

**DIVISION 14 – CONVEYING EQUIPMENT**

Section Number	Title
<b>14 20 00</b>	<b>ELEVATORS</b>
14 21 00	Electric Traction Elevators
<b>14 24 00</b>	<b>Hydraulic Elevators</b>
14 24 13	Hydraulic Freight Elevators
14 24 23	Hydraulic Passenger Elevators (Machine Room Less [MRL])
14 24 43	Hydraulic Service Elevators

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**14 20 00 ELEVATORS**

Part 1 – General

The size, number, and location of elevators must be addressed at the earliest stages of the design, to ensure that neither the overall function of the facility nor the optimum configuration of elevators is compromised. The size and location of the machine room is similarly critical.

Provide a minimum elevator machine room size of 100 square feet, exclusive of the area above the hoistway (for traction elevators), and without any odd corners, narrow passages or structural interferences.

Design Professional shall design elevators to comply with current ASME A117.1, ASME A117.2, IBC, NEC codes referenced in Division 1.

When new elevators are being installed into existing buildings where elevators do not currently exist (as opposed to elevator modernization) comply with the criteria for new elevators.

The Design Professional is expressly responsible for incorporating these overall requirements into the project, and for ensuring that all sub-consultants are aware of the requirements and incorporate them into their designs as well.

Reliance on "after-the-fact" equipment selections to compensate for a problematic design decision is unacceptable.

Service elevators shall be located near the loading dock.

**Basic Elevator Selection**

Hydraulic elevators are generally used in low-rise buildings with two to three floors. Electric traction elevators are generally used in buildings over three stories. Design Professional shall coordinate the electrical requirements as well as the code requirements for the pit, overhead clearance, shaft ventilation, pit ladder, light (with switch adjacent to ladder) and electrical duplex 120 VAC outlet in pit, equipment room and phone in cab.

**GENERAL REQUIREMENTS FOR ALL ELEVATORS:**

- In all multi-level buildings and facilities, at least one passenger elevator shall serve each level, including mezzanines. (If more than one elevator is provided, each full passenger elevator shall comply with this section). Standby power shall be provided in accordance with code referenced in Division 1.

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- Elevators shall have button controls to each floor without keying to shut down the unit and, if required by the program, to lock out selected floors.
- Specifications shall include attention to interlock to existing or proposed fire detection systems and devices.
- All elevator operating switches shall be keyed alike according to function.
- Elevators shall be located as close as practical to stairways to facilitate use of stairways for those with that preference.
- Where elevator rise is 60 feet or more, a two-way communications means within the building and accessible to emergency personnel to speak with persons in each elevator car individually shall be provided. Operating instructions shall be incorporated with or adjacent to the two-way communication means outside the elevator car.
- Buildings four or more stories above or below grade plane shall be provided with an elevator capable of transporting 24" by 84" open ambulance stretcher and be identified on the hoist way door frame for such use.
- In buildings or structures where standby power is required (i.e., 75 feet of rise or more) or provided for elevators(s), all electrical circuits required for elevators(s) shall be connected to the standby power source.

### Hoistways:

- Where applicable, hoistway glass shall be laminated and each piece visibly marked as per ANSI Z97.1 or 16 CFR Part 1201. Windows prohibited in hoistways.
- Hoistway ventilation to the outer air shall be provided, per the building code, for elevators penetrating more than three floors. The area of the hoistway vent shall not be less than 3 ½ percent of the area of the hoistway nor less than 3 square feet for each elevator car.
- Projections, ledges, or recesses more than 4 inches shall be beveled not less than 75 degrees.
- Where applicable, hoistway access doors of secondary and overhead machinery spaces shall be a minimum of 29 ½ inches in width and height and shall be self-closing and self-locking using a spring-type lock.
- Where applicable, hoistway access doors necessary for access to an MRL elevator emergency brake shall be a maximum of 24 inches in width and height and shall be self-closing and self-locking using a spring-type lock. Keys to unlock the access doors shall be Group 1 Security (restricted to elevator personnel only).

