
SECTION 14240 - HYDRAULIC ELEVATORS

PART 1 GENERAL

1.01 RELATED WORK

A. Related work and requirements performed by other trades and specified elsewhere:

1. Section 02300 - Earthwork: Excavation for cylinder well casing.
2. Section 03300 - Cast-in-Place Concrete: Elevator pit, elevator motor and pump foundation, and grouting sills.
3. Section 04000 - Unit Masonry: Masonry hoistway enclosure, building in and grouting hoistway doorframes, and grouting sills.
4. Section 05500 - Miscellaneous Metal: Pit ladder, divider beams, supports for entrances and guide rails, hoist beam at top of hoistway.
5. Section 07170 - Bentonite Waterproofing: Waterproofing of elevator pit.
6. Division 15 - Heating, Ventilating, and Air-Conditioning: Ventilation and temperature control of elevator equipment room.
7. Division 16 - Electrical: Electrical service to main disconnect in elevator machine room, electrical power for elevator installation and testing; electrical disconnecting device to elevator equipment prior to activation of sprinkler system; electrical service for machine room and pit receptacles with ground fault current protection, lighting in machine room and pit, wiring for telephone service to machine room.
8. Division 16 - Standby Power Supply systems; emergency generator for elevator operation.
9. Division 16 - Fire Alarm Systems; fire and smoke detectors, fire alarm signal lines to contact in the machine room.
10. Division 16 - Telephone Systems; ADAAG-required emergency communications equipment.

1.02 SYSTEM DESCRIPTION

A. Performance Requirements for elevators are defined as follows:

1. Quantity: One (1)
2. Type: Holeless Hydraulic Passenger.
3. Number of Stops: Two.
4. Capacity: 3,500 Lbs
5. Speed: Elevators shall ascend and descend at 125 feet/minute (0.64 M/sec.)
6. Travel: First Floor to Second Floor - 16'-0".
7. Landings: Two (2).
8. Openings: Two (2) - (1)Front opening, (1)Reverse opening.
9. Operation: Selective Collective (Simplex).

10. Hoistway Entrance: 3'-6" wide x 7'-0" high.
11. Power Supply: 480 volt / 3 Phase / 60 Hertz.
12. Lighting Power Supply: 120 Volts/1 Phase/60 Hertz
13. Machine Room Location: Adjacent at bottom floor.

1.02 QUALITY ASSURANCE

- A. To elevate criteria, limitations, and standards for establishing a minimum level of quality assurance, use the following guidelines:
 1. Manufacturer: Shall provide elevators manufactured by a firm with a minimum of ten (10) years of experience in fabrication of elevators equivalent to those specified.
 2. Installation: Elevators shall be installed by the manufacturer.
 3. Regulatory Requirements: Design and installation of elevator system shall comply with the latest version of ASME A17.1.
 - a. Elevator shall be designed in response to the Americans with Disabilities Act Accessibility Guidelines (ADAAG).
 4. Permits and Inspections: Provide licenses and permits and perform required inspections and tests.

1.03 REFERENCE STANDARDS

- A. Except as otherwise specified herein or shown on the Drawings, comply with the latest editions of all applicable codes and regulations including the applicable requirements of the following reference Standards and Codes, which are hereby made a part of this Section, as they relate to the elevators:
 1. ANSI A17.1, Buildings and Facilities, Providing Accessibility and usability for Physically Handicapped People.
 2. ADAAG, Americans with Disabilities Act Accessibility Guidelines.
 3. ANSI / NFPA 70, National Electrical Code.
 4. ANSI/NFPA 80, Fire Doors and Windows.
 5. ASME / ANSI A17.1, Safety Code for Escalators and Elevators.
 6. ANSI/UL 10B, Fire Tests of Door Assemblies.
 7. Local Building Codes.
 8. BOCA Building Code, latest Edition.
 9. The Occupational Health and Safety Administration (OSHA)Code of Federal Regulations(CFR),Volume 29.

1.04 SUBMITTALS

- A. Product Data - Submit manufacturer's product data for each system proposed for use, including the following:
 - 1. Cab design dimensions and layout.
 - 2. Hoistway door and frame details.
 - 3. Electrical characteristics and connection requirements.
 - 4. Color schedule and selection chart for cab and entrance features.

