

SECTION 14250 - HYDRAULIC FREIGHT ELEVATOR CONSTRUCTION STANDARD

PART 1: GENERAL

1.01 Summary:

1. Section Includes:

- a. Hydraulic freight elevator system.
- b. Hydraulic cylinder.
- c. Cab with finishes and power operated car gate.
- d. Power operated hoistway doors.
- e. Motor and pump, controllers, hoistway equipment, and accessories.

2. Related Sections:

- a. Construction Facilities and Temporary Controls: Temporary power supply.
- b. Cast-in-Place Concrete: Reinforced concrete shafts.
- c. Unit Masonry System: Masonry for fire rated shafts and hoistway openings.
- d. Structural Steel: Structural hoist, divider, and sheave beams and other steel items.
- e. Metal Fabrications: Pit ladder and accessories.
- f. Plumbing Fixtures: Pit drainage.
- g. Panelboards: Electrical power to the machine room including main switch and breaker. Heat and smoke sensing devices.

3. Work Required by Other Sections:

- a. The contractor shall coordinate all work required by latest applicable codes including fire and smoke rated hoistway enclosures, pits, shaft venting, operable fire alarm systems, etc.
- b. The machine room shall be enclosed and conditioned per the elevator manufacturer's required tolerances and have temporary power available for installation work.
- c. Crane service shall be provided for the hoisting of the machine room equipment.
- d. All structural beams and rails shall be in place.
- e. The elevator pit shall include ladder, guarded light, GFI receptacle and sump pump with cover. Light and pump shall each be on separate dedicated circuits.

1.02 References:

1. American Architectural Manufacturers Association (AAMA):
 - a. AAMA 607.1: Voluntary Guide Specification and Inspection Methods for Clear Anodic Finishes for Architectural Aluminum.
2. American Society of Mechanical Engineers (ASME):

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- a. A17.1: Safety Code for Elevators.
- b. A17.2.2: Inspector's Manual For Elevators.
3. American Plywood Association (APA): Product Guide-Grades and Specifications.
4. American Society for Testing and Materials (ASTM):
 - a. A36: Structural Steel.
 - b. A167: Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip.
 - c. A325: High Strength Bolts for Structural Steel Joints.
 - d. A446: Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality.
 - e. A480: General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet and Strip.
 - f. A490: Quenched and Tempered Alloy Steel Bolts for Structural Steel Joints.
 - g. A500: Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Round and Shapes.
 - h. A501: Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
 - i. A525: Steel Sheet, Zinc Coated (Galvanized) by Hot Dip Process, General Requirements.
 - j. B138: Manganese Bronze Rod, Bar, and Shapes.
 - k. B209: Aluminum-Alloy Sheet and Plate.
 - l. B221: Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes and Tubes.
 - m. C1048: Heat Treated Flat Glass-Kind HS, Kind FT, Coated and Uncoated Glass.
5. National Electrical Manufacturer's Association (NEMA):
 - a. FS L-P-508: Plastic Sheet, Laminated, Decorative, and Nondecorative.
 - b. LD-3: High Pressure Decorative Laminates.
 - c. MG1: Motors and Generators.
 - d. PS-1: Construction and Industrial Plywood.
6. National Fire Protection Association (NFPA):
 - a. NFPA 70: National Electrical Code.
 - b. NFPA 80: Fired Doors and Windows.

Or
7. Americans with Disabilities Act: Texas Accessibility Standards (TAS)
8. Other:
 - a. MIL-L-1914: Lumber and Plywood, Fire Retardant Treated.

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- b. AWS D1.1: Structural Welding Code.
- c. AISC-Specification for the Design, Fabrication, and Erection of Structural Steel for Buildings.
- d. ANSI/IEEE 519: Electrical harmonic requirements.

