: Reuse existing guide rails for elevator car. Examine for defects, anchorage and alignment and rework or replace as necessary.
- H. Roller Guides: Provide roller guides at top and bottom of car. Roller guides shall be 6 inch minimum diameter for cars. Provide rollers for speeds in excess of 50 ft./min.
1. Manufacturer: Provide roller guides by one of the following:
    - a. ELSCO , Elevator Safety Company, (410) 363-9020.
    - b. Owner approved equal
- I. Control System: Provide control system for elevator including all necessary starting switches of adequate size, together with all relays, switches and hardware required as required to provide single automatic operation of type indicated and as defined in ASME A-17.1 as "Operation".
1. Single Elevator Control: Selective Automatic Operation, as defined in ASME A17.1.
  2. Control System: Shall be non-proprietary type so that full service may be performed by EMU maintenance staff and shall include all diagnostic equipment in order to identify malfunctioning processor units or manufacturer's standard microprocessor operation system as required to provide type of operation system indicated.
    - a. Manufacturer: Provide control system by one of the following:
      - 1) Motion Control Engineering, (800) 444-7442.
      - 2) EC Controls
      - 3) Virginia Controls
      - 4) Owner approved equal

3. Provide all controllers with Central Monitoring System (CMS) capabilities, including all software, firmware, and communication parts and the ability to print out data, along with black box unit cable and hook-up of monitor to Ethernet connection.
  4. Provide a ground for the control system in accordance with the National Electrical Code and as recommended by the manufacturer.
- J. Auxiliary Operations and Controls:
1. Inspection Station: Provide a permanent top of car inspection station. Provide with a 20A, 125V duplex G.F.I. receptacle and two incandescent lights with guards, with a standard light switch on top of each car; and also underneath each car. The inspection station shall have a control fixture with continuous pressure button for up and down. The fixture shall have emergency stop button, a toggle switch to make the control operative and a fire jewel..
  2. Independent Service: Provide a keyed switch at car control panel that will remove car from normal service and place it under manual control of an operator. The switch shall have a 7-pin Corbin-Russwin cylinder keyed to Owner's keying system.
- K. Landing System: Car positioning system using steel hoistway tape, magnetic targets and cartop mounted sensors.
1. Manufacturer: Provide landing system by one of the following:
    - a. Model LS-QUTE; Motion Control Engineering, (800) 444-7442.
    - b. Owner approved equal
- L. Car Frame and Platform: Welded steel units.
1. Manufacturer: Provide car frame and platform by one of the following:
    - a. Hollister-Whitney Elevator Corporation, (217) 222-0466.
    - b. Owner approved equal
- M. Door Hardware: For each sliding door, furnish and install manufacturer's standard suspension hangers and tracks complete.
1. Bottom of doors shall be guided by non-metallic shoes in smooth grooves in the thresholds of the car and landings.
  2. Manufacturer: Provide door hardware by one of the following:
    - a. G. A. L. Manufacturing Corporation, (877) 425-3538.
    - b. NY Cube
    - c. Owner approved equal
- N. Finish Materials: Provide the following materials and finishes for exposed parts of elevator car enclosures, car doors, hoistway entrance doors and frames, and signal equipment as indicated:
1. Satin Stainless Steel: ASTM A 666, Type 304, with No. 4, directional satin finish.

2. Textured Stainless Steel (Base Bid): ASTM A 666, Type 304; with embossed texture rolled into exposed surface, 16 gage, "5WL" pattern.
  - a. Surface is satin polished after rolling.
  - b. Product: Subject to compliance with requirements, provide "Pattern 5-WL" by Rigidized Metals Corp., 800-836-2580.
3. Nickel Silver Sill Extrusions: ASTM B 151, alloy UNS No. C74500.
4. Plastic Laminate (Alternate): High-pressure type complying with NEMA LD 3, Type HGS for flat applications; color, texture, and pattern as selected by Architect from elevator manufacturer's full range of products.

