

SECTION 14240 - HYDRAULIC ELEVATORS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. This Section includes holed hydraulic passenger elevators.
 - 1. Elevator jack hole and inner sealed earth casing.
 - 2. Elevator car enclosures, hoistway entrances and signal equipment.
 - 3. Operation and control systems.
 - 4. Accessibility provisions for physically disabled persons.
 - 5. Equipment, machines, controls, systems and devices as required for safely operating the specified elevators at their rated speed and capacity.
 - 6. Materials and accessories as required to complete the elevator installation.
 - 7. 5 year service maintenance agreement.
- B. Related Sections include the following:
 - 1. Division 3 Section "Cast-in-Place Concrete" for setting sleeves, inserts, and anchoring devices in concrete.
 - 2. Division 5 Section "Metal Fabrications" for the following:
 - a. Structural steel shapes for subsills at each floor.
 - b. Hoisting and divider beams.
 - c. Pit ladders.
 - d. Sump pump cover and frame.
 - e. Attachment plates, angle brackets, and other steel framing for supporting guide-rail brackets.
 - 3. Division 7 Section "Cementitious Waterproofing" for waterproofing elevator pit.
 - 4. Division 9 for finish flooring in elevator car.
 - 5. Division 15 Sections for ventilating hoistway and machine room.
 - 6. Division 16 Sections for electrical service to elevator, including fused disconnect switch, standby power source, transfer switch, convenience outlets, lock out-tag-out switch, and telephone.
 - 7. Division 16 Sections for smoke detectors in elevator lobbies to initiate emergency recall operation and heat/smoke detectors in shafts and machine rooms to disconnect power from elevator equipment before sprinkler activation and for connection to elevator controllers.

1.03 DEFINITIONS

- A. Hydraulic Elevators: Elevators in which cars are hoisted by action of a hydraulic plunger and cylinder (jack); with other components of the Work, including fluid storage tank, pump, piping, valves, car enclosures, hoistway entrances, operation systems, signal equipment, guide rails,

electrical wiring, buffers, and devices for operations, safety, security, required performance at rated speed and capacity, and for complete elevator installation.

- B. 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.

1.04 SUBMITTALS

- A. General: Submit in accordance with Section 01330.
- B. Product Data: Include capacities, sizes, performances, operations, safety features, controls, finishes, and similar information.
- C. 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.
- D. Samples: For exposed finishes for car, hoistway doors, and signal equipment; 3-inch square samples of sheet materials; and 4-inch lengths of running trim members.
- E. Maintenance Manuals: Include operation and maintenance instructions, parts listing with sources indicated, recommended parts inventory listing, emergency instructions, and similar information. Include all diagnostic and repair information available to manufacturer's and Installer's maintenance personnel. Submit for Owner's information at project closeout as specified in Division 1.
- F. Inspection and Acceptance Certificates: Obtain and submit inspection and acceptance certificates and operating permits as required by governing authorities for normal, unrestricted elevator use.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Engage 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 and Accessibility Requirements: All work shall be performed in accordance with the latest revised edition (as of date bids are taken) of the American National Standard Safety Code for Elevators, Dumbwaiters, Escalators, and Moving Walks (ANSI A-17), the National Electrical Code, The American Disabilities Act and state and local codes as may be applicable. Elevator shall meet current state laws relating to accessibility to public buildings for the physically handicapped.
 - 1. Seismic: Comply with the applicable requirements of the 2003 IBC Code to resist earthquake loads (Seismic Zone 2).
 - a .20 sec Response Acceleration (S_s) = 0.315.

- b 1.0 sec Response Acceleration (S1) = 0.077.
- c Design Spectral Response Acceleration Parameters: SDS = 0.326; SD1 = 0.123.
- d Seismic Design Category = B.

- C. In the interest of unified responsibility, Elevator package shall be a nationally recognized United States company regularly engaged in the business of manufacturing elevators of type and character required by these Specifications, and shall manufacture entire power unit, controller, hydraulic cylinder and all other parts of the equipment, including door operators and signal fixtures, and shall so state in his request for approval listing the items he manufactures.
- D. Design for Maintenance Requirements: Installation shall be a non-proprietary design that is maintainable by any licensed elevator maintenance company employing journeymen mechanics, without need to purchase or lease additional diagnostic devices, special tools, or instructions from original equipment manufacturer.

