



DESIGN & CONSTRUCTION GUIDELINES

DIVISION 14 CONVEYING SYSTEMS

DIVISION 14 CONVEYING EQUIPMENT
SECTION 14 24 00 HYDRAULIC ELEVATORS..... 2

SECTION 14 24 00 HYDRAULIC ELEVATORS**PART 1 – GENERAL****1.1 SUMMARY**

- A. This Section includes hydraulic elevators.
- B. Related Sections: The following sections contain requirements that relate to this Section:
 - 1. Setting of sleeves, inserts, and anchoring devices in concrete is specified in [Division 3, Concrete](#).
 - 2. Electrical service to each elevator, including fused disconnect switch, is specified in [Division 26, Electrical](#).

1.2 DEFINITIONS

- A. Hydraulic elevators are hereby defined to include systems in which cars are hoisted either directly or indirectly by action of a hydraulic plunger and cylinder (jack); with other components of the work including fluid storage tank, pump, piping, valves, car enclosures, hoistway entrances, control systems, signal equipment, guide rails, electrical wiring, roping, buffers, and devices for operating, dispatching, safety, security, leveling, alarm, maintenance, and similar required performances and capabilities.
- B. Modernization of an outdated elevator system may include, but is not limited to the following:
 - 1. Microprocessor Based Control Systems
 - 2. High Speed Solid - State Door Operators
 - 3. [Americans with Disability Act \(ADA\)](#) compliant, barrier free access, Security, and Safety Enhancements
 - 4. Aesthetics Upgrades of Car Enclosures, Entrances, and Operating Devices
 - 5. Changes to Existing Hoistway

1.3 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and [Division 1, General Requirements](#).
- B. Product Data for each principal component or product of each elevator, including certified test reports on required testing. Indicate capacities, sizes, performance, and operating characteristics, features of control system, finishes, and similar information. Indicate any variations from specified requirements.
- C. Shop Drawings including dimensioned drawings showing plans, elevations, sections and large-scale details indicating service at each landing, coordination with building structure and relationships with other construction, and details of car enclosures and hoistway entrances. Include diagrams to indicate elevator service to each level and include excavation requirements for jack. Elevator controls and components shall comply with all requirements of the currently adopted [Americans with Disability Act \(ADA\)](#) code.
- D. Signal Operating Fixture Details
- E. Electrical Coordination Information
- F. Samples of finishes.
- G. Prior to substantial completion of the project, the following shall be submitted:
 - 1. One (1) set of diagnostic tools, including all manuals, troubleshooting and programming guides, codes and sundries necessary to operate the tools to test, adjust and maintain the elevator equipment provided, elevator prints and wiring schematics.
 - 2. Three (3) sets of complete certified engineering data, including parts lists and parts numbers on all equipment as will be necessary for maintaining the equipment and for ordering replacements. Certified engineering data shall be permanently bound.
 - 3. One (1) complete set of tested replacement micro-processor chips as required for the elevator controllers, for retention by the Owner.
 - 4. One (1) original reproducible and three (3) complete and legible sets of blue or black line wiring diagrams and straight line diagrams showing the complete electrical connections, functions and sequence of operation of all apparatus connected with the elevator, including door operator, both in the machine room and in the hoistway, together with photographs or cuts of controller repair parts with numbers listed. Each device on the wiring diagrams and