- B. Shop Drawings - Submit layout drawings or product literature including the following:
 - 1. Maximum rail bracket spacing.
 - 2. Maximum loads imposed on guide rails requiring load transfer to building structure.
 - 3. Clearances and travel for car.
 - 4. Clear inside hoistway and pit dimensions.
 - 5. Location and Sizes of access doors, doors, and frames.

- C. Operation and Maintenance Manuals. Provide three (3) manufacturer's standard operation and maintenance manuals.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Should the building or the site not be prepared to receive the elevator equipment on the agreed upon date, the general contractor shall be responsible for providing 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, the elevator contractor, upon notification from the general contractor, shall divert the elevator equipment to the storage area. If the elevator equipment has already been delivered to the site, the general contractor shall be responsible for transporting the elevator equipment to the storage area. The elevator equipment shall be stored and removed from storage to the job site in a timely manner at no cost to the elevator contractor.

1.07 WARRANTY

- A. The elevator contractor guarantees the materials and workmanship of the apparatus furnished under these specifications. The elevator operator shall make good any defects which may develop within one (1) year from the date of acceptance of each elevator not due to ordinary wear and tear or vandalism; improper or insufficient maintenance by others; abuse, misuse, or neglect or any other cause beyond the control of the elevator contractor.

1.08 MAINTENANCE SERVICE

- A. A quality maintenance service consisting of regular examination, adjustments, and lubrication of the elevator equipment shall be provided by the elevator contractor for a period of twelve (12) months after the elevator has been turned over for customer use.
- B. 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 or regular working days and shall include regular time call backs.
- C. This service shall not include 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.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Unless otherwise noted, specifications in this Section are based on hydraulic elevators as manufactured by Kone, Inc. and are intended as a guide. Equivalent systems of other manufacturers are also acceptable subject to meeting the requirements of the Drawings and specifications in this Section.
- B. Products of other manufacturers, which meet the requirements of the Drawings, this Section and the Kone, Inc. published specifications may be accepted, with approval obtained from the Resident.

2.02 EQUIPMENT

- A. Mechanical Equipment
 - 1. A hydraulic power unit, especially designed and manufactured for this service, shall be furnished. The motor pump shall be submersed under the oil inside the tank or located under the tank for proper operation. A muffler, designed to reduce pulsation and noise, which may be present in the flow of hydraulic oil, shall be provided in the oil line between the pump and machine room shut off valve.
 - 2. Control valves shall be mounted in a compact unit assembly. These valves include a safety check valve; up-direction valve with high pressure relief, including up leveling and soft stop features; lowering valve, including down leveling and manual leveling features. Automatic two-way leveling shall be provided to automatically stop and maintain the car approximately level with the landing, regardless of change in load.

3. An up-traveling car will automatically descend to the lower terminal landing if the hydraulic system does not have a sufficient reservoir of oil. Power-operated car and hoistway doors will automatically open at the lowest terminal landing, permitting passenger egress. The doors will then automatically close and all control buttons, except the Door Open Button in the car operating panel, shall be made ineffective.
4. A valve designed to shut off the flow of oil between the cylinder and the power unit shall be provided in the oil line in the machine room.
5. The elevators also shall be provided with:
 - a. Hydraulic Plunger: An accurately ground and polished hydraulic plunger shall be provided. The bottom of the plunger shall be fitted with a positive stop designed to prevent the plunger from leaving the cylinder. The top of the plunger shall be fastened to the car frame.
 - b. Hydraulic Cylinder: The hydraulic cylinder shall be constructed from steep pipe with a machined steel flange at the upper end and a heavy steel bulkhead at the lower end. The cylinder shall be connected to the oil line. A safety bulkhead shall be provided in the cylinder, designed to safely lower the car in the event of failure of the bottom cylinder head. A packing gland with guide bearing, wiper ring and packing especially designed for hydraulic elevator service shall be mounted at the top of the cylinder along with an oil collector ring and drain
6. PVC Casing: An auxiliary casing made from Polyvinyl Chloride (PVC) shall be furnished to provide corrosion protection for the cylinder, and to act as an oil contaminant casing in the event of a cylinder leak. The casing shall be a minimum schedule 40-mil thickness and will extend through the top of the pit floor. This casing shall be provided with an inspection port as required by code.