1.06 COORDINATION

- A. Coordinate installation of sleeves, block outs, and items that are embedded in concrete or masonry for elevator equipment. Furnish templates and installation instructions and deliver to Project site in time for installation.
- B. Coordinate locations and dimensions of other work relating to hydraulic elevators including pit ladders, sumps; entrance subsills; and electrical service, electrical outlets, lights, and switches in pits and machine rooms.

1.07 WARRANTY

- A. General Warranty: Special warranty specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Special Manufacturer's Warranty: Submit a written warranty signed by manufacturer agreeing to repair, restore, or replace defective elevator work within 12 months from date of Substantial Completion.

1.08 MAINTENANCE SERVICE

- A. Furnish maintenance and 24/7 call back service for a period of 12 months for each elevator.
 - 1. Service shall consist of periodic examination of the equipment, adjustment, lubrication, cleaning, supplies and parts to keep the elevators in proper operation. Maintenance work, including emergency call back repair service, shall be performed by trained employees of the elevator contractor during regular working hours.
 - 2. Submit parts catalog and show evidence of local parts inventory with complete list of recommended spare parts. Parts shall be produced by manufacturer of original equipment.
 - 3. Manufacturer shall have a service office and full time service personnel within a 100 mile radius of the project site.

- B. Submit 5 year full service maintenance agreement of the same coverage in addition to 12 months warranty service. Provide full service coverage which must include mandatory monthly preventative maintenance visits, 5 year load testing, emergency power (if equipped) and annual fire service testing.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide high frequency use hydraulic elevators by one of the following:
1. Basis of Design: ThyssenKrupp Elevator, Marquis 25, Group North America; local distributor, Stanley Elevator Co., Inc., phone: (800) 258-1016.
 2. Comparable Product: Provide comparable product meeting the operations, functions and finishes specified:
 - a Otis Elevator Co.; with Series 2 cab.

2.02 DESCRIPTION OF EQUIPMENT

- A. Passenger Elevators:
1. Capacity: 2500 lbs. minimum.
 2. Speed: 150 feet per minute full load up.
 3. Operation: Duplex.
 4. Clear Car Inside: 80 inches wide x 51 inches deep.
 5. Travel: 65'-10" ±.
 6. Power Supply: 480 volts - 3 phase - 60 cycles.
 7. Stops and Openings: 7 stops; front opening.
 8. Door Size and Type: 3'-6" x 7'-0", single slide.
 9. Door Operation: D.C. Power Operation.
 10. Signals Vandal resistant: Illuminated buttons, alarm bell, position indicator in car with audible signal, vertical hall lantern and gong at each floor, with position indicator at main floor, brushed stainless steel.
 11. Special Features: Infrared light beam door protection system for full height of door, handicapped requirements (ANSI A117.1), fire-fighters service, emergency lighting with power pack. Standby power operation.
 12. Motor: 40 HP maximum. Include closed transition solid state starting.
Note: Manufacturer providing elevator motor with greater H.P. shall be responsible for cost of upgrading disconnect and wiring.

2.03 PASSENGER ELEVATOR CAR ENCLOSURES

- A. General: Provide manufacturer's standard car enclosures of the selections indicated. Include ventilation, lighting, access doors, doors, power door operators, sills (thresholds), trim, accessories, and wall and ceiling finishes. Provide manufacturer's standard flush-panel horizontal-sliding doors of type indicated. Provide manufacturer's standard protective edge trim system for door and wall panels, except as otherwise indicated.

- B. Materials and Fabrication: Provide selections indicated or, if not otherwise indicated, manufacturer's standard welded steel construction with factory finish of synthetic enamel, and provide other materials and fabrication of not less than the following:
1. Walls: 16 ga. No. 4 Stainless steel 5WL rigidized cab walls.
 2. Front and Transom: Brushed stainless steel.
 3. Doors: Hollow metal construction, brushed stainless steel.
 4. Ceiling and Lighting: No. 4 stainless steel island type perimeter ceiling with indirect fluorescent lighting above on four sides..
 5. Sill: Aluminum.
 6. Flooring: Rubber sheet flooring specified in Division 9.
 7. Handrails: Cylindrical metal bar at rear wall, brushed stainless steel.
 8. Clear Cab Height: 7'-4".
 9. Accessories: Two-speed exhaust fan, brushed stainless steel certificate frame, and ADA compliant, two-way speakerphone, protection pads and stainless steel pad buttons.