1.03 System Description:

- 1. Characteristics of Elevator No. # as follows:
 - 1. Type: Direct plunger type hydraulic freight; cylinder in buried casing.
 - 2. Control: Microprocessor based static type that is software oriented.
 - 3. Electric Power Characteristics: For elevator drive equipment: (##) Hp., 480 Volt, three-phase 60Hz. For lighting: 120 Volt, 60 Hz.
 - 4. Capacity: ##### pounds (#### kg).
 - 5. Speed: ### ft/min (##m/s).
 - 6. Loading Class: "A".
 - 7. Car Interior Dimensions: (#'-#") wide x (#'-#") deep (#'-#") height.
 - 8. Landing entrances:
 - a. Size: (#'-#") wide by (#'-#") high.
 - b. Type: Vertical bi-parting, power operated.
 - c. Construction: Welded type.
 - d. Material: Steel prime and painted.
 - e. Truckable sill on lower panel.
 - 9. No. of Stops: Number (#) stops; Travel distance: (##'-#") .
 - 10. No. of Openings: Number (#); (#) at front and (#) at rear.
- 2. Operation (Select one):
 - a. Simplex Collective.
 - b. Duplex Collective.
- 3. Car Gate and Hoistway Door Control Features:
 - a. Individual electric operators shall open and close the hoistway doors and car gate at a panel speed of not more than one foot per second without slamming. Limit switches shall be provided to stop the operator motors as the doors approach the limit of travel in opening.
 - b. Provisions shall be made for the manual operation of the doors from the car in the event of a power failure.
 - c. The door operators shall be arranged to open the door automatically after the car enters the automatic leveling zone at the designated landing.
 - d. Each door shall use dual motors.
 - e. Provide automatic closing operation which shall close the gate and door after a field adjustable period of time. Prior to automatic closing, an audible pre-closing signal shall sound to warn the operator. The audible signal shall be accomplished with a solid state toner. Bells are not acceptable.

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- f. Door Safety Devices: soft, mechanical safety edges, quiet in operation, with non-contact reversing light ray. Peelle or Owner approved equivalent. Gates shall be provided with passenger sequence operation.
 - g. Door Operators: Individual electric operators.
- 4. A stainless steel vandal proof hall lantern with an audible signal shall be installed at each landing entrance for each elevator. The lanterns, when illuminated, shall indicate the elevator car which shall stop at the landing and in which direction the car is set to travel.
 - 5. Electric limit switches shall be placed in the hoistway near the terminal landings and be designed to cut off the electric current and stop the car should it run beyond either terminal landing.
 - 6. The elevator shall be provided with a self-leveling feature that will automatically bring the car to the floor landings. This feature shall be entirely automatic and independent of the operating device and shall correct for overtravel or undertravel. The car shall be maintained level with the landing irrespective of the load.

1.04 Fireman's Service:

- 1. Interconnect elevator control system with building fire alarm, and smoke alarm system.
 - a. Provide "Firefighter's Operation" in accordance with the latest ASME A17.1.
 - b. Designated Landing: Egress Floor.
- 2. Seismic Design: In accordance with applicable code.

1.05 Emergency Operation:

- 1. Battery or Auxiliary Emergency Power operated emergency return device to return elevator to the Egress Floor and open car and landing doors. Auxiliary (form "C") contacts are required to be incorporated in Shunt Trip, or fused type disconnects for emergency lowering device. The elevator controls shall include two inputs from the emergency electrical system. One input shall be from a set of (Form "C") contacts which shall change state when the electrical system has switched to emergency operation. A second input shall be from a set of normally open contacts which shall close 0-50 seconds prior to any controlled change of the emergency electrical system and shall open after the change. This input shall be designed as the pre-transfer signal. This may not be used at the time of installation of the equipment but must be available for future use.

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2. When normal power is restored, automatically return elevator to normal operation.
- 1.06 Submittals For Review:
- Submit under provisions established in the project specifications, Division One requirements.
1. Provide a signed copy of The University of Texas ENVIRONMENTAL HEALTH AND SAFETY CONSTRUCTION SITE PROCEDURES FOR CONTRACTORS, prior to commencement of any work.
 2. Shop Drawings: Include following information:
 - a. Motor, hydraulic pumps, valves, controller, selector, governor, and other component locations.
 - b. Car, machine beams, guide rails, buffers, and other components in hoistway.
 - c. Rail bracket spacing and maximum loads imposed on guide rails requiring transfer to structure.
 - d. Individual weight of principle components and load reactions at points of support.
 - e. Loads on hoisting beams.
 - f. Clearances and over travel.
 - g. Locations of components in machine room. Show arrangement so that moving elements and other equipment can be removed for repairs without disturbing other components. Arrange equipment for clear passage through doors and access doors.
 - h. Location in hoistway and machine room of connections for car light and telephone.
 - i. Locations of access doors, doors, and frames.
 - j. Expected heat dissipation of elevator equipment in machine room.
 - k. Electrical characteristics and connection requirements.
 3. Samples: Illustrate cab interior finishes and car and hoistway door and frame finishes.
- 1.07 Submittals At Project Close-Out:
1. Contract Close-out: Procedures for submittals.
 2. Furnish two copies of bound maintenance manuals for each elevator. Include full maintenance and operating instructions, parts list, recommended spare parts, emergency parts inventory, sources of purchases and wiring diagrams.