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- Where applicable, headroom in secondary and overhead machinery spaces shall be a minimum of 42 inches without a governor and 53 inches with a governor.
- The minimum vertical distance in the refuge area between the car top and the overhead structure or other obstruction shall not be less than 43 in. when the car has reached maximum upward travel.
- Where applicable, hoistway machinery spaces shall be provided with a minimum of 19-foot candle lighting with light guard. The light switch shall be located within easy reach of access to such phase.
- Where applicable, hoistway machinery spaces shall be provided with means, mechanical, if necessary, to keep the temperature and humidity in the range specified by the elevator equipment manufacturer.
- Machinery and equipment or electrical equipment and wiring that does not pertain to the elevator is prohibited.
- Pipes or ducts conveying gases, vapors, or liquids that do not pertain to the elevator are prohibited.
- Where applicable, secondary and overhead machinery spaces shall be provided with a GFCI protected duplex receptacle. Machinery space lighting and receptacle shall be on a separate branch circuit.

### **Pit:**

- Pit floors shall be level and have a sump for a drain or sump pump, and have a sump cover that is flush with the floor. Drains or sump pumps shall remove a minimum of 50 GPM per elevator. Exposed discharge lines shall be of metal. Discharge lines shall be provided with a check valve installed close to the drain or pump. Shut-off valves in discharge lines and oil sensing equipment to stop fluid removal are not allowed.
- Access to pits shall be by a ladder extending to at least 48 inches above the lowest landing or by a separate pit access door, where required. Ladders shall be within reach from the lowest landing door.
- Pits shall be provided with a minimum of 10-foot candle lighting with light guard. The light switch shall be located on the pit ladder side and within easy reach from the pit access door.
- Provide a permanent means to access the underside of the car (i.e., working platform) if the distance from the pit floor to the underside of the plank channels or slings exceeds 83 inches.

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- Pits shall be provided with a GFCI protected duplex receptacles. A single non-GFCI receptacle shall be provided for the sump pump. Pit lighting and receptacles shall be on a separate branch circuit.

### **Fire Protection:**

- If sprinkled, all electrical equipment in the pit within 48 inches above the pit floor shall be weatherproof (NEMA 4 Rated) and wiring identified for use in wet locations per NFPA 70
- Sprinkler protection shall supply only branch lines at not more than one floor level. Sprinkler lines running up the hoistway are prohibited. Pit sprinkler heads shall be within 24 inches of the pit floor.
- When sprinklered, a main power shunt-trip disconnect and heat detector(s) is required. Heat detectors shall be within 2 feet of each sprinkler head at the top of the hoistway and in the machine/control room or control space. No heat detectors in sprinkler pits.
- Provide smoke detector(s) in the top of hoist ways that are sprinklered.
- Sprinkler protection shall supply only branch lines into the machine/control room or control space.

### **Machine Room:**

- Provide machine room (control room/ control space, if applicable) enclosure. Seal all gaps and penetrations.
- There shall be a minimum of 18 inches around equipment for maintenance path and clearance.
- Safe, permanent, and unobstructed access to these rooms/ spaces shall be a minimum of 60 degrees from the horizontal, have handrails, and have a platform, at the access-door sill level. Platform length shall permit full swing of the door plus 2 feet for doors that swing out and platform length for doors that swing in shall be not less than the width of the door. Ships ladders are not acceptable as stairs. Access doors to machine rooms, control rooms, and control spaces shall be self-closing and self-locking using a spring-type lock. Doors to machine and control rooms shall not be less than 29 ½” wide and 80” high.
- Machine/ control rooms shall have clear headroom of not less than 84 inches. Control spaces, where applicable, shall have clear headroom of not less than 778 inches or the height of the equipment, whichever is greater.

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- Machine rooms and control rooms, where provided, shall not be located in the hoistway.
- Where applicable, remote machine rooms and/ or control rooms of electric elevators shall be provided with a permanent means of communication between the elevator car and remote machine room and/ or control room.
- Machine rooms, control rooms, and control spaces shall have a minimum of 19-foot candle lighting with light guard. Light switch shall be within reach from the door and on the lock-jamb side.
- Machine rooms, control rooms, and control spaces shall have independent ventilation means to keep the air temperature and humidity in the range specified by the elevator equipment manufacturer.
- Machinery, equipment, electrical equipment, or wiring not pertaining to the elevator is prohibited in the machine room.
- Pipes or ducts conveying gases, vapors, or liquids that do not pertain to the elevator in the machine room are prohibited.
- There shall be smoke detection in machine/ control rooms and control spaces for fire recall.
- There shall be a class “ABC” fire extinguisher in machine/ control rooms and control spaces.
- All wiring shall be installed in metal conduit, box, or wire way.
- A separate branch circuit shall supply the car lights.
- A separate branch circuit shall supply the machine/ control room /control space lighting and receptacle. There shall be a duplex GFCI receptacle in the machine/ control room or control space.
- A separate branch circuit shall supply the machine / control room or control space air conditioning equipment. A disconnect with overcurrent protection and lockable in the open position shall be provided.
- A single means of disconnect, with overcurrent protection and lockable in the open position, shall be provided for the main power supply (see #35). Per NFPA70-620.91 (c) The main power disconnect shall be provided with an auxiliary contact for use on hydraulic elevators with battery lowering.
- All disconnecting means shall be provided with identification and power feed locations.