2.04 PASSENGER HOISTWAY ENTRANCES

- A. General: Provide manufacturer's standard hollow-metal, sliding, door-and-frame hoistway entrances complete with track systems, hardware, sills, and accessories. Match car doors for size, number of panels, and door movement. Provide frame size and profile to coordinate with hoistway wall construction.
- B. Materials and Fabrication: Provide the following materials and finishes for exposed parts of elevator car enclosures, car doors, hoistway entrance doors and frames, and signal equipment; provide manufacturer's standards, but not less than the following:
1. Satin Stainless-Steel Frames: Formed stainless-steel sheet, 14gage, ASTM A 167, Type 302 or 304, with No. 4 satin finish.
 2. Satin Stainless-Steel Panels: Flush construction, fabricated from ASTM A 167, Type 302 or 304 stainless steel, 16 gage, with No. 4 satin finish.
 3. Aluminum Sills: Extruded aluminum, with grooved surface, 1/4-inch thickness, mill finish.
 4. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107 for grouting door sills.

2.05 EQUIPMENT

- A. Passenger Elevator: Holed hydraulic elevator meeting the following minimum requirements. Interior car finishes shall match those specified; failure to comply will be reason for rejection.
1. Platform and Sling: Platform shall have fabricated frame of formed and structural steel shapes, gusseted and rigidly welded. Provide fire-treated wood subfloor prepared for finish flooring. Finished flooring, installed on top of car platform, shall be provided in Division 9 Section "Carpet." Underside of platform shall be fireproofed. Sling shall consist of heavy steel channel stiles properly affixed to steel crosshead and bolster, with adequate bracing members, to remove all strain from car enclosure. Steel bumper plates shall be affixed to bottom of bolster channels, and a platen plate with clamps and cap screws shall be furnished for fastening sling to plunger.
 2. Passenger Car Doors: Car entrance shall be provided with horizontal sliding doors with panel rigidity obtained by suitable steel reinforcements. Doors shall be hung on sheave hangers with polyurethane tires and sheaves not less than 3-1/4" diameter, running on a polished steel track, and guided at bottom by non-metallic shoes sliding in smooth threshold groove.

3. Emergency Alarm Bell: Locate in conformance with ANSI A-17.1 Code requirements and connect to a plainly marked pushbutton in car. Connect emergency alarm bell to emergency lighting power pack.
4. Guides: Roller guides, with a minimum of three tires, shall be mounted on top and bottom of the car and be held in contact with the guide rail by adjustable devices..
5. Power Unit (Oil Pumping and Control Mechanism): Shall be compactly and neatly designed with all components listed below combined in a self-contained unit; structural steel outer base with tank supports; floating inner base for mounting pump assembly; oil reservoir with tank cover and controller compartment with cover; metal drip pan; oil-hydraulic pump; electric motor; oil control unit with following components built into single housing; high pressure relief valve; check valve; automatic unloading upstart valve; lowering and leveling valve; and magnetic controller. Pump shall be specifically designed and manufactured for oil-hydraulic elevator service. It shall be of the positive displacement type, inherently designed for steady discharge with minimum pulsations to provide a smooth and quiet operation. Output of pump shall not vary more than 10% between no load and full load on elevator car. Motor shall be specifically designed for oil-hydraulic elevator service, of standard manufacture, and of duty rating to comply with herein specified speeds and loads. Oil control unit shall consist of following components, all built into single housing. Welded manifolds with separate valves to accomplish each function will not be acceptable under this Specification. All adjustments shall be accessible and shall be made without removing assembly from oil line. Relief valve shall be externally adjustable, and shall be capable of bypassing total oil flow without increasing back pressure more than 10% above that required to barely open valve. Up start and stop valve shall be externally adjustable, and designed to bypass oil flow during start and stop of motor pump assembly. Valve shall close slowly, gradually diverting oil to or from jack unit, insuring smooth up starts and up stops. Check valve shall be designed to close quietly without permitting any perceptible reverse flow. Lowering valve and leveling valve shall be externally adjustable for drop-away speed, lowering speed, leveling speed and stopping speed to insure smooth "Down" starts and stops. Leveling valve shall be designed to level car to floor in direction car is traveling when slowdown is initiated. Electric controller shall be microprocessor integrated circuitry. Silver to silver contacts shall be utilized on all relays and contactors (where provided). Provide thermal overload relays to protect motor. All component switches to be mounted in a steel panel designed for mounting on power unit, wall or floor.
6. Jack Unit: Shall be designed and constructed in accordance with applicable requirements of ANSI A-17.1 Code. It shall be of sufficient size to lift gross load the height specified and shall be factory tested to insure adequate strength and freedom from leakage. No brittle material, such as grey cast iron, shall be used in jack construction. Jack unit shall consist of following parts: plunger of heavy seamless steel tubing accurately turned and polished; stop ring shall be electrically welded to plunger to positively prevent plunger leaving casing; internal guide bearing; packing or seal of suitable design and quality; drip ring around cylinder top; cylinder made of steel pipe and provided with pipe connection and air bleeder. Brackets shall be welded to jack cylinder for supporting elevator on pit channels. Provide auxiliary safety bulkhead in lower end of cylinder, which will limit down car speed to safe value in event of leakage around external bulkhead.
7. Mainline Strainer: Shall be self-cleaning type, equipped with 40-mesh element, for installation in oil line.
8. Failure Protection: Electrical control circuit shall be designed so if malfunction should occur, due to motor starter failure, oil becoming low in system, or car failing to reach landing in up direction within predetermined time, elevator car will automatically descend to lowest