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3. Include legible schematic of hydraulic piping and wiring diagrams of installed electrical equipment and changes made in the work. List symbols corresponding to identity or markings on machine room and hoistway apparatus.
4. Provide two copies of master electric and hydraulic schematics and one copy of lubrication chart.
5. Tools, electrical prints, parts catalogs, keys, door keys, protective cab pads and other proprietary components shall be turned over to The University of Texas Utilities Service Elevator Inspection Department, upon final inspection of the elevator.

1.08 Quality Assurance:

1. Perform Work in accordance with the latest ASME A17.1, AWS D1.1, NFPA 70, AISC, and as supplemented in this section.
2. Fabricate and install door and frame assemblies in accordance with NFPA 80 and UL 10B.
3. Qualifications:
 - a. Contractor:
 1. Maintain a warehouse and maintenance service in the City of Austin, Texas.
 2. Minimum (5) years, prior to bid date of this project, in the business of providing elevator service and having warehouse facilities.
 3. Maintain in Austin, Texas an adequate stock of parts for emergency and replacement purposes.
 4. Qualified personnel available at Austin, Texas to insure fulfillment of maintenance and/or repair service on a 24 hour emergency call basis.
 - a. Installer: Employees and supervisor on payroll of elevator equipment manufacturer.
 - b. Equipment: Manufactured and guaranteed by the selling company; manufactured in its entirety (exclusive of cabs and doors) by the designer and manufacturer.
 - c. Parts, accessories, and appurtenances: Erected, installed, adjusted, tested and placed in operation by competent mechanics skilled in this work and under the direct control and supervision of the installers experienced foreman.

1.09 Regulatory Requirements:

1. Conform to the latest ASME A17.1 code for manufacture and installation of elevator system.
2. Conform to State of Texas Accessibility Standards for provisions for the disabled.

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3. Products Requiring Electrical Connection: Listed and classified by Underwriters' Laboratories, Inc.

1.10 Warranty:

1. Contract Close-out.
2. Correct defective Work within a one year period after Date of Substantial Completion.
3. Warranty: Include coverage for elevator operating equipment and devices.
4. Sealed jack assembly: 20 year unconditional warranty. Jack packing is excluded from this warranty.

1.11 Maintenance Service:

1. Contract Close-out.
2. Provide service and maintenance of elevator system and components for Ninety (90) Days from Date of Final Acceptance of last elevator.
3. Examine system components monthly. Clean, adjust, and lubricate equipment.
4. Include systematic examination, adjustment, and lubrication of elevator equipment; maintain hydraulic fluid levels. Repair or replace parts whenever required. Use parts produced by the manufacturer of the original equipment.
 - a. Include monthly fire service, battery lowing and emergency lighting inspections and test.
 - b. Include elevator cab handrails.
5. Perform work without removing cars during peak traffic periods.
6. Maintain in Austin, Texas an adequate stock of parts for replacement or emergency purposes. Have personnel available to ensure the fulfillment of this maintenance service on a 24 hour emergency call basis for this maintenance period.
7. Perform maintenance work using competent and qualified personnel under the supervision and in the direct employ of the elevator manufacturer .
8. Maintenance service shall not be assigned or transferred to any agent or subcontractor without prior written consent of the Owner.

1.12 Extra Materials:

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1. Contract Close-out.
2. Supply three extra keys for each keyed switch.
3. Supply hand held computer and other proprietary components necessary to test and maintain elevator and equipment. Include updates or modifications of test equipment for 10 years.
4. Tools, electrical prints, parts catalogs, keys, door keys, protective cab pads and other proprietary components shall be turned over to The University of Texas Utilities Service Elevator Inspection Department, upon final inspection of the elevator.