- also on the controller panels shall be properly and permanently identified by name and part number.
- 5 One (1) original reproducible and three (3) complete sets of As-Built shop drawings, including layouts and signal operating fixture details.
 - 6 One (1) complete parts catalogs listing costs of all major electronic replacement parts and numbers of all equipment installed and the names of the equipment suppliers and reordering procedures and the approval from the factory to sell directly to the Owner's current Service Company, with delivery not to exceed 72 hours.
 - 7 Three (3) sets of neatly bound instructions explaining all operating features including apparatus in the car and lobby control panels, control sequence of operation, adjusting, and troubleshooting procedures.
 - 8 Three (3) sets of lubrication charts indicating lubrication points and type of lubrication recommended for all equipment. One (1) set shall be bound and permanently maintained in the elevator machine room.
 - 9 The Elevator Contractor shall provide three (3) bound sets of printed instructions for use of any tool that may be necessary to perform diagnostic evaluations, systems adjustment, and/or programmable software changes on any unit of the microprocessor based elevator control equipment. The Elevator Contractor shall provide access codes, passwords and other proprietary information that is necessary to interface with the microprocessor control equipment. In addition, the Elevator Contractor shall provide step by step adjusting, programming and troubleshooting procedures as pertain to the microprocessor control equipment, a composite listing of the individual settings chosen for the variable software parameters stored on the software programs of both motion and dispatch controllers.
 - 10 Spill Prevention, Control and Countermeasure (SPCC) Plan: USF-FM maintains a comprehensive SPCC plan adhering to the requirements of the United States Environmental Protection Agency (USEPA) regulations contained in 40 C.F.R. Part 112 – Oil Pollution Prevention. Coordinate with USF Project Manager (USF-PM), FM-Operations (FM-OPS), and FM-Environmental Health & Safety (FM-EHS) regarding applicable information required to amend the SPCC Plan in accordance with 40 C.F.R. Part 112 prior to construction.

1.4 QUALITY ASSURANCE

- A. Installer Qualification: Engage the elevator manufacturer or an installer approved by the elevator manufacturer and who has completed elevator installations similar in material, design, and extent to that indicated for Project which have resulted in installations with a record of successful in-service performance.
- B. All material, design, clearances, construction, workmanship, operation and tests shall be in accordance with the requirements of the currently adopted issuance of the American National Standards Institute (ANSI) A17.1 Safety Code for Elevators, the National Electrical Code, the Building Officials Code Administrators International (BOCA) Code, the National Fire Protection Association (NFPA) Code, the ADA and all other codes, regulations, laws, and ordinances as may govern. Where conflicts occur in the above codes, the most rigid shall apply.

1.5 WARRANTY

- A. Special Project Warranty: Provide special project warranty, signed by Contractor, Installer, and Manufacturer, agreeing to replace, repair, or restore defective materials and workmanship of elevator work during warranty period. This warranty shall be in addition to, and not a limitation of, other rights the Owner may have against the Contractor under the Contract Documents.
 1. "Defective" is hereby defined to include, but not by way of limitation, operation or control system failures, performances below required minimums, excessive wear, unusual deterioration or aging of materials or finishes, unsafe conditions, the need for excessive maintenance, abnormal noise or vibration, and similar unusual, unexpected, and unsatisfactory conditions.
 2. Warranty period is 12 months starting on date of project Substantial Completion.

1.6 PERMITS AND INSPECTIONS

- A. The Elevator Contractor shall give all requisite notices, obtain and pay for all permits, and pay all deposits and fees necessary for the installation of all work provided under this specification. In addition, the Elevator Contractor shall obtain and pay for all necessary state and local inspections and conduct such tests as may be required by the regulations of such authorities. These tests shall be made in the presence of the authorized representative of such authorities and in the presence of the Owner. An elevator installation permit shall be displayed on the job site and visible to interested parties.
- B. The installation, when complete, shall receive the final approval of all constituted authorities, and the Elevator Contractor shall submit evidence of the inspection results and the Certificate of Operation from the constituted authority, prior to Substantial Completion.