B. Additional Hydraulic Equipment

1. Guide Rails: Elevator car guide rails shall be provided, erected plumb, and securely fastened to the hoistway framing. Design and provision of hoistway framing shall be of adequate strength and properly positioned to withstand loads applied in conjunction with data provided by the elevator contractor.
2. Platform Isolation: The platen plate shall be mounted on suitable sound dampeners designed to isolate the platen from the car frame. The elevator contractor shall provide spring buffers in the elevator pit.
3. Logic Control: The logic control operation will be accomplished utilizing microprocessor computer logic control contained in a cabinet. The elevator control program will be contained in non-volatile, programmable memory. Control will be constructed such that future alterations in elevator operation may readily be made by altering the programmable memory. Safety circuits will be monitored and controlled by the programmable Logic Control for redundant protection.

4. Controller: The controller shall govern starting and stopping, as well as preventing damage to the motor from overload or excessive current. It shall automatically cut off the power supply and bring the car to rest in the event any of the safety devices are activated. The controller shall be mounted in a vented cabinet with the machine room. The controller shall utilize soft start characteristics.
 5. Pit Float Switch Sensor.
- C. Auxiliary Operations and Controls include the following.
1. Fireman's Control.
 2. Pit Shut-Off Valve.
 3. Battery Operated Emergency Power Pack.
 4. Oil Return.
 5. Independent Service.
- D. Signal Features:
1. Car Operation Station: Each elevator shall be equipped with a Main Car Operating Station, located integrally in a vertical swing panel and containing call registration buttons in accordance with the logic operation specified. The Main Car Operating Station shall also include an emergency stop switch, door open button, door close button, alarm button, tactile plates, and light switch, as well as any other device(s) required by applicable code and/or as explained within this Part.
 2. Each Car Operating Station shall be equipped with illuminating pushbuttons which, when pressed, shall signal the car passenger that the call has been registered. The button shall remain illuminated until the call has been answered.
 3. Service/Telephone Cabinet: A combination Service Cabinet/Telephone Cabinet, integral to the Main Car Operating Station, with a flush door, concealed hinge, and pull handle shall be provided. Within this cabinet, specialized controls shall be installed for restricted elevator functions.
 4. An ADA-approved telephone shall be installed in this cabinet under another section of this specification. A separate phone line to the elevator controller shall be provided and located in the elevator machine room under another section of the specifications.
 5. Car Position Indicator: A digital car position indicator consisting of a dot matrix (red LED) display shall be provided in the car. The position of the car shall be indicated by single or dual numeral and/or letter floor designations. The position indicator shall be located near the top of the Car Operating Station. The Car Position Indicator shall be provided with an audible signal, which shall sound when the car passes each floor or stops at a floor.
 6. Hall Pushbutton Stations: One hall pushbutton shall be provided at each landing served by the elevator system proposed. Illuminating pushbuttons shall be provided in each hall pushbutton station which, when pressed, shall signal the

waiting passenger that the call has been registered. The button shall remain illuminated until the call has been answered.

7. Car Direction Signs: Car direction sign(s) shall be supplied which shall include directional indications and an audible signal. The appropriate arrow shall illuminate to correspond with the direction in which the car is set to travel. The audible signal shall alert passengers in the car and at the landing, sounding once for up and twice for down.
8. Hall Position Indicator: A digital hall position indicator consisting of a red LED display shall be provided at ground level. The position of the car shall be indicated by single or dual numeral and/or letter floor designations.

E. Passenger Cab Enclosure

1. The elevator cabs shall meet the requirements of the ASME/ANSI A17.1 Elevator Code, and all Elevator Code Supplements issued to date, including Code restrictions pertaining to flame spread and smoke generation.
2. Cab features shall include:
 - a. White canopy
 - b. Return wall(s) to be integral design with entrance columns.
 - c. Emergency light with battery charger.
 - d. Emergency exit(s) in ceiling and/or side wall(s) as required.
 - e. Finished flooring (supply and installation) is specified under another section of these specifications. Total thickness of flooring, including substrate, shall not exceed 1/2 inch (12.5mm) in depth, and finished flooring weight may not exceed two lbs. /square foot or 70 lbs. total weight.
 - f. Walls to be flush vertical stainless steel panels. Panels shall be finished in #4 brushed stainless steel.
3. Return walls shall be #4 brushed stainless steel.
4. A drop ceiling, comprised of #4 satin stainless steel shall be provided. Cab ceiling lighting shall be 50W incandescent down lights in sufficient number to meet code requirements. The clear height under the suspended ceiling shall be 7 feet and 5 inches (2260).
5. The wall containing car operating panel shall be of the vertical swing design.
6. Car door panel(s) shall be finished on car side in #4 brushed stainless steel.
7. A 1-1/2 inch diameter tubular design handrail #4 brushed stainless steel shall be mounted on rear wall.
8. Two-speed fan power ventilation.
9. Provide protective pads for side and rear walls.
10. Car sill(s) shall be nickel silver.