PART 2: PRODUCTS

2.01 Manufacturers:

1. Contract Documents are based on Approved products.
2. Equivalent products by the following are acceptable:
 - a. Motion Control Engineering
 - b. Thyssen/Dover
 - c. KONE Inc.
 - d. Tejas Elevator
 - e. United Technologies Otis Elevator Company
 - f. Schindler Elevator Corp
 - g. Elevator Products Corp
 - h. Innovation Industries Corp. Hollister Whitney Elevator Corp.
 - i. PTL Car & Hall Fixtures
 - j. Owner approved equal
3. Substitutions: Under provisions established in the project specifications, Division Two requirements.

2.02 Materials:

1. Steel:
 - a. Shapes: ASTM A 36.
 - b. Sheet: ASTM A 446, galvanized, stretcher leveled, Commercial Grade.
2. Stainless Steel: ASTM A 167, Type 302 or 304.
3. Aluminum: Anodizing quality.

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- a. Extrusions: ASTM B 221.
 - b. Sheet: ASTM B 209, alloy 6063.
4. Plywood: APA Structural I, Grade C-D, sanded.
 5. Paints:
 - a. Primer for steel: Red Oxide.
 - b. Primer for wood: Alkyd primer/sealer.
 - c. Enamel: Semigloss alkyd.

2.03 Components:

1. Motors, Pumps, Valves, Regulators, Fluid Tank, Hydraulic Fluid, Controller, Controls, Buttons, Wiring, Devices, and Indicators: As required by NFPA 70.
2. Power Unit (Oil Pumping and Control Mechanism):
 - a. Pump and valves: Specifically designed for elevator application; the pump shall be of the positive displacement type. Pump/valve assembly shall be suspended within the oil reservoir by a rubber isolated suspension system to allow easy removal of components without draining oil from the reservoir. Silencer shall be installed integrally in the oil reservoir interior. The design shall be such that the silencer shall contain no degradable parts. Where pump/valve assembly requires location outside of reservoir, drip pan under entire unit shall be provided.
 - b. Oil Control Valve: Shall contain in a single housing; high pressure relief valve; check valve; automatic unloading up start valve; lowering and leveling valve and magnetic control. Welded manifolds with separate valves to accomplish each function will not be permitted.
 - c. Motor: Designed for oil-hydraulic elevator service, of standard manufacture, and of duty rating to comply with specified speed and load. Motor rating for the number of starts per hour shall be suitable for the expected use of the elevator (minimum 80 starts per hour).
 - d. Relief valve: Externally adjustable and capable of bypassing the total oil flow before the pressure exceeds 150 percent of the working pressure and that the system will withstand this pressure. The relief valve to be pre-set to open at a pressure not greater than 125 percent of working pressure. The size of the relief valve and by-pass shall be sufficient to pass the maximum rated capacity of the pump without raising the pressure more than 20 percent above that at which the valve opens.
 - e. Up Start and Stop Valve: Externally adjustable and designed to bypass oil flow during start and stop of motor pump assembly. Valve shall close

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slowly, gradually diverting oil to or from the jack unit, insuring smooth up starts and up stops.

f. Oil Viscosity Control: When the oil temperature drops below the optimum operating temperature means shall be provided to maintain the proper viscosity of the oil.

3. Guide Rails, Spring Buffers, Attachment Brackets and Anchors: Purpose designed, sized according to ASME A17.1 Code with safety factors.

4. Jack Unit:

a. Designed and constructed in accordance with the applicable requirements of the ASME A17.1 Code; Sized to lift the gross load to height specified; Factory tested to insure adequate strength and freedom from leakage; No brittle material, such as gray cast iron, shall be used in the jack construction.

b. Components:

1. Plunger: Heavy seamless steel tubing accurately turned and polished.

2. Stop ring: Electrically welded to plunger to positively prevent plunger leaving the casing.

3. Internal guide bearing, packing or seal of suitable design and quality.

4. Drip ring around cylinder top.

5. Cylinder constructed of steel pipe and provided with a pipe connection and air bleeder.

6. Brackets: Welded to the jack cylinder for supporting elevator on pit channels.

7. Accessories: As required.

c. Provide required cylinder hole for hydraulic jack complete with an outer steel casing per ASME A17.1 and an inter watertight schedule 40 PVC casing.

