

## DIVISION 14 - CONVEYING SYSTEMS

### SECTION 14245 – ROPED HYDRAULIC ELEVATORS

#### PART 1: GENERAL

##### 1.1 SECTION INCLUDES

- A. These specifications are intended to cover the complete installation of the elevator plant in a first-class workmanlike manner and to include all work and material in accordance with the drawings as specified. All work and material shall conform to the requirements of the American Standard Safety Code for Elevators, dumbwaiters, and escalators, latest edition, the National Electric Code, and any local codes which may govern the Requirements of installation. Equipment to be hole less, indirect piston type, in which the driving machine is connected to the car frame with wire ropes running over a sheave with a ratio of 1:2.

##### 1.2 REFERENCES

- A. The Americans with Disabilities Act. (ADA)
- B. ASME/ANSI A17.1 2002 Safety code for elevators and escalators.
- C. ASTM A 36 - Structural Steel
- D. ANSI/NFPA 70 National Electric Code.
- E. ASTM A167 Stainless and Heat-resisting Chromium- nickel steel plate, sheet and strip
- F. ASTM B221 Aluminum and Aluminum, Alloy extruded bars rods wire, shapes, and tubes.

##### 1.3 SUBMITTALS

- A. Submit under provisions of Division 1.
- B. Product Data: Provide data on the following items:
  - 1. Signal and operating fixtures, operating panels, indicators and phone system.
  - 2. Controller and motor drive including non-proprietary compliance.
  - 3. Complete door operating system.
  - 4. Elevator cab
- C. Shop Drawings: Indicate the following information:
  - 1. Pump machine, controller, selector, and other component locations.
  - 2. Car, hoistway dimensions, rails, buffers, hoistway door sizes and location
  - 3. Rail bracket spacing and maximum loads imposed on building structure. Individual weights of principle components and load reactions at points of support.
  - 4. Color selections for door and cab finishes, fixture cut sheets, Electrical characteristics and connection requirements.

##### 1.4 QUALITY ASSURANCE

- A. Perform work in accordance with ANSI/ASME A17.1 2002, ADA, NFPA 70, and as supplemented in this section.

B. Warranty Period: The elevator contractor shall repair or replace any defective components, not due to ordinary wear and tear or improper use, which may develop within one (1) year from date of completion of the equipment.

C. Maintenance Period: The elevator installer shall furnish full maintenance for a period of three months after completion of elevator installation.

## 1.5 QUALIFICATIONS

A. Installer: Elevator Service Company specializing in performing the work of this section and approved by the elevator equipment manufacturer.

B. Controller: The elevator equipment proposed for the project identified below shall be **nonproprietary**. It shall comply with the following provisions and be in compliance with all known standards for universal serviceability and maintainability.

1. Equipment must be generally available for purchase by any qualified elevator contracting business.
2. Spare Parts must be available to any qualified purchaser at reasonable prices and based on a published price list.
3. All equipment or tools necessary for diagnostics, maintenance, adjustment, or troubleshooting shall be available to any qualified elevator contracting business. Such tools shall provide access to all parameters and levels of adjustment that are necessary for the maintenance of the equipment. There shall be no expiring or degrading software that would prohibit proper maintenance.
4. Factory and or on-site training for the installation, adjustment, maintenance, and troubleshooting shall be available for the manufacturer to any qualified elevator contracting business. Any training fees shall be reasonable and appropriate.
5. Technical Support should be made available to any qualified elevator contracting business by the equipment manufacturer. The equipment manufacturer shall provide a toll free phone line available for technical support. This technical support shall be provided at no additional charge.
6. Documentation in the form of manuals, circuitry diagrams, prints, engineering drawings, testing procedures, and parts lists shall be provided with the equipment at the time of installation. Replacement documentation shall be available to any qualified elevator contracting business and reasonable and normal cost.