F. Hoistway Entrances (UL "B" Labeled):

1. Hollow metal, horizontal sliding hoistway entrances shall be provided.
2. Entrance type and clear opening entrance size shall be in accordance with data at the beginning of these specifications. Sills, struts, headers and unit frames shall be erected by the elevator contractor and set in proper relation to the car guide rails. Such erection is to be accomplished prior to construction of hoistway walls. Door panels shall be installed by the elevator contractor after the wall erection is completed.
3. Entrances shall include unit frames, flush design door panels, sills, strut angles, headers, fascia plates, toe guards, dust covers, and necessary hardware. Necessary support for entrance sills shall be included.
4. Material and finish for fascia, toe guards, dust covers and structural members shall be fabricated and finished in accordance with the elevator contractor standards.
5. Entrance Frames: Hoistway entrance frames shall be finished in #4 brushed stainless steel.
6. Door Panels: Hoistway door panels shall be finished in #4 brushed stainless steel.
7. Entrance Sills: Entrance sills shall be constructed of nickel silver.
8. Standard entrance jamb tactile markings (i.e., jamb plates) shall be supplied on both jambs, at all floors. Plates shall be surface mounted. Plates shall be finished to match #4 brushed stainless steel.

G. Door Operator Equipment

1. 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 movements shall be cushioned at both limits of travel. An 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 in the car at each car entrance to prevent the operation of the elevator unless the car is closed.
2. 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 the local code.
3. 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.
4. The car door shall be provided with a protective device extending the full in height. This device shall be designed to sense an obstruction in its path while the doors are closing and automatically cause the car and hoistway doors to return to the open position. The doors shall remain open until the expiration of the time interval; the doors will then close automatically.

5. Door hangers and tracks shall be provided for each car and hoistway door. Tracks shall be designed to integrate with 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 and sealed-for-life bearings.

H. Electronic Door Safety Device

1. 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 causing 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 INSPECTION

- A. Before starting elevator installation, inspect hoistway, hoistway openings, pits and machine rooms, as constructed, verify all critical dimensions, and examine supporting structures and all other conditions under which elevator work is to be installed
- B. Take field dimensions and examine condition of substrates, supports, and other conditions under which this work is to be performed. Do not proceed with elevator work until unsatisfactory conditions are corrected. Installation constitutes acceptance of existing conditions and responsibility for satisfactory performance.

3.02 PREPARATORY WORK

- A. To complete the elevator installation, the following work must be performed or furnished by contractors other than the elevator subcontractor, according to governing codes. These conditions include the following:
 1. Design and construct legal hoistway(s), plumb within one-inch (25 mm), according to the required fire rating, including where hoistway walls are penetrated by elevator fixture boxes. Hoistways shall include adequate fastening to hoistway entrance assemblies, with the front entrance wall, at the main landing, not constructed until all elevator material has been located in the hoistway. Remaining front entrance walls shall not be constructed until after doorframes and sills are in place. All rough openings shall be of proper depth and clear overhead of adequate height including suitably sized support for necessary hoisting in accordance with the elevator contractor's details. Minimal rough openings at typical openings shall be 16-inches greater in width and 8-inches greater in height than the finished entrance opening.