5. Operational Controller:

a. Motion Control Engineering Inc. (MCE) Only. Controller shall be NEMA 1

b. Drive Control: PHC

6. Landing System: Shall be compatible with MCE controller.

a. (LS-QUTE)

2.04 Electrical System Characteristics:

1. Electrical Characteristics:

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- a. 480 volts, three phase, 60 Hz.
 - b. Refer to Division 16, - Equipment Wiring Systems: Electrical connections.
2. Motor: NEMA code letter G or as required for torque and duty requirements. (##) hp motor @ (##) rated load amperes. Class F insulation rating.
 3. Starter Characteristics:
 - a. Provide "Soft Start" electronic mode voltage reduction for operation of starters.

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2.05 Electrical Components:

1. Boxes, Conduit, Wiring, and Devices: Required by NFPA 70 and Division 16.
2. Fittings: Steel compression type for electrical metallic tubing. Fittings with set screws are acceptable only when a separate grounding conductor is also installed across the joint.
3. Spare Conductors: Include 10 percent extra conductors and two pairs of shielded audio cables in traveling cables. Do not parallel conductors to increase electric current capacity unless individually fused.
4. Do not use armored flexible metal conduit as a grounding conductor.
5. Include wiring and connections to elevator devices remote from hoistway and between elevator machine rooms. Provide additional components and wiring to suit machine room layout.
6. All labeling required by ASME A.17.1 shall be of permanently engraved/embossed and permanently affixed plaques. Plaques may be either plastic laminate or metallic. **“Permanent Marker” or “Labeling Tape” ID’s shall not be used.**

2.06 Lubrication:

1. Grease Fittings: For lubricating bearings requiring periodic lubrication.
2. Lubrication Points: Visible and easily accessible.

2.07 Car Structural Fabrication:

1. Frame: Fabricated steel frame of formed or structural steel shapes, gusseted and rigidly welded.
2. Platform: Aluminum checkered plate, 1/4” thick laid over steel stringers and subflooring. The car sling shall be completely isolated from piston by vibration absorbing materials.
3. Sling: Shall consist of heavy steel stiles, properly affixed to a steel crosshead and safety channels with adequate bracing members to remove all strain from the car enclosure.
4. Car Guides: Rubber faced, spring loaded roller guides of suitable size for a smooth quiet operation.

2.08 Cab Fabrication:

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1. Cab Design:

- a. Cab Size: Platform (#'-#")X(#'-#") Floor to ceiling (#'-#").
- b. Flooring: Aluminum checkered plate, 1/4" thick.
- c. Car Gate: Single Blade, expanded metal, power operated.
- d. Sides and rear: Rigidized stainless steel panels with diamond pattern.
- e. Ceiling: Baked enamel on 14 gauge steel. ____ ft. ____ in. under ceiling.
- f. Ventilation: 2 speed blower mounted above ceiling, with grille.
- g. Lighting: Fluorescent with solid lens diffuser.
- h. Controls and fixtures:
 1. Operating panel flush mounted vandal resistant in side wall.
 2. Flush mounted telephone.
 3. Car position indicator.
 4. Emergency light.
- i. Provide stainless steel license holders for display of required certificates. Design the holder to use non-visible tamper-proof fastenings. Holder shall enclose an 8 1/2" x 11" sign.

2.09 Car Operating Panel:

1. Provide one flush mounted vandal resistant operating panel with an integral and front return face plate; with front return panels containing vandal resistant illuminated car buttons corresponding to floors served, in car alarm button, and DOOR OPEN, DOOR CLOSE buttons.
 - a. Locate a 110 V, 15 Amp GFI convenience receptacle in car panel.
 - b. Elevator identification number, 1/2 inch high, engraved and filled. Locate at top of panel.
 - c. Engraved and filled lettering on panel; silk screened lettering not acceptable.
2. Position alarm button and emergency stop switch not less than 35 inches above cab floor where it is unlikely to be accidentally actuated. Key switches to be mounted in car panel. Emergency stop, push-pull or toggle type shall activate alarm or bell when operated.
3. Switches mounted in car operating panel:
 - a. Independent service switch (key operated).
 - b. Fan or blower switch (key operated).
 - c. Light switch (key operated).