### 2.3 OPERATION SYSTEMS

- A. Passenger Elevators: Provide manufacturer's standard microprocessor operation system for elevator as required to provide type of operation system indicated.
  1. Single Car Control: Provide "selective collective operation" as defined in ASME A17.1.
- B. Auxiliary Operations: In addition to primary operation system features, provide the following operational features for elevators where indicated:
  1. Independent Service: Keyswitch in car control station removes car from operation and allows it to respond only to car calls. When in independent service, doors close only in response to the door close button.
  2. Nuisance Call Cancel: When car calls exceed a preset number while the car load is less than a predetermined weight, all car calls are canceled. Preset number of calls and predetermined weight can be adjusted
  3. Inspection Service: Keyswitch in car control station with Corbin Russwin cylinder for in-car inspection operation in accordance with ASME A17.1.
- C. Fire Fighters Service: Provide fire fighters service Phase I and Phase II.
  1. Key switches in the hall and car shall operate using the "Adams" WDO-1 key.
  2. The alternate landing shall be designated by the Owner.

### 2.4 SIGNAL EQUIPMENT

- A. Manufacturers: Provide car control station, car position indicators, hall push button stations, hall position indicators, and hall lanterns, hall call station pictograph signs manufactured by the following:
  1. Manufacturer: Provide signal equipment by one of the following:
    - a. PTL Equipment Manufacturing Company Inc., Toccoa, Georgia, (800) 736-2120.
    - b. Owner approved equal
- B. General: Provide vandal resistant signal equipment for elevator with satin stainless steel car-call buttons that light when activated and remain lit until call has been fulfilled. All buttons to be lighted with Light Emitting Diodes (LED's) which

illuminate a translucent jewel in center of button. Button shall project just beyond cover plate.

- C. Car Control Stations: Mount car control stations in return panel adjacent to car door. Provide fully recessed car control stations with applied metal faceplates or provide car control stations fully recessed in hinged return panel adjacent to car door.
1. Include call buttons for each landing served and other buttons, switches, and controls required for specified car operation.
  2. Mark buttons and switches with tamper-proof tactile words, numbers and Braille denotations for required use or function that complies with ASME A17.1.
  3. Mount controls at heights so that the top public button shall be 48 inches maximum and the bottom public button shall be 33-1/2 inches above the car floor.
  4. Panel covers shall be hinged to provide proper access with covers held in place with stainless steel tamper-proof screws.
  5. Main Car Operating Panel shall contain the following:
    - a. One button for each floor served.
    - b. Door close button.
    - c. Door open button.
    - d. Emergency stop, with Corbin Russwin cylinder.
    - e. Alarm button.
    - f. Phase 2, in-car switch for fire service.
    - g. Car call cancel button.
    - h. Door hold open switch.
  6. Main Car Operating Panel shall contain maintenance personnel operated keyed switches. The top switch shall be at 60 inches maximum above the car floor. These switches shall be independently key-operated with a 7-pin "Corbin-Russwin" cylinder with interchangeable core keyed to Owner's keying system. Provide the following maintenance personnel operated keyed switches:
    - a. Independent operation
    - b. Lights on/off switch.
    - c. Fan on/off switch.
    - d. Inspection on/off switch.
  7. Fire Jewel: All main car operating panels shall have a standard lighted red jewel to indicate when the Firefighter's Feature/Emergency Return has been activated. Jewels shall also be located in the Hall Emergency Service switch and at the top of car inspection station.
- D. Car Position Indicator: Provide segmented, digital-display type inside car located above car door or above car control station. Lens for car position indicator shall be scratch resistant plastic.
1. Mechanical indicators are not acceptable.
  2. Audible Signals: Provide audible signal to indicate to passengers that car is either stopping at or passing each of the floors served.

