

HYDRAULIC ELEVATORS**SECTION 14245****PART 1 - GENERAL**

1.01 SECTION INCLUDES

- A. Passenger elevator.
- B. Hydraulic elevator systems; "holeless" cylinder system.
- C. Cab with doors and frames; hoistway entrance doors and frames.
- D. Motor and pump, controllers with reduced voltage starting, hoistway, equipment, and all accessories for a complete installation.
- E. The Contractor is responsible to assure his equipment will operate satisfactorily within the specified conditions. If modifications are required, it shall be the Contractor's responsibility to make any necessary changes as needed.
 - 1. Should any equipment be furnished that will not properly function within the specified parameters, it shall be the Contractor's responsibility to pay any additional costs attributable to providing the correct equipment.
- F. Successful elevator vendor must provide a priced spare parts list with prices good for at least three (3) years and indicate availability of spare parts. Also provide a "Full Maintenance" proposal for one (1) year beyond the specified maintenance requirements for the first year including cost, services, terms and conditions on vendor letterhead.
- G. If proprietary diagnostic equipment or special tools are required for elevator maintenance, the diagnostic equipment must be supplied with the elevator.
- H. Elevator vendor must include cost and description of training available for Owner.

1.02 RELATED SECTIONS

- A. Section 05500 - Metal Fabrications: Pit ladder and sill supports.
- B. Section 07145 - Waterproofing: Waterproofing of elevator pit walls and floor.
- C. Section 09260 - Gypsum shaft wall enclosures.
- D. Division 15 - Plumbing Equipment: Pit sump and pump.
 - 1. Heat and ventilation in Machine Room to maintain the room at a temperature of 60°F minimum and 100°F maximum with humidity not exceeding 95%.

E. Division 16:

1. Empty conduit to elevator equipment devices remote from elevator machine room or hoistway.
2. Electrical characteristics and wiring connections.
3. Electrical service to main disconnect in elevator machine room including electrical power for elevator installation and testing.
4. Electrical service for machine room, machine room convenience outlets, and pit.
5. Lighting and outlet in elevator pit with switch located adjacent to access door or ladder.
6. Empty conduit for telephone service to elevator controller in machine room.
7. Fire Alarm and Smoke Detection Systems: Fire and smoke detectors and interconnecting devices.
8. Shunt trip on "building side" to interrupt power at the elevator disconnect.
9. Fire alarm signal lines to elevator controller cabinet.
10. Fused disconnect or circuit breaker per elevator.
11. Feeder and branch wiring circuits to the controller, including main line switch and convenience outlets.
12. Provide a telephone circuit terminated at each controller. Elevator contractor shall supply and wire telephone cable between controller and car. When separate firefighters' telephones are required, provide as above.
13. Provide a 20A, 120 volt, single-phase protected branch circuit from a normal/emergency power source to the elevator group supervisory panel.
14. Provide circuits to each controller for life safety speakers and firefighters' phone communication, if required. Furnish car speaker and phone jack for mounting and wiring by elevator contractor. Where required by local codes, furnish and install firefighters' phone jacks in a separate fixture at each elevator lobby.

1.03 REFERENCES

- A. AISC - Specification for the Design, Fabrication and Erection of Structural Steel for Buildings.
- B. ANSI A117.1 - Buildings and Facilities - Providing Accessibility and Usability for Physically Handicapped People.
- C. ANSI/ASME A17.1 - Safety Code for Elevators and Escalators.
- D. ANSI/ASME A17.2 - Inspector's Manual For Elevators and Escalators.
- E. ASTM A36 - Structural Steel.
- F. ASTM A366 - Steel, Sheet, Carbon, Cold-Rolled, Commercial Quality.
- G. ANSI/AWS D1.1 - Structural Welding Code, Steel.
- H. ANSI/NFPA 70 - National Electrical Code.
- I. ANSI/NFPA 80 - Fire Doors and Windows.

- J. ANSI/UL 10B - Fire Tests of Door Assemblies.
- K. APA - American Plywood Association.
- L. ASTM A139 - Electric-Fusion (ARC)-Welded Steel Pipe (NPS 4- in. and Over).
- M. ASTM A167 - Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
- N. ASTM A446 - Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality.
- O. ASTM B221 - Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes.
- P. NEMA LD3 - High Pressure Decorative Laminates.
- Q. NEMA MG1 - Motors and Generators
- R. Steel Structures Painting Council (SSPC) - Steel Structures Painting Manual.