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4. Emergency light: Include an Integral Emergency light mounted above the main Car operating panel. Include battery and charging unit within Car Operating Panel.
 5. ADA Flush mounted telephone: Wurtec Inc. Cat. #11-582-van, or Owner approved equal.
 6. Car Position Indicator: Through engraved and filled car position indicator in car operating panel.
 7. Additional operating switches for the special features specified:
 - a. DOOR HOLD OPEN PUSH BUTTON to be included. When activated by momentary pressure, the doors shall remain open for an adjustable period of time (1-180 seconds). This extended door open time will be canceled by activation of the DOOR CLOSE button. This circuit shall be rendered inoperative during Fire Service.
- 2.10 Car Top Inspection Station:
1. Provide station device to operate each elevator from on top of the car during adjustment, inspection, maintenance, and repair.
 2. Operating means shall conform to the following:
 - a. Device shall be of the continuous-pressure type; operate the car at a speed not exceeding 150 ft/min; operate the car subject to the electrical protective devices required by ASME A17.1 Rule 210.1d.
 3. Device shall be used only for the purpose of adjustment, inspection, maintenance, and repair of the elevator or hoistway equipment.
 4. Provide each elevator with an electric light with guard and GFI convenience outlet fixture on the car top.
- 2.11 Cab Entrances:
1. Car Gate: Single Blade expanded metal, power operated, 6'-0" height. With standard returns.
 2. Gates shall be provided with soft mechanical safety edge and a non-contact reversing device, Pelle or equivalent, and with passenger sequence operation.
- 2.12 Accessibility Provisions:
1. Comply with applicable code.

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- a. Provide 2 inch high raised Braille and numerals on each landing jamb to identify landing number, characters shall be centered 60 inches above finish floor.
- b. Provide Braille numerals immediately to left of car buttons, DOOR OPEN DOOR CLOSE, and alarm buttons in the control panel to identify each landing. Shall be glued and screwed into position.

2.13 Hoistway Entrances:

1. Hoistway Doors shall be Peel doors (or Owner approved equal): Prime painted steel vertical BI-parting; 0.058 inch ([1.5 mm) thick metal, of insulated sandwich panel construction, flush design, rolled profiles, rigid construction, 4'x12'' tempered glass vision panel.
2. Hoistway Door Frames: Steel channel established in the project specifications, Division Two requirements.
 - a. Provide 2 inch high raised numerals and Braille on each landing jamb to identify landing number, characters shall be centered 60 inches above finish floor.
3. Door Construction: 1-1/2 hour fire rating; insulated sandwich panel door construction 1-1/4 inch (32mm) thick, minimum; Truckable sill on lower door panel.
4. Sills: Steel edge angle established in the project specifications, Division Two requirements.

2.14 Landing Controls:

1. Landing Buttons: Vandal-resistant stainless steel Illuminating type, one for originating UP and one for originating DOWN calls, one button only at terminating landings; marked with arrows, including indications required by ASME A17.1. Hall button covers to be engraved and filled with pictograph detailing "In case of fire use stairs". Accepted alternate "Cast Appendix H" inset to face plate as manufactured by Stencil Cutting & Supply Company.
2. DOOR OPEN DOOR CLOSE buttons. Vandal-resistant type. Constant pressure on the CLOSE button shall close the door. Momentary pressure on the OPEN button shall re-open the door, provided the car is at a landing.
3. Screws: All screws to be pin in hex tamper proof.

2.15 Finishes:

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1. Structural Metal Surfaces: Clean surfaces of rust, oil or grease; wipe clean with solvent; prime and paint.
2. Machine Room Components: Clean and degrease; prime one coat, finish with one coat of enamel.
3. Galvanized Surfaces: Clean with neutralizing solvent; prime one coat.
4. Aluminum: Mill finish.
5. Wood Surfaces not Exposed to Public View: One coat primer; one coat enamel.
6. Stainless Steel: #4 Satin.