2. Furnish in place properly sized structural supports for guide rails in adequate quantity, located per the elevator contractor details and as required by governing code. Separator beams shall be installed where required. Supports to the clear hoistway line shall be installed if it is necessary to support rail brackets from the web of a beam or other structure beyond the clear hoistway line.
3. Provide properly ventilated, heated, lighted and sound-isolated room(s) of sufficient size for the machinery. Temperature shall be maintained between 65 degrees Fahrenheit (18.3 degrees Centigrade) and 100 degrees Fahrenheit (37.7 degrees Centigrade), with relative humidity not to exceed 85 percent (non-condensing). Access door to be adequately sized to accept the elevator contractor's equipment.
4. Reinforce dry pit to sustain impact loads on guide rails and buffers, including either a drain or a sump with grated cover. If required, a pump shall also be provided to prevent any accumulation of water in the pit.
5. Provide all items set forth in these specifications, which are noted to be the responsibility of the General Contractor or other subcontractors.
6. Provide blockouts and/or do all cutting of walls, floors or partitions, together with all repairs made necessary by such blockouts, cutting or changes as required by the elevator contractor. Provide any cutting, including cutouts to accommodate hall signal fixtures, patching, and painting of walls, floors, or partitions together with finish painting of entrance doors and frames, if required.
7. Prepare each landing for entrance sill installation and do necessary grouting after sills are installed. Plumb vertical surfaces square with the hoistway. A horizontal support shall be provided 1 foot (305 mm) above the clear opening at the top landing to support the doorframe assembly.
8. Do all painting required beyond that included in these specifications.
9. A properly framed and enclosed legal hoistway, including venting as required by the governing code or authority, ready for uninterrupted use by the elevator contractor at an agreed upon date.
10. All electrical power including 3 phase and single phase for lights, tools, hoists, welding, etc., during erection, brought to the elevator controller room prior to the elevator delivery.
11. Guard and protect the hoistway during the installation of the elevator(s) and to complete all of this work in such time as not to delay work of the elevator contractor.
12. Temporary Use of Elevators requires available 3-phase power before cars can be placed on temporary acceptance. Should any elevator be required for use before substantial completion, others shall provide without expense to the elevator contractor, if required, temporary car enclosures, requisite guards or other protection for elevator hoistway openings, main line switch with wiring, necessary power, signaling devices, lights in car and elevator operators, along with any other special labor or equipment needed to permit this temporary usage.
13. Provide dry, protected storage space adjacent to the hoistway(s) at the grade level, as required by the elevator contractor.

14. Provide fixed vertical steel ladder to pit extending a minimum of 42 inches (1066-mm) (U.S.) or 48 inches (1219 mm) (Canada) above sill of bottom terminal entrance. Ladder rungs to be a minimum of 12 inches (305 mm) wide and spaced 12" (305 mm) on center.
15. Elevator lobby smoke detectors, located as required, with wiring from the sensing devices to a terminal block located in the machine room as designated by the elevator contractor. For each group of elevators, provide a normally closed contact from the smoke detector at the designated return landing, as well as a normally closed contact representing all other smoke detectors at lobbies, machine rooms, and hoistway smoke detectors. If a smoke detector is located in the hoistway at or below the lower of the two designated return landings, it shall be wired to activate the same normally closed contact as the smoke detector located in the lobby at the lower of the two designated return landings.
16. If sprinklers are installed in the hoistway, machine room, or machinery spaces, a means to automatically disconnect the main line power supply of the affected elevator prior to the application of water. Smoke detectors shall not be used to activate sprinklers in hoistways, machine rooms, or machinery spaces or to disconnect the main line power supply.
17. Bring 3-phase and single-phase power wires to machine room(s) prior to delivery of elevator equipment (elevator installation cannot begin without 3 phase power) and have an electrician connect elevator contractor controller terminals with properly sized, intervening fused disconnect switches conveniently located in machine room(s) and furnish, without charge, necessary current for tools, drilling equipment, hoists, as well as current for starting, testing and adjusting of machinery.
18. If 3-phase power is not available when required, a temporary single-phase 220V, 50 ampere power supply with a fused disconnect or circuit breaker for each elevator in the machine room may be provided if approved by the elevator contractor.
19. A 3-phase fused disconnect switch or circuit breaker, sized to suit elevator power characteristics, for each elevator with feeder or branch wiring to the controller.
20. A 120V, 15-ampere capacity dedicated branch circuit, single-phase power supply with an SPST-fused disconnect switch or circuit breaker, with feeder wiring to each controller for car lights.
21. Suitable light fixture (minimum 10 ft at floor level) and convenience outlets with ground fault circuit interrupter in machine room with light switches located within 18 inches (457 mm) of lock jamb side of the machine room door.
22. Suitable light fixture and convenience outlets with ground fault circuit interrupter in pit with light switch adjacent to the access ladder.
23. Telephone instrument or means within the car for communicating or signaling to an accessible location outside the hoistway or central exchange system or approved emergency service, unless stated elsewhere in this specification. System shall be designed according to ADAAG.
24. For elevators having an intercom, a separate 120-V 15-ampere single-phase power supply with fused SPST disconnect switch or circuit breaker, located as

required for inter-communicating power supply. Circuit shall be arranged for feeding from the building emergency lighting supply, if available. Conduit and wiring shall be provided for remotely located inter-communicating stations.