- E. Emergency Telephone: Provide vandal resistant system that provides two-way voice communication without using a handset. System is contained in surface-mounted cabinet, with identification, and operating instructions in English and Braille. The telephone shall have a FCC registration number, be compatible with the University telephone network and be dual-tone multi-frequency signal type. The emergency telephone shall be programmable in the field, be initially programmed to call the campus operator, and be assigned a number for incoming calls. Mount emergency telephone on front wall below car control station.
1. Manufacturer: Provide emergency telephone by one of the following:
    - a. Model 11-901; Wurtec Elevator Products & Services, Inc. 6200 Brent Drive, Toledo, Ohio 43611; 800-837-1066.
    - b. Owner approved equal
- F. Emergency Alarm Bell: Provide an emergency alarm bell in accordance with ASME A-17.1. Locate bell on top of each car.
- G. Hall Push-Button Stations: Provide hall push-button stations at each landing for elevator.
1. Provide surface mounted units sized to cover recessed box of existing hall call buttons and to allow for mounting of new hall push buttons centered at 42 inches above finish floor.
  2. Provide units with flat backing plates if required to cover conditions where existing hall push buttons were removed so as not to require patching of existing walls.
  3. Provide vertical stations units with direction-indicating buttons; two buttons at intermediate landings; one button at terminal landings.
    - a. Provide vandal resistant hall push-button stations with satin stainless steel car-call buttons that light when activated and remain lit until call has been fulfilled. All buttons to be lighted with Light Emitting Diodes (LED's) which illuminate a translucent jewel in center of button. Button shall project just beyond cover plate.
  4. Provide tamper proof tactile and Braille denotations adjacent to each button.
- H. Hall Position Indicators and Hall Lanterns: Provide segmented light emitting diode (LED) digital-display type, located above each hoistway entrance. Provide surface mounted units in stainless steel housing. Lens for car position indicator shall be scratch resistant plastic.
1. Integrate hall lanterns with hall position indicators. Provide units with illuminated arrows, but provide single arrow at terminal landings.
  2. With each lantern, provide audible signals indicating car arrival and direction of travel. Signals sound once for up and twice for down.
    - a. At manufacturer's option, audible signals may be placed on car.

- I. Corridor Call Station Pictograph Signs: Provide signs on each hall push-button stations with text and graphics according to ASME A17.1, Appendix H, and instructing persons to “Use Stairs in Case of Fire”.
- J. Signage: The following signs at each landing:
  - 1. Provide 2 inch high raised numeral signs at each landing to indicate floor of landing. Provide 1 inch high Braille denotations next to each raised numeral sign.
    - a. Signs shall be metal tamper proof tactile and Braille denotations.
    - b. Mount signs visible from inside of car on entrance frame, 60 inches above floor on both sides of door opening.

## **2.5 CAR DOOR CONTROLS**

- A. Door Operator: Provide manufacturer’s standard door operator, designed to operate the car and hoistway doors simultaneously, at a maximum speed of two feet per second. Door movement shall be electrically cushioned at both limits of travel, and the door operating mechanism shall be arranged for manual operation in the event of power failure.
- B. Infrared Array: Provide door reopening devices with a uniform array of microprocessor-controlled, infrared light beams projecting across car entrance. Interruption of one or more of the light beams shall cause doors to stop and reopen.
  - 1. Manufacturer: Provide infrared array by one of the following:
    - a. Adams Gatekeeper 2000.
    - b. Owner approved equal
- C. Nudging Feature: After car doors are prevented from closing for a predetermined adjustable time, through activating door reopening device, a loud buzzer shall sound and doors shall begin to close at reduced kinetic energy.
- D. Emergency Hoistway Access: Provide mechanical means for emergency release of all landing hoistway doors.
- E. Smoke Detectors: Provide 24 VDC, 4-wire smoke detector. Auxiliary contacts shall be used to send a signal to annunciator panel showing each detector in the system.
  - 1. Manufacturer:
    - a. 81/82 Series; Gentex.