1.04 SYSTEM DESCRIPTION

- A. Hydraulic Elevator System: Holeless unit as standard with specified system with motor and pump and valves in tank with tank heater.
- B. **Service Elevator:** Characteristics of elevator are as follows:
 - 1. Rated Net Capacity: 5000 lbs.
 - 2. Car Speed: 100 Feet Per Minute
 - 3. Simplex Collective Operation: Using a microprocessor-based controller, operation shall be automatic by means of the car and hall buttons. If all calls in the system have been answered, the car shall park at the last landing served.
 - 4. Number of Stops and Openings: See Drawings, front and rear doors
 - 5. Power Supply: 3 Phase, 60 Hertz, 208 volt; Contractor is responsible to verify available power characteristics.
 - 6. Lighting Supply: 120 Volts, 1 Phase, 60 Hertz
 - 7. Clear Inside Cab Size: 5'-11" Wide x 8'- 6-3/4" Deep
 - 8. Height Under Car Top: 8'-0"
 - 9. Height Under Suspended Ceiling: 7'-4-1/2"
 - 10. Type of Doors for Car and Hoistway Entrances: Two speed, factory finished
 - 11. Hoistway Entrance and Car Opening Size: 4'-6" Wide x 7'-0" High
 - 12. Car Operating Panel: One (1) at front and one (10) at rear
 - 13. Signals: Impulse signal fixtures. Car buttons mounted at 20° angle. Position indicator in car. Illuminated car and hall registration pushbuttons.
- C. Hydraulic Elevator System: Motor and pump and valves in tank with tank heater.

D. Special Features as follows:

1. Emergency return unit (automatic return to the ground floor)
2. Variable door times for car and hall calls
3. Limited door reversal
4. Independent Service
5. Nudging
6. Fireman's Emergency Service Phase I and Phase II per ANSI A17.1 with integrated signage
7. Hall lanterns and gongs
8. Solid state (SCR) motor starter
9. Reverse phase relay
10. Car top inspection service with service light
11. Power surge protector so upon elevator start and full running speed there will be no affect on other electrical components of the building.
12. Emergency light with battery and charger in each cab.
13. Emergency power battery as part of elevator system.
14. Full collective operation

E. Door Control Features:

1. A direct current motor driven heavy-duty operator shall be provided, designed to operate the car and hoistway doors simultaneously. Door movements shall be electrically cushioned at both limits of travel and the door operating mechanism shall be arranged for manual operation in event of power failure,. The leading edge of the car door shall be provided with a retractable reversal edge arranged to automatically return car and hoistway doors to the open position in the event doors are obstructed during closing cycle. Doors shall then resume closing cycle.
2. Doors shall automatically open when the car arrives at the landing and shall automatically close after an adjustable time interval or when the car is dispatched to another landing. Direct drive geared operators, AC controlled units with oil checks, or other deviations from the above are not acceptable.
3. The door operator microprocessor shall reside in the door operator and controls all functions of the door. The microprocessor door operator and the microprocessor selector shall be linked to the main processor through a serial communications link.
4. Nudging: The doors shall remain open as long as the electronic detector senses the presence of a passenger or object in the door opening if door movement is obstructed for a field programmable time value, a buzzer shall sound and the doors will close at reduced speed. If the reversing edge contacts a person or object while closing, the doors will stop and resume closing after the obstruction has been removed.
 - a. When the doors have failed to fully close and are in the recycle mode, the door drive motor shall have increased torque applied. This shall overcome any mechanical resistance or differential air pressure and allow the door to close.

5. Doors shall open automatically when object present in doorway by means of infrared beam detection system.
- F. Interconnect elevator control system with building fire alarm, and smoke alarm.