- terminal landing. If power operated doors are used, doors shall automatically open when car reaches landing to allow passengers to depart. Doors shall then automatically close and all control buttons, except "Door Open" button in car station, shall be made inoperative.
9. Sound Isolating Couplings: Provide a minimum of two installed in oil line in Machine Room between pump and jack.
 10. Oil-Hydraulic Silencer (Muffler Device): Shall be installed in oil line near power unit. It shall contain pulsation-absorbing material inserted in blowout-proof housing arranged for inspecting interior parts without removing unit from oil line. A rubber hose without blowout-proof features will not be acceptable.
 11. Vibration Pads: Mount under power unit assembly to isolate unit from building structure.
 12. Automatic Terminal Limits: Electric limit switches, placed in hatchway near terminal landings, shall be designed to cut off electric current and stop car should it run beyond either terminal landing.
 13. Automatic Self-Leveling: Provide elevator with self-leveling feature that will automatically bring the car to floor landings. Self-leveling shall, within its zone, be entirely automatic and independent of operating device, and shall correct for overtravel or undertravel. Car shall also be maintained approximately level (within 1/2-inch) with landing irrespective of load.
 14. Buffers: Provide buffers, complying with ANSI A-17.1 Code requirements, under car in elevator pit. Mount buffers on continuous channels fastened to elevator guide rail or securely anchored to pit floor; provide substantial extensions, if required.
 15. Car Top Inspection Station: Provide station with "emergency stop" switch and with constant pressure "up-down" direction buttons which make normal operating devices inoperative and give inspector complete control of elevator.
 16. Door Operation: Provide direct current motor-driven, heavy-duty operator designed to operate car and hoistway doors simultaneously. Door movements shall be electrically cushioned at both limits of travel and door operating mechanism shall be arranged for manual operation in event of power failure. Provide full height, infrared light beam door sensing device with automatic non-contact reversal of car and hoistway doors if obstruction enters path of travel for passenger elevators. Doors shall then resume closing cycle. Doors shall automatically open as car arrives at landing and shall automatically close after an adjustable time interval or when car is dispatched to another landing. Direct drive geared operators, AC controlled units with oil checks, or other deviations from above are not acceptable.
 17. Interlocks: Each hoistway entrance shall be equipped with approved type interlock tested as required by code. Design interlock to prevent operation of car away from landing until doors are locked in closed position as defined by code and to prevent opening of doors at any landing from corridor side unless car is at rest at that landing or is in leveling zone and is stopping at that landing. Interlocks shall bear Underwriters' Laboratories "B" label of approval.
 18. Hoistway Door Unlocking Device: As specified by ANSI A-17.1 Code, shall be provided to permit authorized persons to gain access to hoistway when elevator car is away from landing.
 19. Door Hangers and Tracks: For each hoistway sliding door, provide sheave type two-point suspension hangers and tracks complete. Sheaves shall be 3-1/4" in diameter and have polyurethane tires with ball bearings properly sealed to retain grease. Hangers shall have adjustable slide to take up-thrust of doors. Tracks shall be drawn steel shapes with smooth surfaces and shaped to conform to hanger sheaves.