## **2.6 PASSENGER ELEVATOR CAR ENCLOSURES**

- A. General: Provide flush panel car enclosure of welded construction made from stainless-steel sheet, ceiling, accessories, access doors, doors, power door operators, lighting, and ventilation.
  - 1. Car Shell: Construct car shell of 16 gage leveled cold rolled steel.

2. Car Interior Wall Panels: Textured stainless-steel sheet with No. 4 finish, with a nominal thickness of 0.0677 inch (14 gage) reinforced at 16-inch maximum spacing,
3. Fabricate car with recesses and cutouts for signal equipment.
4. Fabricate car door frame integrally with front wall of car.
5. Textured Stainless-Steel Doors: Flush, reinforced hollow metal doors, fabricated from textured stainless-steel face sheets.
6. Ceiling: 1/8 inch thick white translucent polycarbonate lay-in panels in baked enamel finished metal frame. Metal frame shall be of welded or bolted construction. Eggcrate ceilings are not acceptable.
7. Flooring: Rubber tile flooring, ASTM F 1344 with embossed surface.
  - a. Products: Provide the following:
    - 1) Flecksibles No. 10 Shale Gray; Endura Rubber Flooring; Div. of The Biltrite Corp.
8. Car Sills: Extruded nickel silver, with grooved surface, 1/4 inch thick with polished finish.
9. Handrails: Manufacturer's standard stainless steel handrail with No. 4 satin finish. Provide handrails on back and side walls.
10. Access Panels: Provide top of cab access panel, secure in manner acceptable to the State Elevator Inspector.
11. Certificate: Etch on car operating panel certificate information issued by the State Elevator Inspector (showing the state serial number, capacity, number of passangers). The actual operating certificate will be on file at EMU Physical Plant.
12. Car Ventilation: Furnish exhaust fan to circulate air through car enclosure into hoisway, minimum 100 cfm.
13. Car Electrical: Provide a 110V duplex G.F.I. receptacle on the wall of the car, below the control panel 18 inches above car floor. Receptacle shall be Hubbell No. 5362 with stainless steel plate.
14. Lighting: 120V T-8 fluorescent light fixtures.

## **2.7 HOISTWAY ENTRANCES**

- A. General: Reuse existing horizontal-sliding, door- hoistway entrances. Install new door track systems, hardware, hangers, rollers, closers and interlocks. Reuse existing hoistway frames and sills.
- B. Materials and Fabrication: Provide manufacturer's standards but not less than the following:

**PART 3 - EXECUTION****3.1 EXAMINATION**

- A. Examine elevator areas for compliance with requirements for installation tolerances and other conditions affecting performance. Examine hoistways, hoistway openings, pits, and machine rooms as constructed; verify critical dimensions; and examine supporting structure and other conditions under which elevator work is to be installed. Proceed with installation only after unsatisfactory conditions have been corrected.

**3.2 DEMOLITION OF ELEVATOR EQUIPMENT**

- A. Disassemble and remove existing elevator equipment as indicated. Take care not to damage adjacent finishes.
- B. Disposal: Transport demolished elevator materials off Owner's property and legally dispose of them.

**3.3 INSTALLATION**

- A. Comply with manufacturer's written instructions.
- B. Excavation for Jack: Drill excavation in elevator pit to accommodate installation of cylinders if cylinder is if different size than existing.
  - 1. Transport earth materials off Owner's property and legally dispose of them.
- C. Install min. 3/8" wall casing with welded watertight bottom
- D. Install cylinder in protective PVC casing within well hole. Before installing protective PVC casing, remove water and debris from well hole.
- E. Install cylinders plumb and accurately centered for elevator car position and travel. Anchor securely in place, supported at pit floor. Seal between protective PVC casing, cylinder and pit floor with 4 inches of nonshrink, nonmetallic grout.
- F. Welded Construction: Provide welded connections for installing elevator work where bolted connections are not required for subsequent removal or for normal operation, adjustment, inspection, maintenance, and replacement of worn parts. Comply with AWS standards for workmanship and for qualifications of welding operators.
- G. Sound Isolation: Mount rotating and vibrating equipment on vibration-isolating mounts designed to effectively prevent transmission of vibrations to structure and thereby eliminate sources of structure-borne noise from elevator system.
- H. Install piping above the floor.