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- A car light disconnect, with overcurrent protection and lockable in the open position, shall be provided in the machine/ control room or control space (see #42).
- Plumbing systems (i.e., floor drains) shall not be installed in the elevator machine/ control rooms or spaces.

**Miscellaneous:**

- Pipes (i.e., sprinkler) or similar equipment that contains liquid shall not be located directly above elevator or electrical equipment. Pipes shall not encroach upon any required clearances.
- Air conditioning equipment and condensate drains shall not be installed directly above the elevator or electrical equipment. Condensate drain lines shall not be connected directly to sewers. There shall be safe and convenient access for servicing and maintenance of air conditioning equipment.

Part 2 – Products

N/A

Part 3 – Execution

N/A

**14 21 00      Electric Traction Elevators**

Part 1 – General

**WORK INCLUDED**

- Installation of a new traction elevator

Part 2 – Products

N/A

Part 3 – Execution

**SUBMITTALS**

Product data: Contractor shall provide standard cab entrance and signal fixture data to describe product for approval.

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Powder Coat Paint selection: Submit manufacturer’s standard selection charts for exposed finishes and materials.

Plastic laminate selection: Submit manufacturer’s standard selection charts for exposed finishes and materials.

Metal Finishes: Upon request, standard metal samples provided.

**SHOP DRAWINGS**

- Show equipment arrangement in the pit and hoistway. Provide plans, elevations, sections and details of assembly, erection, anchorage, and equipment location.
- Indicate elevator system capacities, sizes, performances, safety features, finishes and other pertinent information.
- Show floors served. Travel distances, maximum loads imposed on the building structure at points of support and all similar considerations of the elevator work.
- Indicate electrical power requirements and branch circuit protection device recommendations.

**OPERATION AND MAINTENANCE DATA**

Include the following:

- Owner’s Manual and Wiring Diagrams.
- Parts list, with recommended parts inventory.

**QUALITY ASSURANCE**

Manufacturer Qualifications: An approved manufacturer with minimum fifteen years -experience in manufacturing, installing, and servicing commercial elevators.

- Must be the manufacturer of the power unit, controller, signal fixtures, door operators cab, entrances, and all other major parts of the elevator operating equipment.
- The major parts of the elevator equipment shall be manufactured in the United States, and not be an assembled system.
- The manufacturer shall have a documented, on-going quality assurance program.
- ISO-9001:2000 Manufacturer Certified
- ISO-14001:2004 Environmental Management System Certified



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Installer Qualifications: The manufacturer or an authorized agent of the manufacturer with not less than fifteen years of satisfactory experience installing elevators equal in character and performance to the project elevators.

**USE OF ELEVATOR**

- The elevator shall not be used temporarily for building construction purposes unless specifically allowed by the Owner.
- If the Contractor is allowed to use the elevator prior to Substantial Completion of the project, the warranty and service period shall not be comprised and shall begin when substantial completion is achieved.