20. Passenger Hoistway Entrances: Provide hollow metal, horizontal sliding type entrances complete at each hoistway opening. Entrances shall be manufacturer's standard design bearing Underwriters' Laboratories' "B" labels. They shall consist of frames, sills, doors, hangers, hanger supports, hanger covers, fascia plates, and all necessary hardware. Entire front wall of hoistway shall be left open or a rough opening provided which is 18" greater in width and 12" greater in height than finished opening, until after entrances are installed. After guide rails are set and lined, install entrance frames in perfect alignment with guide rails. Finish walls shall then be completed by others.
21. Passenger Operation (Selective Collective Automatic Pushbutton): Control of elevator car shall be automatic in operation by means of pushbutton in car marked for each landing level served, an "up-down" button at each intermediate landing, and a call button at each terminal landing, wherein all stops registered by momentary pressure of landing or car buttons shall be maintained until car answers call. Provide emergency stop switch in car pushbutton station which, when in off position, will render elevator inoperative, and which will enable attendant or passenger to stop car at any point during its travel. Opening of this switch shall not cancel registered calls, and when switch is closed, car will continue to answer calls that have been registered. Each landing station shall contain an illuminated push button which shall "light up" when pressed to indicate that a call has been registered to bring car to that particular landing. A time delay, noninterference feature, shall be incorporated in control mechanism to allow ample time for opening and closing car and hoistway doors before it is again placed in motion.
22. Auxiliary Operations: In addition to primary operation system features, provide the following operational features for elevators:
 - a Standby Power Operation: On activation of standby power, cars are returned to a designated floor and parked with doors open. If a car cannot be returned, it is removed from the system. One car is selected for service on standby power by a key switch located at main landing.
 - b Nuisance Call Cancel: When car calls exceed a preset number while car load is less than a predetermined weight, all car calls are canceled. Preset number of calls and predetermined weight can be adjusted.

2.06 SIGNAL EQUIPMENT

- A. General: Provide signal equipment for each elevator or group of elevators with hall-call and car-call buttons that light when activated and remain lit until call has been fulfilled. Fabricate lighted elements of acrylic or other permanent, non-yellowing translucent plastic.
- B. Car Control Stations: Provide manufacturer's standard swing return car control stations. Mount in return panel adjacent to car door, if not otherwise indicated.
- C. Emergency Communication System: Provide system that complies with ASME A17.1 and U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines (ADAAG)." On activation, system shall dial preprogrammed number of monitoring station and identify elevator location to monitoring station. System shall provide two-way voice communication without using handset and provide visible signals that indicate when system has been activated and when monitoring station has responded. Provide system contained in flush-mounted cabinet, with identification, instructions for use, and battery backup power supply.

- D. Car Position Indicator: For passenger elevator cars, provide illuminated-signal type, digital-display type, or segmented type, located above car door or above car control station. Also provide audible signal to indicate to passengers that car is either stopping at or passing each of the floors served.
 - 1. Include travel direction arrows if not provided in car control station.
- E. Hall Push-Button Stations – Vandal Resistant: Provide illuminated hall push-button stations at each landing for elevator.
 - 1. Provide units with flat faceplate for mounting with body of unit recessed in wall.
 - 2. Provide units with direction-indicating buttons; two buttons at intermediate landings; one button at terminal landings.
- F. Hall Lanterns – Vandal Resistant: Provide vertical units with illuminated direction indicators, but provide single arrow at terminal landings.
 - 1. Provide units with flat, satin stainless steel faceplate, vandal-resistant, for mounting with body of unit recessed in wall and with illuminated elements.
 - 2. Place lanterns beside each hoistway entrance, unless otherwise indicated. Mount at a minimum of 72 inches above finished floor.
 - 3. 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 each car.
- G. Hall Position Indicators: Provide illuminated-signal type or digital-display type, located above each hoistway entrance at ground floor. Provide units with flat, satin stainless steel faceplate, vandal-resistant fasteners for mounting with body of unit recessed in wall.
- H. Corridor Call Station Pictograph Signs: Provide signs matching hall push-button stations with text and graphics according to ASME A17.1, Appendix H.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine elevator areas, with Installer present, for compliance with requirements for installation tolerances, and other conditions affecting performance of elevator work. 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.
 - 1. If unacceptable conditions are encountered, prepare written report, endorsed by Installer, listing dimensional discrepancies and conditions detrimental to performance of work.
- B. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Comply with manufacturer's instructions and recommendations.
- B. Coordination: Coordinate elevator work with work of other trades for proper time and sequence to avoid construction delays. Use established benchmarks, lines, and levels to ensure dimensional coordination of the Work.