- I. Lubricate operating parts of systems as recommended by manufacturers.
- J. Set sills flush with finished floor surface at landing. Fill space under sill solidly with nonshrink, nonmetallic grout.
- K. Leveling Tolerance: 1/8 inch, up or down, regardless of load and direction of travel.
- L. Install smoke detectors in accordance with National Electrical Code and ASME A 17.1 at each Elevator Lobby, in Elevator Machine Room, and the top of the Hoistway.

### **3.4 FIELD QUALITY CONTROL**

- A. Acceptance Testing: On completion of elevator installation perform acceptance tests as required and recommended by ASME A17.1 and governing regulations and agencies.
- B. Operating Test: Load elevators to rated capacity and operate continuously for 30 minutes over full travel distance, stopping at each level and proceeding immediately to the next. Record temperature rise of elevator machines during 30-minute test period. Record failure of elevators to perform as required.
  - 1. Perform operating test specified above on one elevator of each type, capacity, speed, and travel distance.
- C. Advise Owner, Architect, and authorities having jurisdiction in advance of dates and times tests are to be performed on elevators.

### **3.5 DEMONSTRATION AND TRAINING**

- A. Training: Instruct Owner's personnel in proper use, operations, and daily maintenance of elevators. Training shall be for a minimum of 8 hours and shall include, but not be limited to the following:
  - 1. Elevator System Design, Operational Requirements, and Criteria: Include the following:
    - a. Elevator system, subsystem, and equipment descriptions.
    - b. Performance criteria.
    - c. Regulatory requirements.
    - d. Equipment function.
    - e. Operating characteristics.
    - f. Limiting conditions.
  - 2. Documentation: Review the following items in detail:
    - a. Emergency manuals.
    - b. Operations manuals.
    - c. Maintenance manuals.
    - d. Project Record Documents.
    - e. Identification systems.
    - f. Warranties.
  - 3. Emergencies: Include the following, as applicable:

- a. Instructions on meaning of warnings, trouble indications, and error messages.
  - b. Instructions on stopping.
  - c. Shutdown instructions for each type of emergency.
  - d. Operating instructions for conditions outside of normal operating limits.
  - e. Sequences for electric or electronic systems.
  - f. Special operating instructions and procedures.
  4. Operations: Include the following, as applicable:
    - a. Startup procedures.
    - b. Equipment or system break-in procedures.
    - c. Routine and normal operating instructions.
    - d. Regulation and control procedures.
    - e. Safety procedures.
    - f. Operating procedures for emergencies.
    - g. Operating procedures for system, subsystem, or equipment failure.
  5. Adjustments: Include the following:
    - a. Alignments.
    - b. Checking adjustments.
    - c. Noise and vibration adjustments.
    - d. Economy and efficiency adjustments.
  6. Troubleshooting: Include the following:
    - a. Diagnostic instructions.
    - b. Test and inspection procedures.
  7. Maintenance: Include the following:
    - a. Inspection procedures.
    - b. Types of cleaning agents to be used and methods of cleaning.
    - c. List of cleaning agents and methods of cleaning detrimental to product.
    - d. Procedures for routine cleaning
    - e. Procedures for preventive maintenance.
    - f. Procedures for routine maintenance.
    - g. Instruction on use of special tools.
  8. Repairs: Include the following:
    - a. Diagnosis instructions.
    - b. Repair instructions.
    - c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
    - d. Instructions for identifying parts and components.
    - e. Review of spare parts needed for operation and maintenance.
- B. Make a final check of each elevator operation with Owner's personnel present and before date of Substantial Completion. Determine that operation systems and devices are functioning properly.

**END OF SECTION 14210**