PART 3: EXECUTION

3.01 Installation:

1. Install in accordance with ASME A17.1, manufacturer's instructions, and applicable codes.
2. Casing:
 - a. Excavate for hydraulic hole casing. Set steel casing in hole free of rocks and other protrusions. Backfill open space between the hole and steel casing with settling sand. The PVC casing shall be of suitable size to allow a minimum annular space of 1-1/2 inches between the PVC and steel casing. After plumbing the PVC fill the 1-1/2 inch annular space between the steel casing and PVC casing with settling sand. There shall be a minimum 1-1/2 inch annular space between the PVC casing and the elevator hydraulic jack. PVC casing shall be sealed at the bottom with a schedule 40 PVC cap that fits the casing. The PVC casing shall be brought up to the finish floor level. Following installation of hydraulic jack in the PVC casing, fill the annular space with Union-guard 160 by Pacific Standard Chemical Co. or (Owner approved substitute). Follow Manufacture's recommended installation procedure. The PVC casing shall be grouted into concrete floor slab with a non-shrinking concrete. There shall be a 1" galvanized nipple installed through the concrete cap into the 1-1/2" annular space between the PVC and hydraulic jack with a bleeder valve mounted on top to monitor the pressure between the PVC and jack. Wrap nipple with electrical tape.
 - b. Prior to installing jack, remove water and debris from PVC casing.
 - c. Double wrap hydraulic jack with an approved coating designed to protect the unit from electrolytic and chemical corrosion. Any other underground piping shall be similarly protected.

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- d. Install jack assembly plumb, centered, and shimmed; use centering lugs to prevent displacement.
 - e. Following installation of hydraulic jack in the PVC casing, fill the annular space with Union-guard 160 by Pacific Standard Chemical Co. Follow Manufactures recommended installation
3. Arrange equipment in machine room so that elements requiring removal or maintenance are readily accessible without disturbing other components. Arrange for clear passage between components.
 4. Install system components. Connect equipment to building utilities.
 5. Mount motor and pump unit on vibration and acoustic isolators, equal to type ND by Mason Industries. Securely fasten to building supports; prevent lateral displacement.
 6. Install and connect piping between machine and cylinder.
 7. Install guide rails to compensate for expansion and contraction movement.
 8. Accurately machine and align guide rails. Form smooth joints with machined splice plates.
 9. Install hoistway doors. Set doors in vertical bi-parting alignment with car openings and plumb hoistway lines.
 10. Adjust equipment for smooth and quiet operation.
 11. Clean field welds; remove oxidation and residue. Apply touch up primer and paint.

3.02 Erection Tolerances:

1. Quality Control: Tolerances.
2. Guide Rail Alignment: Plumb and parallel to each other in accordance with ASME A17.1 and ASME A17.2.2.
3. Cab Movement on Aligned Guide Rails: Smooth movement, with no objectionable lateral or oscillating movement or vibration.

3.03 Field Quality Control:

1. Quality Control: Field inspection, testing, adjusting, and balancing.
2. Perform tests required by ASME A17.1 and ASME A17.2.2.
3. Test elevator in presence of Owner and Architect to ensure proper operation and compliance with specified requirements; make final adjustments as appropriate.

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4. Obtain inspections and permits and make such tests as are required by governing authorities. Deliver test certificates and permits to Owner.
 5. Provide two weeks written notice of date and time of tests.
 6. Supply instruments and execute specific tests.
- 3.04 Tests By Regulatory Agencies:
1. QEI Certified Testing in accordance with ASME A 17.1 will be performed by Owner.
- 3.05 Adjusting:
1. Contract Close-out: Adjusting installed work.
 2. Adjust for smooth acceleration and deceleration of car so not to cause passenger discomfort.
 3. Adjust automatic floor leveling feature at each floor to achieve (+/-)1/4 inch (6mm) from flush.
- 3.06 Cleaning:
1. Contract Close-out: Cleaning installed work.
 2. Remove protective coverings from finished surfaces.
 3. Clean surfaces and components ready for inspection.
- 3.07 Protection Of Finished Work:
1. Contract Close-out: Protecting installed work.
 2. Do not permit construction traffic within cab after cleaning.

END OF STANDARD 14250