**OPERATION, EQUIPMENT AND FUNCTION**

**Operation and Maintenance**

- Starting at the time of Substantial Completion of the complete project, provide complete systematic inspection and maintenance of the elevator for a period of 24 months. Furnish trained experts and equipment to check, adjust, lubricate, and otherwise maintain the elevator in operation without defects or deterioration. Replace or repair materials and parts which become defective or deteriorated for any reason except through abuse or misuse by Owner.
- Instruct Owner’s personnel in proper use, operations and daily maintenance of elevators.
- Training shall include operation of diagnostic microcomputer and servicing of elevator microprocessor.
- Make final check of each elevator operation, with Owner’s personnel present and just prior to date of substantial completion. Determine that control systems and operating devices are functioning properly.
- Continuing Maintenance: Provide 2-year maintenance on elevators on an as-needed basis as part of standard 2-year warranty on new equipment and upgrades.
- Maintenance shall include systematic examination, adjustment and lubrication of new elevator equipment; replacement of seals, packing and valves to maintain required factor of safety; performance of maintenance work without removing car during peak traffic periods and providing 24-hour emergency call back service during maintenance period, at an additional cost to Owner.
- Repair or replace electrical and mechanical parts of the new elevator equipment using only genuine standard parts produced by manufacturer of equipment concerned.

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- Ensure that competent personnel handle maintenance service. Maintain and adequate stock of parts for replacement of emergency purposes, locally, and have qualified personnel available at such places to ensure the fulfillment of this service without unreasonable loss of time.

**Cleaning**

- Remove all trash and debris from site during elevator installation.
- Clean all elevator surfaces, removing all dirt, dust, spots, and scratches. Any damage shall be repaired or replaced as directed by Owner, at no cost to Owner.
- Prior to substantial completion, remove protection from finished or ornamental surfaces and clean and polish surfaces with due regard to type of material.
- Remove tools, equipment and surplus materials from site.

**14 24 00 Hydraulic Elevators**

Part 1 – General

**WORK INCLUDED**

- Installation of a new hydraulic elevator complete as described in this standard.
- Provide an engineered system in accordance with this document.
- **GENERAL NOTE:** All hydraulic elevators will need an oil separator or an underground storage tank. In the event of a water discharge in the pit to ensure hydraulic fluid does not get into the sewer system.

Part 2 – Products

N/A

Part 3 – Execution

**SUBMITTALS**

Product data: Contractor shall provide standard cab, entrance and signal fixture data to describe product for approval.

Shop drawings:

- Show equipment arrangement in the pit and hoistway. Provide plans, elevations, sections and details of assembly, erection, anchorage, and equipment location.

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- Indicate elevator system capacities, sizes, performances, safety features, finishes and other pertinent information.
- Show floors served, travel distances, maximum loads imposed on the building structure at points of support and all similar considerations of the elevator work.
- Indicate electrical power requirements and branch circuit protection device recommendations.

Powder Coat Paint selection: Submit manufacturer's standard selection charts for exposed finishes and materials.

Plastic laminate selection: Submit manufacturer's standard selection charts for exposed finishes and materials.

Metal Finishes: Upon request, standard metal samples provided.

Operation and maintenance data. Include the following:

- Owner's Manual and Wiring Diagrams.
- Parts list, with recommended parts inventory.

### QUALITY ASSURANCE

Manufacturer Qualifications: An approved manufacturer with minimum fifteen years' experience in manufacturing, installing, and servicing commercial elevators.

- Must be the manufacturer of the power unit, controller, signal fixtures, door operators cab, entrances, and all other major parts of the elevator operating equipment.
- The major parts of the elevator equipment shall be manufactured in the United States, and not be an assembled system.
- The manufacturer shall have a documented, on-going quality assurance program.
- ISO-9001:2000 Manufacturer Certified
- ISO-14001:2004 Environmental Management System Certified

Installer Qualifications: The manufacturer or an authorized agent of the manufacturer with not less than fifteen years of satisfactory experience installing elevators equal in character and performance to the project elevators.

### USE OF ELEVATOR

- The elevator shall not be used temporarily for building construction purposes unless specifically allowed by the Owner.

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- If the Contractor is allowed to use the elevator prior to Substantial Completion of the project, the warranty and service period shall not be compromised and shall begin when substantial completion is achieved.