1.05 AUTOMATIC OPERATION

- A. The elevator control shall be distributed control system, microprocessor based and software oriented. The main microprocessor and car controller shall be located behind the elevator swing return panel. The microprocessor selector, situated on the car top and the microprocessor door operator, residing in the door operator shall be linked together with the main processor by a serial communications link. Control of the elevator shall be automatic in operation by means of push buttons in the car numbered to correspond to floors served, for registering car stops by "up-down" push button at each landing and "call" push buttons at terminal landings.
1. The momentary pressing of one or more buttons shall dispatch the car to the designated landings in the order in which the landings are reached by the car, irrespective of the sequence in which the buttons are pressed. Each landing call shall be canceled when answered. When the car is traveling in the up direction, it shall stop at all floors for which car buttons or "up" hall buttons have been pressed; it shall not stop at floors when "down" buttons only have been pressed, unless the stop for that floor has been registered by a car button, or unless the down call is at the highest floor for which any buttons have been pressed. Likewise, the pressing of an "up" button when the car is traveling in the down direction shall not intercept the travel unless the stop for that floor has been registered by a car button, or unless the up call is the lowest for which any button has been pressed.
- B. When the car has responded to its highest or lowest stop, and stops are registered for the opposite direction, its direction of travel shall reverse automatically and it shall then answer the calls registered for that direction.
- C. An adjustable time delay shall be provided so that after the car has stopped in response to a hall button, the entering passenger may register his car button before the car will reverse to answer calls in the opposite direction.
- D. Key activation to normal operation will return car to normal operation.

1.06 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Shop Drawings: Indicate the following information:
1. Motor and hydraulic pump, valves, controller, selector, governor and other component locations.
 2. Car, machine beams, guide rails, buffers, and other components in hoistway.

3. Rail bracket spacing; maximum loads imposed on guide rails requiring load transfer to building structural framing.
 4. Individual weight of principal components; load reaction at points of support.
 5. Loads on hoisting beams.
 6. Clearances and over travel of car.
 7. Location of components in machine room.
 8. Locations in hoistway and machine room of connections for car light and telephone.
 9. Location and sizes of access doors, doors, and frames.
 10. Expected heat dissipation of elevator equipment in machine room.
 11. Electrical characteristics and connection requirements.
 12. Show arrangement of equipment in machine room so moving elements and other equipment can be removed for repairs or replaced without disturbing other components. Arrange equipment for clear passage through access door.
- C. Product Data: Provide data on the following items:
1. Signal and operating fixtures, operating panels, indicators.
 2. Cab design, dimensions, layout, and components.
 3. Cab and hoistway door and frame details.
 4. Electrical characteristics and connection requirements.
- D. Samples: Submit two samples, 3 x 4 inch in size illustrating cab interior finishes and cab and hoistway door and frame finishes.
- E. Certificates and Test Reports:
1. Submit written, certified reports for required tests, recording the dates performed, test method (description), test results, interpretation of the results, and recommended action. Where required, submit additional copies directly to governing authorities.
 2. Provide certificates and operating permits to the Owner for each elevator, obtained from governing authorities, as necessary for normal, unrestricted use of the elevators.

1.07 OPERATION AND MAINTENANCE DATA

- A. Submit under provisions of Section 01700.
- B. Submit four (4) copies of bound maintenance manuals for each elevator or group of elevators. Include record (as-built) drawings, one-line wiring diagrams for power, lighting, signals, controls and communications, full maintenance and operating instructions, parts lists, recommended spare parts and emergency parts inventory, sources of purchase and similar information. Include engineering data for microprocessor based systems.
- C. Diagnostic Test Equipment and Instructions: Diagnostic test device together with one set of all supporting information necessary for interpretation of test data and troubleshooting of system. The instruction period for use of the controller diagnostics and interpretation of test results by Owner's maintenance personnel shall not be less than one eight-hour day for the work included under this section.

- D. Include a parts catalog with complete list of equipment replacement parts; identify each entry with equipment description and identifying code.
- E. Provide technical information for servicing operating equipment.
- F. 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.
- G. Provide one copy of master electric and hydraulic schematic and one copy of lubrication chart, each framed with clear plastic; mount on machine room wall.
- H. Provide field adjusting and diagnostic tool required for the microprocessor.

1.08 QUALITY ASSURANCE

- A. Perform Work in accordance with ASME/ANSI A17.1 with latest editions, ANSI/AWS D1.1, NFPA 70, AISC, and as supplemented in this section.
- B. Fabricate and install door and frame assemblies in accordance with ANSI/NFPA 80 and ANSI/UL 10B.