25. Provide the standby power unit and means for starting the unit for installations having standby power. Deliver power to the elevator via disconnect switches in the machine room, with sufficient power to operate one or more elevators at any one time at full-rated speed.
26. Remote conduit and wiring runs for the emergency/fire status panel (if required) and/or between hoistway banks to tie elevators in an emergency power (if required).

3.03 INSTALLATION

- A. Install all elevator components in accordance with manufacturer's specifications except as specifically provided for elsewhere.
- B. Install elevator system components and coordinate installation of hoistway wall construction.
 1. Work shall be performed by competent elevator installation personnel in accordance with ASME A17.1, manufacturer's installation instructions and approved shop drawings.
 2. Comply with the National Electric Code for electrical work required during installation.
- C. Perform work with competent, skilled workmen under the direct control and supervision of the elevator manufacturer's experienced foreman.
- D. Supply in ample time for installation by other trades, inserts, anchors, bearing plates, brackets, supports, and bracing including all setting templates and diagrams for placement.
- F. Set jack unit cylinder assembly plumb, centered accurately and shimmed to proper elevation, using centering lugs to prevent dislocation during filling. Fill space between casing and cylinder with clean, dry, compacted sand.
- G. Welded Construction: Provide welded connections for installation of 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 qualification of welding operators.
- H. Coordination: Coordinate elevator work with the work of other trades, for proper time and sequence to avoid construction delays. Use benchmarks, lines, and levels designated by the Contractor, to insure dimensional coordination of the work.

- I. Install machinery, guides, controls, car and all equipment and accessories to provide a quiet, smoothly operating installation, free from side sway, oscillation or vibration.
 - J. Sound Isolation: Mount rotating and vibrating elevator equipment and components on vibration-absorption mounts, designed to effectively prevent the transmission of vibrations to the structure, and eliminate sources of structure-borne noise from the elevator system.
 - K. Alignment: Coordinate installation of hoistway entrances with installation of elevator guide rails for accurate alignment of entrances with car. Where possible, delay final adjustment of sills and doors until car is operable in shaft. Reduce clearances to minimum safe, workable dimensions at each landing.
 - L. Erect hoistway sills, header, and frames before erection of rough walls and doors; erect fascias and toe guards after rough walls finished. Set sill units accurately aligned and slightly above finish floor at landings.
 - M. Lubricate operating parts of system, including ropes, as recommended by manufacturer.
- 3.04 FIELD QUALITY CONTROL
- A. Acceptance Testing: Upon completion of the elevator installation and before permitting use of elevator, perform acceptance tests as required and recommended by Code and governing regulations or agencies. Perform other tests, if any, as required by governing regulations or agencies.
 - B. Advise Owner, Contractor, Resident, and governing authorities in advance of dates and times tests are to be performed.
 - C. Adjusting: Make necessary adjustments of operating devices and equipment to insure elevator operates smoothly and accurately.
- 3.05 CLEANING
- A. Before final acceptance, remove protection from finished surfaces and clean and polish surfaces in accordance with manufacturer's recommendations for type of material and finish provided.
- 3.06 PROTECTION

- A. At time of Substantial Completion of elevation work, or portion thereof, provide suitable protective coverings, barriers, devices, signs or other such methods or procedures to protect elevator work from damage or deterioration. Maintain protective measures throughout remainder of construction period.

3.07 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.
- B. Instruct Owner's personnel in proper use, operations, and daily maintenance of elevators. Review emergency provisions, including emergency access and procedures to be followed at time of failure in operation and other building emergencies. Train Owner's personnel in normal procedures to be followed in checking for sources of operational failures or malfunctions.
- C. Make a final check of each elevator operation, with Owner's personnel present, immediately before date of substantial completion. Determine that control systems and operating devices are functioning properly.

***END OF SECTION ***