**OPERATION AND MAINTENANCE**

- Instruct Owner’s personnel in proper use, operations and daily maintenance of elevators.
- Training shall include operation of diagnostic microcomputer and servicing of elevator microprocessor.
  - Make final check of each elevator operation, with Owner’s personnel present and just prior to date of substantial completion. Determine that control systems and operating devices are functioning properly.
  - Continuing Maintenance: Provide 2-year maintenance on elevators on an as-needed basis as part of standard 2-year warranty on new equipment and upgrades.
  - Starting at the time of substantial completion of the complete project, provide complete systematic inspection and maintenance of the elevator for a period of 24 months. Furnish trained experts and equipment to check, adjust, lubricate, and otherwise maintain the elevator in operation without defects or deterioration. Replace or repair materials and parts which become defective or deteriorated for any reason except through abuse or misuse by Owner.
  - Maintenance shall include systematic examination, adjustment and lubrication of new elevator equipment; replacement of seals, packing and valves to maintain required factor of safety; performance of maintenance work without removing car during peak traffic periods and providing 24-hour emergency call back service during maintenance period, at an additional cost to Owner.
  - Repair or replace electrical and mechanical parts of the new elevator equipment using only genuine standard parts produced by manufacturer of equipment concerned.
  - Ensure that competent personnel handle maintenance service. Maintain an adequate stock of parts for replacement of emergency purposes, locally, and have qualified personnel available at such places to ensure the fulfillment of this service without unreasonable loss of time.

**CLEANING**

- Remove all trash and debris from site during elevator installation.

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	<ul style="list-style-type: none"><li>• Clean all elevator surfaces, removing all dirt, dust, spots, and scratches. Any damage shall be repaired or replaced as directed by Owner, at no cost to Owner.</li><li>• Prior to substantial completion, remove protection from finished or ornamental surfaces and clean and polish surfaces with due regard to type of material.</li><li>• Remove tools, equipment and surplus materials from site.</li></ul>

**14 24 23 Hydraulic Passenger Elevators (Machine Room Less [MRL])**

Part 1 – General

N/A

Part 2 – Products

**HOISTWAY EQUIPMENT**

Platform: Fabricated frame of formed or structural steel shapes, gusseted and rigidly welded with a wood subfloor. Underside of the platform shall be fireproofed. The car platform shall be designed and fabricated to support one-piece loads weighing up to 25% of the rated capacity.

Sling: Steel stiles affixed to a steel crosshead and bolstered with bracing members to remove strain from the car enclosure.

Guide Rails: Steel, omega shaped, fastened to the building structure with steel brackets.

Guide Shoes: Slide guides shall be mounted on top and bottom of the car.

Buffers: Provide substantial buffers in the elevator pit. Mount buffers on a steel template that is fastened to the pit floor. Provide extensions if required by project conditions.

Jack: Jack unit shall be of sufficient size to lift the gross load the height specified. Factory test jack to insure adequate strength and freedom from leakage. Brittle material, such as gray cast iron, is prohibited in the jack construction. Provide the following jack type: Twin post hole-less. Two jacks piped together, mounted one on each side of the car with a polished steel hydraulic plunger housed in a sealed steel casing having sufficient clearance space to allow for alignment during installation each plunger shall have a high-pressure sealing system which will not allow for seal movement or displacement during the course of operation. Each

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jack assembly shall have a check valve built into the assembly to allow for automatically re-syncing the two plunger sections by moving the jack to its fully contracted position. The jack shall be designed to be mounted on the pit floor or in a recess in the pit floor. Each jack section shall have a bleeder valve to discharge any air trapped in the section.

Automatic Self-Leveling: Provide each elevator car with a self-leveling feature to automatically bring the car to the landings and correct for over-travel or under-travel. Self-leveling shall, within its zone, be automatic and independent of the operating device. The car shall be maintained approximately level with the landing irrespective of its load.

Wiring, Piping, and Oil: Provide all necessary hoistway wiring in accordance with the National Electrical Code. All necessary code compliant pipe and fittings shall be provided to connect the power unit to the jack unit.

Pit moisture/water and oil sensor located approximately 1 foot above the pit floor to be provided. Once activated, elevator will perform “flooded pit operation”, which will run the car up to the designated floor, cycle the doors and shut down and trip the circuit breaker shunt to remove 3 phase power from all equipment, including pit equipment.

Motorized oil line shut-off valve shall be provided that can be remotely operated from the controller landing service panel. A means for manual operation at the valve in the pit is required.

#### **POWER UNIT**

Power Unit (Oil Pumping and Control Mechanism): A self-contained unit located in the elevator pit consisting of the following items:

- NEMA 4/Sealed Oil reservoir with tank cover including vapor removing tank breather.
- An oil hydraulic pump.
- An electric motor.
- Electronic oil control valve with the following components built into single housing; high pressure relief valve, check valve, automatic unloading up start valve, lowering and leveling valve, and electro-magnetic controlling solenoids.