1.10 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum ten years documented experience.
- B. Installer: The elevator installer shall be an authorized licensee of the manufacturer, who has not less than 5 years successful experience with the installation of similar elevators, and who is currently under contract for maintenance of similar elevators in the area, and who maintains a service center within 75 miles of the project site.

1.11 REGULATORY REQUIREMENTS

- A. Conform to applicable code for manufacture and installation of elevator system.
- B. Conform to ANSI A117.1 and ADA, whichever is more stringent, for provisions for the physically handicapped, including clearances, control and jamb signage, locations for signal equipment, door timing cycles, and similar provisions.
- C. Products Requiring Electrical Connection: Listed and classified by Underwriters' Laboratories, Inc. as suitable for the purpose specified and indicated.

1.12 PRE-INSTALLATION CONFERENCE

- A. Convene one week prior to commencing work of this section; see Section 01200.
- B. Require attendance of persons directly involved with the work of this section.

- C. Review schedule of installation, installation procedures and conditions, and coordination with related work.
- D. Review temporary use of elevator, hours of use, scheduling of its use, cleanliness of cab, employment of operator, maintenance of system

1.13 FIELD MEASUREMENTS

- A. Verify that field measurements are as indicated on shop drawings and as instructed by the manufacturer.

1.14 SCHEDULING

- A. Schedule work to permit early use of Elevator for construction purposes.

1.15 WARRANTY

- A. Provide written warranty in four copies signed by Installer and Elevator Manufacturer agreeing to replace defective materials or workmanship including, but not limited to the following:
 - 1. Operational failures.
 - 2. Performance below specified minimums.
 - 3. Excessive deterioration or aging.
 - 4. Unsafe conditions.
 - 5. Excessive noise or vibration.
 - 6. Abnormal wear considering intensity of use, unexpected or unsatisfactory conditions.
- B. Warranty will not include:
 - 1. Acts of Nature.
 - 2. Abusive use.
 - 3. Vandalism.
 - 4. Failure of the structure.
 - 5. Failure of power supply.
- C. Make corrective adjustments or repairs within 24 hours of notification by the Owner.
 - 1. Should such repairs be required outside of normal working hours, Owner will pay differential cost between regular and overtime hours.
- D. Warranty Period: One year starting at the date of the Notice of Acceptance of all elevators included under scope of this work.
- E. Provide a full twenty (20) year warranty on the hydraulic cylinder and casing.
- F. Defective items shall be removed, replaced or repaired without expense to the Owner at the convenience of the Owner. Any damages to the building or any other work resulting from defects in the work of the Contractor's actions in removing, repairing or replacing the

defective work shall be the responsibility of the Contractor.

- G. The Contractor and Elevator Subcontractor shall jointly guarantee the equipment to perform in complete accordance with the characteristics, rating, capacities, and speeds required by the Contract Documents.

1.16 MAINTENANCE SERVICE

- A. Starting at the date of the Notice of Acceptance, provide complete systematic inspection and maintenance of elevators concurrent with one year new equipment warranty.
 - 1. Furnish trained experts and equipment to check, adjust, lubricate and otherwise maintain the elevators.
 - 2. Repair or replace defective or worn materials or parts except as cause by misuse or abuse by Owner or building occupants.
 - 3. Maintenance period: Twelve (12) months.
- B. This service shall include regular examinations of the installation by competent and trained employees of this Subcontractor, and shall include all necessary adjustments, lubrication, cleaning, supplies, and parts to keep the equipment in perfect operation, except such parts made necessary by misuse, accidents, or negligence not caused by this Subcontractor.
- C. The Elevator Subcontractor shall have bonafide proven manufacturer's service facilities within 75 miles of the project, which shall be maintained direct by the manufacturer. This Subcontractor shall also have in inventory, within 75 miles of the project, the necessary replacement parts for satisfactory servicing.
- D. Make corrective adjustments, repairs within 24 hours of notification by Owner. Should such repairs be required outside of normal working hours, Owner will pay differential cost between regular and overtime.
- E. Perform work without removing cars during peak traffic periods.
- F. Provide emergency call back service at all hours for this maintenance period within one hour of that call.
- G. Maintenance service shall not be assigned or transferred to any agent or Subcontractor without prior written consent of the Owner.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Specification is based on "LVM 5000LR" by Otis or equal by Kone, Dover and Schindler.