- C. Excavation for Elevator Jack: Drill excavation in each elevator pit to accommodate installation of plunger-cylinder units.
- D. Provide inner sealed earth casing with permanent waterproff seal at bottom of well casing and water stop collar on the outside of the earth casing to seal the casing to the pit floor.
- E. Install plunger-cylinder units plumb and accurately centered for elevator car position and travel; anchor securely in place, supported at the pit floor.
- F. Install plunger cylinders in protective PVC cylinder casings. Fill void spaces between cylinder casings and cylinders with sand. Provide oil sensor in casing.
- G. 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.
- H. 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.
- I. Install piping above the floor, where possible. Where not possible, install underground piping in Schedule 40 PVC pipe casing assembled with solvent cement fittings.
- J. Lubricate operating parts of systems, including ropes, if any, as recommended by manufacturers.
- K. Alignment: Coordinate installation of hoistway entrances with installation of elevator guide rails for accurate alignment of entrances with cars. Where possible, delay installation of sills and frames until car is operable in shaft. Reduce clearances to minimum, safe, workable dimension at each landing.
- L. Leveling Tolerance: 1/4-inch, up or down, regardless of load and direction of travel.
- M. Set sills flush with finished floor surface at landings. Fill space under sills solidly with nonshrink, nonmetallic grout.
- N. Wiring, Piping and Oil: All necessary wiring shall be furnished and installed in the hoistway in accordance with the National Electrical Code, to connect the operating buttons and switches to the control board in the power unit. All wiring shall be in rigid conduit or electric metallic tubing except to movable apparatus, which shall be connected by short lengths of flexible conduit. Provide all necessary pipe and fittings to connect the power unit to jack unit and oil in proper grade. All underground conduit and piping shall be adequately protected against corrosion.
- O. Controls: Shall be placed for convenient use of wheelchair operators as required by the State Handicapped Code.

3.03 FIELD QUALITY CONTROL

HYDRAULIC ELEVATORS

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- A. Acceptance Testing: Upon nominal completion of elevator installation, and before permitting use (either temporary or permanent) of elevators, perform acceptance tests as required and recommended by the ASME A17.1 and by governing regulations and agencies.
- B. Advise Owner, Architect, and authorities having jurisdiction in advance of dates and times tests are to be performed on elevators.
- C. In addition to other requirements, inspections, tests and remedies herein provided, upon completion of elevator installation and before final approval and final payment, the Elevator Subcontractor shall make, in the presence of the Architect or his designated representative, a running speed test with full maximum load on the elevator car to determine whether the elevator equipment, as installed, meets the speed, capacity and all other requirements of the Specifications.
- D. In the event the equipment does not meet all requirements of the Specifications, Elevator Subcontractor shall promptly remove from premises, all work condemned by Architect as failing to conform to Contract, and shall promptly replace and re-execute work in accordance with Contract without expense to Owner. Elevator Subcontractor shall bear all expense of making good all work of other Contractors destroyed or damaged by such removal or replacement.

3.04 DEMONSTRATION

- A. 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 procedures to follow in identifying sources of operational failures or malfunctions. Confer with Owner on requirements for a complete elevator maintenance program. Coordinate instruction with the availability of the Owner's personnel.
- B. Make a final check of each elevator operation with Owner's personnel present and just prior to date of Substantial Completion. Determine that operation systems and devices are functioning properly.

3.05 PROTECTION

- A. Temporary Use: Do not use elevators for construction purposes.
- B. Provide protective coverings, barriers, devices, signs, and other procedures to protect elevator. If, despite such protection, elevator becomes damaged, engage elevator Installer to restore damaged work so no evidence remains of corrective work. Return items that cannot be refinished in field to shop, make required repairs and refinish entire unit, or provide new units as required.
- C. Provide final protection and maintain conditions, in a manner acceptable to elevator manufacturer and Installer that ensure elevators are without damage or deterioration at the time of Substantial Completion.

END OF SECTION 14240