Pump: Positive displacement type pump specifically manufactured for oil-hydraulic elevator service. Pump shall be designed for steady discharge with

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minimum pulsation to give smooth and quiet operation. Output of pump shall not vary more than 10 percent between no load and full load on the elevator car.

Motor: Standard manufacture motor specifically designed for oil-hydraulic elevator service. Duty rating – motors shall be capable of 80 starts per hour with a 30% motor run time during each start.

Oil Control Unit: The following components shall be in a single housing. Welded manifolds with separate valves to accomplish each function are not acceptable. Adjustments shall be accessible and be made without removing the assembly from the oil line.

- Relief valve shall be adjustable and be capable of bypassing the total oil flow without increasing back pressure more than 10 percent above that required to barely open the valve.
- Up start and stop valve shall be 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 the jack unit, ensuring 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 adjustable for down start speed, lowering speed, leveling speed and stopping speed to ensure smooth “down” starts and stops. The leveling valve shall be designed to level the car to the floor in the direction the car is traveling after slowdown is initiated.

Provided with constant speed regulation in both up and down direction. Feature to compensate for load changes, oil temperature, and viscosity changes.

Solid State Starting: Provide an electronic starter featuring adjustable starting currents.

A secondary hydraulic power source (powered by 110 VAC single phase) must be provided. This is required to be able to raise (reposition) the elevator in the event of a system component failure (i.e., pump motor, starter, etc.)

### HOISTWAY ENTRANCES

Doors and Frames: Provide complete hollow metal type hoistway entrances at each hoistway opening bolted\knock down construction.

- Manufacturer’s standard entrance design consisting of hangers, doors, hanger supports, hanger covers, fascia plates, sight guards, and necessary hardware.

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- Main landing door & frame finish: ASTM A1008 steel panels, factory applied powder coat finish.
- Typical door & frame finish: ASTM A 366 steel panels, factory applied powder coat enamel finish.

Integrated Control System: The elevator controller to be mounted to hoistway entrance above 1<sup>st</sup> landing. The entrance at this level, shall be designed to accommodate the control system and provide a means of access to critical electrical components and troubleshooting features. The control system shall have 19 lumens of light from entrance to control panel, as well as sprinkler coverage that matches machine room requirements as the upper floor of a MRL Elevator is considered the machine room by code.

At the controller landing, the hoistway entrance frame shall have space to accommodate and provide a lockable means of access (group 2 security) to a 3-phase circuit breaker. See section 2.11 Miscellaneous Elevator Components for further details.

Interlocks: Equip each hoistway entrance with an approved type interlock tested as required by code. Provide door restriction devices as required by code.

Door Hanger and Tracks: Provide sheave type two-point suspension hangers and tracks for each hoistway horizontal sliding door.

- Sheaves: Polyurethane tires with ball bearings properly sealed to retain grease.
- Hangers: Provide an adjustable device beneath the track to limit the up-thrust of the doors during operation.
- Tracks: Drawn steel shapes, smooth surface and shaped to conform to the hanger sheaves.

Hoistway Sills: Extruded metal, with groove(s) in top surface. Provide mill finish on aluminum.

### **CAR ENCLOSURE**

Car Top Inspection: Provide a car top inspection station with an “Auto-Inspection” switch, an “emergency stop” switch, and constant pressure “up and down” direction and safety buttons to make the normal operating devices inoperative. The station will give the inspector complete control of the elevator. The car top inspection station shall be mounted in the door operator assembly.



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**DOOR OPERATION**

Provide a direct motor driven heavy duty operator 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. Doors shall automatically open when the car arrives at the landing and automatically close after an adjustable time interval or when the car is dispatched to another landing. Closed-loop, microprocessor controlled motor-driven linear door operator, with adjustable torque limits, also acceptable. AC controlled units with oil checks or other deviations are not acceptable.