2.02 MATERIALS

- A. Sheet Steel (Furniture Steel for Exposed Work): Stretcher-leveled, cold-rolled, commercial-quality carbon steel, complying with ASTM A366, matte finish.
- B. Sheet Steel (for Unexposed Work): Hot-rolled, commercial-quality, carbon steel, pickled and oiled, complying with ASTM A569.
- C. Structural Steel Shapes and Plates: ASTM A6, ASTM A36, ASTM A108.
- D. Stainless Steel: Alloy 302 or 304 complying with ASTM A167, with standard temper and hardness required for fabrication, strength and durability.
 - 1. Exposed Surfaces: Apply mechanical finish (Federal Standard and NAAMM nomenclature) on fabricated work in the locations shown or specified, with texture and reflectivity required to match elevator manufacturer's standard #4 satin (120 grit) and #8 mirror finishes where specified herein. Protect with adhesive plastic covering. The grain of belting shall be in the direction of the longest dimension.
- E. Aluminum: Extrusions per ASTM B221,
- F. Paint: Clean all surfaces receiving a baked enamel finish of oil, grease, scale, etc. Apply one coat of rust-resistant alkyd paint followed by a filler coat over uneven surfaces. Sand smooth and apply final coat of alkyd paint. All coats shall be baked on.
 - 1. Clean exposed metal of oil, grease, scale and other foreign matter and factory paint one shop coat of manufacturer's standard rust-resistant primer.
- G. Galvanize: Clean metal of oil, grease, scale and other foreign matter, pickle and factory dip all unfinished metal surfaces.

2.03 PAINT MATERIALS

- A. Shop and Touch-Up Primer: SSPC 15, Type 1, red oxide
- B. Primer for Wood Surfaces: Alkyd primer sealer.

2.04 EQUIPMENT

- A. Motor, Pumps, Valves, Regulators, Fluid Tank, Hydraulic Fluid, Controller, Controls, Buttons, Wiring and Devices, Indicators: Required by ANSI/NFPA 70.
- B. Guide Rails, Cables, Spring Buffers, Attachment Brackets and Anchors: Purpose designed, sized according to code with safety factors.

2.05 HYDRAULIC DEVICES/PLUNGERS

- A. The motor and pump shall be submersed under the oil inside the tank in order to provide for sound isolation. 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 at the top of the pump.
- B. Control valves, including 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 feature, shall be mounted in a compact unit assembly. 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. Automatic two-way leveling shall be provided to automatically stop and maintain the car approximately level with the landing, regardless of change in load.
- C. An up-traveling car shall 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 shall automatically open at the lowers terminal landing permitting passenger egress. The doors shall than automatically close and all control buttons, except the Door Open Button in the car operating panel, will be made ineffective.
- D. Two accurately ground and polished hydraulic plungers shall be provided. The bottom of each shall be fitted with a positive stop designed to prevent the plungers from leaving their cylinders. The top of each plunger shall be fastened to the car frame. The plungers shall be multi-section telescoping type.
- E. Hydraulic cylinders shall be designed to stand upright on the pit floor, on either side of the car, not requiring a buried casing. Each cylinder shall be constructed from heavy steel pipe with a machined steel flange at the upper end and a heavy steel bulkhead at the lower end. Each cylinder shall be connected to the oil line. A packing gland with guide bearing , wiper ring and packing especially designed for hydraulic elevators shall be mounted at the top of each cylinder along with an oil collector ring and drain hole. Each cylinder shall be finished with a coat of rust inhibiting air-dry enamel

2.06 ELECTRICAL CHARACTERISTICS AND COMPONENTS

- A. Electrical Characteristics:
 - 1. Three phase, 60 Hz.; see Division 16 - Electrical
 - 2. Starter Characteristics: Solid State WYE - Delta Starter; reduced voltage starting.
- B. Disconnect Switch: Refer to Division 16 for disconnect switch to be installed in control panel.

2.07 ELECTRICAL COMPONENTS

- A. Boxes, Conduit, Wiring, and Devices: Required by ANSI/NFPA 70.
- B. 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.