## 1.6 REGULATORY REQUIREMENTS

A. Conform to ANSI/ASME A17.1 2002 and ADA.

B. ANSI/NFPA 70 for products requiring electrical connection.

## 1.7 FIELD MEASUREMENTS

A. Field measure locations of specified equipment prior to ordering shop drawings.

B. Verify that field measurements are as indicated on shop drawings prior to submitting to engineer.

## 1.8 SCHEDULING

A. Coordinate work with Owner.

## 1.9 WORK BY OTHERS

- A. Preparatory work in conjunction with the elevator installation will be done by other contractors and will consist of the following:
- B. A properly framed and enclosed legal hoistway, including venting as required by the governing code or authority, ready for uninterrupted use by the elevator installer at an agreed upon date.
- C. All electric power for light, tools, and hoists. During erection if welding is necessary, then the elevator installer shall provide portable welders.
- D. Suitable machine room with legal access and ventilation, with concrete floor. Temperature in machine room and hoistway to be maintained between 60 degrees F and 100 degrees F. Relative humidity should not exceed 95% non-condensing. Ventilation to suit elevator installer's heat release equipment.
- E. Temporary hoisting beam for a maximum net live load of 5,000lbs. May need to be removed before car is placed in operation if overhead clearance is not to code.
- F. Adequate rail bracket supports, bracket spacing as required by governing code, from pit floor to underside of overhead slab. Separator beams where required.
- G. Dry pit reinforced to sustain normal vertical forces from rail and impact loads from buffer and cylinder. Pit shall have a permanent means to prevent the accumulation of water. Sump pumps shall have a steel cover flush with floor.
- H. Surface of pit floor beneath cylinders and buffers stand to be flat and level within 1/8" of the full width of the pit.
- I. Where access to a pit is by means of the lowest hoistway entrance, a vertical iron ladder extending 48" minimum above sill of access door.
- J. Vertical surfaces of entrance sill supports must be plum, one above the other, and square with the hoistway. Finished floor and grout, if required, between jambs, frames and sill line. A horizontal support (lintel) is to be provided 8'-0" above the top landing to support the doorframe assembly.
- K. Lower finished floor to top finished floor rise tolerance of +0" and -1".
- L. Hoistway walls are to be designed and constructed in accordance with the required fire rating including where penetrated by elevator fixture boxes and to include adequate fastening to hoistway entrance assemblies. One front entrance wall, at the main landing, is not to be constructed until after all elevator material is located in the hoistway. Remaining front entrance walls shall not be constructed until after doorframes and sills are in place. If front walls are poured concrete bearing walls, rough openings are to be provided to accept entrance frames and filled in after frames are sent. Rough openings size to suit elevator installer.
- M. All cutting, including cutouts to accommodate hall signal fixtures, patching, painting of walls, floors or partitions together with finish painting of entrance doors and frames if required.
- N. A three (3) phase, three (3) wire electrical feeder system with an equipment-grounding conductor terminating in the machine room. Size of the feeders and grounding conductor to suite elevator power characteristics. A fused disconnect with auxiliary interlock contact or circuit breaker with auxiliary contact for each elevator per the National Electrical Code or with feeder or branch wiring to controller. Interlock contact to be positively open when main disconnect contacts are open. Size of main and auxiliary contact to suit elevator power characteristics.

- O. A 120 volt, 15 ampere capacity dedicated branch circuit, single phase power supply with SPST or circuit breaker for each elevator, per the National Electrical Code, with feeder wiring to each controller for car lights.
- P. Suitable light fixture and convenience outlets in machine room with light switches located within 18" of lock jamb side of machine room door. The receptacles shall have ground-fault circuit-interrupter protection.
- Q. All 120 volt, 15 or 20 ampere, single phase receptacles installed in machine rooms and pits, car tops and machinery spaces and at top of shaft shall have ground-fault circuit-interrupter protection.
- R. A smoke detector system with wiring from the fire panel to the machine room for the elevator. Elevator requires a set of contact NORMALLY OPEN from the smoke detector at the designated fireman's landing and one set of contacts NORMALLY OPEN representing all other lobbies. Also one set of NORMALLY OPEN CONTACTS representing the smoke detectors and heat detectors in the machine room.
- S. If sprinklers are installed in the hoistway, machine room or machinery spaces, a means must be provided to disconnect automatically the mainline power supply of the affected elevator prior to the application of water. Heat and smoke detectors per code for this system.
- T. Telephone jack located adjacent to elevator controller. An activated dedicated phone line with 24-hour answering service must be available prior to elevator inspection.
- U. Should operation of the elevators be required on emergency standby power, others are to provide an emergency power unit and means for starting it and deliver to the elevator disconnect switches in the machine room, sufficient power to operate one or more elevators at a time at full rated speed.
- V. Provide a transfer switch for each feeder for switching from normal power to emergency standby power and a contact on each transfer switch closed on normal power supply with two wires from this contact to one elevator controller.
- W. Guarding and protecting the hoistway during construction. The protection of the hoistway shall include removable solid panel surrounding each hoistway opening at each floor, a minimum of 48" high. Hoistway guards to be erected, maintained, and removed by others.
- X. During installation, the elevator platform must not be used to hoist material or persons other than required for elevator installation.