- No Un-Necessary Door Operation: The car door shall open only if the car is stopping for a car or hall call, answering a car or hall call at the present position or selected as a dispatch car.
- Door Open Time Saver: If a car is stopping in response to a car call assignment only (no coincident hall call), the current door hold open time is changed to a shorter field programmable time when the electronic door protection device is activated.
- Double Door Operation: When a car stops at a landing with concurrent up and down hall calls, no car calls, and no other hall call assignments, the car door opens to answer the hall call in the direction of the car’s current travel. If an onward car call is not registered before the door closes to within 6 inches of fully closed, the travel will reverse and the door will reopen to answer the other call.
- Nudging Operation: 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 closing is prevented for a field programmable time, a buzzer will sound. When the obstruction is removed, the door will begin to close at reduced speed. If the infra-red door protection system detects a person or object while closing on nudging, the doors will stop and resume closing only after the obstruction has been removed.
- Limited Door Reversal: If the doors are closing and the infra-red beam(s) is interrupted, the doors will reverse and reopen partially. After the obstruction is cleared, the doors will begin to close.
- Door Open Watchdog: If the doors are opening, but do not fully open after a field adjustable time, the doors will recycle closed then attempt to open six times to try and correct the fault.
- Door Close Watchdog: If the doors are closing, but do not fully close after a field adjustable time, the doors will recycle open then attempt to close six times to try and correct the fault.
- Door Close Assist: When the doors have failed to fully close and are in the recycle mode, the door drive motor shall have increased torque applied to

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possibly overcome mechanical resistance or differential air pressure and allow the door to close.

Door Protection Devices: Provide a door protection system using 150 or more microprocessor controlled infra-red light beams. The beams shall project across the car opening detecting the presence of a passenger or object. If door movement is obstructed, the doors shall immediately reopen.

#### **CAR OPERATING STATION**

Controller: Shall be integrated in a hoistway entrance jamb. Should be microprocessor based, software oriented and protected from environmental extremes and excessive vibrations in a NEMA 1 enclosure. 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, and by “up-down” push buttons at each intermediate landing and call push buttons at terminal landings.

Service Panel: To be located outside the hoistway in the controller entrance jamb and shall provide the following functionality/features:

- Access to main control board and CPU.
- Main controller diagnostics.
- Main controller fuses.
- Universal Interface Tool (UIT).
- Remote valve adjustment.
- Electronic motor starter adjustment and diagnostics.
- Operation of pit motorized shut-off valve with LED feedback to the state of the valve in the pit.
- Operation of auxiliary pump/motor (secondary hydraulic power source).
- Operation of electrical assisted manual lowering.
- Provide male plug to supply 110VAC into the controller.
- Run/Stop button.

Automatic Light and Fan shut down: The control system shall evaluate the system activity and automatically turn off the cab lighting and ventilation fan during periods of inactivity. The settings shall be field programmable.

Special Operation: Not Applicable.

Emergency Power Operation: (Battery Lowering 10-DOC) When the loss of normal power is detected, a battery lowering feature is to be activated. The elevator will lower to a predetermined level and open the doors. After passengers have exited the car, the doors will close and the car will shut down. When normal power

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becomes available, the elevator will automatically resume operation. The battery lowering feature is included in the elevator contract and does not utilize a building-supplied standby power source.

### HALL STATIONS

Hall Stations, General: Provide buttons with red-illuminating LED halos to indicate that a call has been registered at that floor for the indicated direction. Provide 1 set of pushbutton risers.

- Provide one pushbutton riser with faceplates having a brushed stainless steel finish.
- Phase 1 firefighter's service key switch, with instructions, shall be incorporated into the hall station at the designated level.

Floor Identification Pads: Provide door jamb pads at each floor. Jamb pads shall comply with Americans with Disabilities Act (ADA) requirements.

Hall Position Indicator: Not Applicable.

Hall Lanterns: Not Applicable.

Special Equipment: Not Applicable.

### MISCELLANEOUS ELEVATOR COMPONENTS

Oil Hydraulic Silencer: Install multiple oil hydraulic silencers (muffler device) at the power unit location. The silencers shall contain pulsation absorbing material inserted in a blowout proof housing.

Lockable three phase circuit breaker with auxiliary contact with shunt trip capability to be provided. Circuit breaker to be located behind locked panel (Group 2 security access) at controller landing entrance jamb should be sized according to the National Electrical Code.

Lockable single phase 110V circuit breaker for cab light and fan to be provided. Circuit breaker to be located behind locked panel (Group 2 security access) at controller landing entrance jamb should be sized according to the National Electrical Code.

Part 3 – Execution

N/A

**\*\*END OF SECTION\*\***