## PART 2: PRODUCTS

### 2.1 MANUFACTURERS

- A. Design is based on Canton Elevator Dual Roped Hydraulic Passenger Elevator.
- B. Acceptable Manufacturers, only manufacturers models that meet the specifications will be accepted.
  - 1. Canton Elevator
  - 2. Delaware Elevator
  - 3. Minnesota Elevator

### 2.2 OUTLINE OF EQUIPMENT

- A. Quantity and type: One (1) Holeless Roped Hydraulic Passenger
- B. Capacity: 3500 pounds
- C. Speed: 100 feet per minute
- D. Travel: 33' 2"
- E. Landings: 4 stops
- F. Openings: 4 front
- G. Operation: Selective collective
- H. Hoistway size: 8' 8" wide x 6' 11" deep
- I. Platform size: 7'-0" wide x 6'-2" deep
- J. Hoistway entrance:
  - Size - 3'-6" wide x 7'-0" high
  - Type - Single speed side Opening
- K. Power supply: 208 volts 3 phase 60 cycles (verify)
- L. Car Enclosure: The Car enclosure shall be as per the following
  - 1. Shell: 16 gauge reinforced steel shell- height 8'-0" to canopy
  - 2. Interior: Faced with laminate, edged with SS #4.
  - 3. Returns: #4 stainless steel
  - 4. Transom: #4 stainless steel
  - 5. Threshold: Extruded Aluminum
  - 6. Lighting: Fluorescent Lighting above Lexan Suspended Ceiling.
  - 7. Handrails: #4 Stainless Steel ½" x 2" bar with angled ends on rear wall.
  - 8. Pads: Vinyl cab pads with #4 stainless steel pad hooks
  - 9. Flooring: By others
  - 10. Fan: Two speed

### 2.3 POWER UNIT

- A. A submersible power unit especially designed and manufactured for this service shall be furnished. It shall include a constant displacement rotary screw type pump, motor, oil reservoir, hydraulic control unit, fill strainer, tank strainer in the suction line, oil level gauge and drip pan. Pressure gauge or quick coupler for gauge shall be located on valve. Low-pressure relay shall be included to prevent oil siphoning if jack head is higher than pump unit. Reverse phase and low power protection relay shall be included.

### 2.4 VALVES

- A. Control valve 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. Control valves shall be solenoid operated and designed to open and close gradually to give smooth control. All valves shall be readily accessible for adjustment.

### 2.5 AUTOMATIC TWO-WAY LEVELING

- A. An automatic two-way leveling device shall be provided so that the car will approach landing stops at reduced speed from either direction of travel. The leveling device shall, within its zone, be entirely independent of the operating device and shall automatically stop and maintain the car approximately level with the landing, regardless of change in load.

## 2.6 PLUNGER

- A. The plungers shall be accurately ground and polished seamless steel. The bottom of the plunger shall be fitted with a heavy steel disc welded in place and provided with a suitable extended edge to provide a positive stop designed to prevent the plunger from leaving the cylinder. The top of the plunger shall be provided with an internal welded steel disc drilled and tapped for fastening plunger to the car platen plate.

## 2.7 CYLINDER

- A. The cylinders shall be machined from steel pipe with a machined flange at the upper end and a heavy steel bulkhead welded in the lower end. The cylinder shall be provided with a suitable steel fitting for connecting to oil line and with an air bleeder. Heavy steel brackets suitable for mounting to elevator pit channels shall be welded to the cylinder.

## 2.8 PACKING GLAND

- A. A steel packing gland with bronze guide bearing, wiper rings and packing especially designed for hydraulic elevator service shall be provided. An oil collector ring and drain hold shall be furnished.

## 2.9 PIPING AND OIL

- A. Piping shall be provided from power unit to cylinder complete with necessary fittings. Oil of proper grade for this service shall be provided.

## 2.10 HYDRAULIC MUFFLER

- A. A muffler shall be provided in the oil line near the pump muffler shall be designed to reduce pulsation and noise, which may be present in the flow of the hydraulic fluid.

## 2.11 PLATEN PLATE ISOLATION

- A. The platen plate shall be mounted on suitable sound dampeners designed to isolate the unit from the building structure.

## 2.12 LOW OIL CONTROL

- A. A low oil control feature shall be provided designed to automatically cause an up traveling car to descend to the lowest terminal landing if the system does not have a sufficient reservoir of oil. If power operated doors are used, the car and hoistway doors shall automatically open at the lowest terminal landing to permit passengers to egress. The doors shall then automatically close and all control buttons, except the door open button in the car-operating panel, shall be made ineffective. The oil reservoir shall be refilled before the elevator is returned to service.

## 2.13 CONTROLLER

- A. **An open source, non-proprietary microprocessor-based controller shall be provided. Controllers manufactured by the installer will not be accepted.** Microprocessor shall have opto-isolated inputs and outputs. Shall be isolated with Dry Relay contacts. Controller shall have all diagnostic and trouble shooting readouts located directly on the unit. Controller shall have the ability to be replaced by a unit of different model or manufacturer without the necessity of replacing any other related items (door operators, selectors, buttons etc). The control system shall include a microprocessor for processing, adjusting and diagnostics. The system shall provide comprehensive means to access the computer memory for elevator adjusting and diagnostic purposes and shall have permanent indicators to show elevator status as an integral part of the controller. Status indicators shall be provided on the controller to indicate when the safety circuit is open, when the door locks are open, when the elevator is running at high speed, with the elevator is on independent service, when the elevator is on fireman's service, when the elevator out of service timer has elapsed, and when the elevator has failed to successfully complete it's intended movement. A means shall also be provided for the displaying of other special or error conditions that are detected by the microprocessor without the use of any hand held on portable device. Changing of operational parameters shall be possible without the use of removable devices or knowledge of any programming languages. Full set of manuals including parameter lists, faults, settings, passwords and instructions on full use of the processor as well as wiring diagrams shall be included. Technical training, engineering, and technical phone and field support shall be available to all.

#### 2.14 SELECTIVE COLLECTIVE OPERATION

- A. The momentary pressing on one or more car buttons shall send 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. During this operation the car shall answer calls from the landings, which are in the prevailing direction of travel and each call shall be canceled when answered. With the momentary pressing of a hall button above the car, the car shall start up and answer any up calls as they are reached by the car irrespective of the sequence in which the buttons are pressed. The car shall not stop at floors where down buttons only are pressed. Similarly, the car shall start down to answer calls below the car and shall not stop where up calls only are registered. When traveling up, the car shall reverse at the highest call and proceed to answer calls below it. Similarly, when traveling down, the car shall reverse at the lowest call and answer calls above it. Should both an up and down call be registered at an intermediate landing, only the call corresponding to the direction in which the car is traveling shall be canceled upon the stopping of the car at that landing.

#### 2.15 CAR FRAME AND PLATFORM

- A. The car frame, which supports the elevator platform and enclosure, shall be made of structural steel members. Platform shall consist of a steel frame filled with suitable sub-floor and a finished floor of others. Underside of platform shall be properly fireproofed.

#### 2.16 HOISTWAY ENTRANCES

- A. Hoistway entrances of the hollow metal horizontal sliding type shall be provided at each of the hoistway openings. Each entrance shall have a clear opening 4 feet 4 inches wide by 7 feet 4 inches high. Each entrance shall include unit frames, flush design door panels, sight guards, extruded Aluminum sills, strut angles, headers, hanger covers, fascia plates, toe guards, dust covers, and necessary hardware. Sill angles shall be provided and installed by the elevator contractor.

#### 2.17 HOISTWAY DOORS AND DOOR EQUIPMENT

- A. Door panels shall be labeled with the UL fire rating as per code door finish shall be as follow:

1. Door frames: Baked Enamel finish
2. Door panels: Baked Enamel finish

- B. Fascias, hanger covers, toe guards and dust covers shall have manufacturer's standard enamel finish or galvanized. Structural members shall have prime coat finish or galvanized. If baked enamel finish is specified, all surfaces shall be thoroughly cleaned of all oil, grease and other foreign substances before paint is applied. Rust resisting mineral paint shall be applied after which a filler coat shall be baked on. The surface shall be sanded off level and smooth and a final priming coat of mineral paint applied. Two finish coats of the best grade solid color enamel shall be baked on. Color shall be as selected by the architect. Sills, struts, headers, hanger covers and unit frames shall be erected prior to the erection of rough walls and set in proper relation to the car guide rails. Door panels shall be installed after the walls are finished.
- C. Hangers and tracks shall be provided at each car and hoistway entrance. Tracks shall be of bar steel with the working surface contoured to match the sheaves. The hangers shall be designed for power operation and have provisions for vertical and lateral adjustment. Hangers shall be designed for two-point suspension of the door panel. Hanger sheaves shall be polyurethane with pre-lubricated and sealed for life bearings. Car door hangers shall have minimum 3-1/4" diameter sheaves. Hoistway door hangers shall have minimum 3-1/4" diameter sheaves.

#### 2.18 MASTER DOOR OPERATOR

- A. A master gearless door operator with direct current motor shall be provided to open and close the car and hoistway doors simultaneously, at a maximum speed of not less than 1-1/2 feet per second. Door movement shall be cushioned or checked at both limits of travel. Electro-mechanical switches and adjustable resistors shall control speed and limits, an electro-mechanical interlock shall be provided on each hoistway door to prevent the operation of the elevator unless all doors are closed and locked. An electric contact shall be provided on the car door to prevent the operation of the elevator unless the car door is closed. The door operator shall be arranged so that, in case of interruption or failure of electric power from any cause, the doors can be readily operated by hand from within the car. Emergency devices and keys for opening the doors from the landing shall be provided as required by the local codes. The doors shall open automatically when the car is leveling at the respective landings, and shall close after a predetermined time interval or immediately on pressing a car button. A "door open" button shall be provided in the car, the momentary pressing of which shall reopen the doors and reset the time interval.

#### 2.19 DOOR EDGE PROTECTIVE DEVICE

- A. The car door shall be provided with a protective device extending the full height. An infrared type car door protective device having a multi-beam array shall be furnished. This device shall be so arranged that should it sense a person or obstruction in its path while the doors are closing, it shall automatically cause the car and hoistway doors to return to the open position. The door shall remain open until the expiration of a time interval and then close automatically.

#### 2.20 CAR OPERATING PANEL

- A. A flush mounted operating panel shall be furnished in the car containing call registration buttons for each landing, emergency stop switch, alarm button, door open, door close, fan and light switch, surface mount phone, emergency lighting shall be provided. Phase II fire service shall be provided and car panel shall be engraved with fire service instructions. Panel shall be 1/8" stainless steel plate. Buttons shall be EPCO Survivor with LED lights. Fire service instructions shall be engraved in panel.
- B. A digital position indicator shall be provided in the car, directly over the car buttons. Floor arrival and passing gong as well as direction indication shall be incorporated in the cab entrance, visible from the hall button panel.

- C. A digital car-riding lantern with LED lights will be installed.

#### 2.21 HALL BUTTONS

- A. A riser of flush mounted buttons shall be provided. A single button shall be furnished at each terminal and up down buttons at all intermediate landings.
- B. A digital position indicator shall be provided at the egress floor.

#### 2.22 TERMINAL LIMIT SWITCHES

- A. Terminal limit switches shall be provided in the hoistway designed to automatically stop the car at each terminal landings.

#### 2.23 GUIDE RAILS

- A. Guide rails shall be provided for the car consisting of planed steel tees erected plumb and securely fastened to the hoistway framing by heavy steel brackets. The ends of all rails shall be tongued and grooved, forming matched joints and shall be connected with steel splice plates.

#### 2.24 CAR GUIDE SHOES

- A. The top and bottom of the car frame shall be provided with roller guides of adequate design to sustain the loads imposed.

#### 2.25 CAR SAFETY

- A. A car safety shall be provided which will conform to the requirements of ANSI A17.1, The safety shall be of the type that can be released only by moving the car in the up direction. To return a car to normal operation after a safety set, the car shall be moved hydraulically in the up direction.

#### 2.26 SPEED GOVERNOR

- A. A car speed-governor conforming to the requirements of ANSI A17.1 shall be provided to activate the car safety.

#### 2.27 ELECTRICAL

- A. All hoistway control wiring, traveling cables, cab wiring and machine room control wiring shall be new insulated copper wiring. Wiring shall bear the UL label and be installed in accordance of the National Electric Code. Each traveling cable shall include 10% spare wires and a minimum of 2 pairs of twisted shielded wires for phone and building security. Phone wires shall be clearly labeled in machine room and terminate in car panel phone box. All wiring shall be run in metal conduit, metallic tubing or wire ducts.

#### 2.28 PAINTING AND CLEANING

- A. The elevator hoistway, pit and machine room shall be thoroughly cleaned at the conclusion of the project and prior to acceptance. The elevator machine room floor shall be painted with gray deck enamel. All machine room elevator equipment shall be painted with two coats of rust inhibiting enamel paint. Pit floor shall be painted gray and buffers painted.

## PART 3: EXECUTION

### 3.1 INSPECTION

- A. Prior to commencing elevator installation, Installer shall inspect hoistway, openings, pits and machine room, as constructed, shall verify all critical dimensions, and examine supporting structure and all conditions under which elevator work is to be installed.

### 3.2 COORDINATION

- A. Coordinate elevator work with work of other trades, for proper time sequence to avoid construction delays.

### 3.3 ALIGNMENT

- A. 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.

### 3.4 ACCEPTANCE TESTING

- A. Perform acceptance tests as requires by State Elevator Code and governing regulations or agencies. Provide owner with approved State operating permit.

END OF SECTION 14245