1.7 MAINTENANCE SERVICE

- A. Initial Maintenance Service: Provide full maintenance service by skilled, competent employees of the elevator Installer for period of 12 months following Date of Substantial Completion. Include monthly preventive maintenance performed during normal working hours. Include repair or replacement of worn or defective parts or components, and lubricating, cleaning, and adjusting as required for proper elevator operation in conformance with specified requirements. Include 24 hours-per-day, 7 days-per-week emergency callback service. Emergency service shall be provided within 24 hours of service call. Exclude only repair or replacement due to misuse, abuse, accidents, or neglect caused by persons other than Installer's personnel.
- B. Continuing Maintenance Service: Installer shall provide a continuing maintenance proposal to Owner, in the form of a standard yearly (or other period) maintenance agreement, starting on date construction contract maintenance requirements are concluded. State services, obligations, conditions, and terms for agreement period and for future renewal options.
 - 1. NOTE: General Elevator Sales and Service is presently providing continuing maintenance service for all existing elevators.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturer: Subject to compliance with requirements, provide products of one of the following:
 - 1. Acceptable Manufacturers: Otis, Schindler, Kone.

2.2 MATERIALS AND COMPONENTS

- A. Description of Universal Non-Proprietary Equipment:
 - 1 Capacity: (Edit According to Project)
 - 2 Speed: (Edit According to Project)
 - 3 Operation: (Edit According to Project)
 - 4 Car Size: Clear Inside: (Edit According to Project)
 - 5 Travel: (Edit According to Project)
 - 6 Power Supply: (Edit According to Project)
 - 7 Machine Location: (Edit According to Project)
 - 8 Stops: (Edit According to Project)
 - 9 Openings: (Edit According to Project)
 - 10 Hoistway Doors: (Edit According to Project)
 - 11 Door Operation: (Edit According to Project)
- B. General Requirement: Provide manufacturer's standard universal non-proprietary pre-engineered elevator systems that will comply with or fulfill the requirements of the specifications. Where components are not otherwise indicated, provide standard components published by manufacturer as included in standard pre-engineered elevator systems and as required for a complete system. No proprietary equipment allowed.
- C. Hydraulic Machines and Elevator Equipment: Provide manufacturer's standard single-acting under-the car hydraulic plunger-cylinder unit for each elevator, with electric pump-tank-control system equipment in machine room as indicated. If mechanical room is cooled, provide hydraulic oil tank heater.

- D. Piping: Provide size, type, and weight piping recommended by manufacturer, and provide isolation couplings to prevent sound/vibration transmissions from power unit.
- E. Inserts: Furnish required concrete inserts and similar anchorage devices for the installation of guide rails, machinery, and other components of elevator work where installation of devices is indicated as work of another specification section. Provide subject to bidding system.
- F. Car Frame and Platform: Manufacturer's standard welded steel units.

2.3 CONTROL SYSTEMS

- A. General: Provide manufacturer's standard control system for elevator as required to provide automatic operation of the type indicated and defined in the Code as "Operations".
- B. Elevator Control - Passenger: Provide solid-state "Selective Collective Automatic Operation," as defined in American Society of Mechanical Engineers / American National Standards Institute (ASME/ANSI) A17.1.

2.4 SIGNAL EQUIPMENT

- A. General: Provide signal equipment for elevator to comply with requirements indicated below and current handicapped code:
 - 1 Provide illuminated hall-call and car-call buttons that light up when activated and remain lighted until call or other function has been fulfilled; fabricate of acrylic or other permanent translucent plastic.
 - 2 Except for buttons and illuminated signal elements, fabricate signal equipment with exposed surfaces of stainless steel with manufacturer's standard directional satin finish.
 - 3 Car Control Stations: Provide car control station in each car with flush-mounted metal faceplates containing call button for each landing served and other buttons, switches, and controls required for specified car operation and control. Mount as shown or scheduled at height complying with ASME/ANSI A117.1. If not otherwise indicated, mount in return panel adjacent to car door. Provide operating device symbols as required by Code. Mark other buttons and switches with manufacturer's standard identification for required use or function.
 - 4. Elevator control panels shall have the following features:
 - a. Buttons: All control buttons shall be at least 3/4 inches in their smallest dimension. They shall be raised or flush.
 - b. Tactile, Braille, and Visual Control Indicators: All control buttons shall be designed by Braille and by raised standard alphabet characters for letters, Arabic characters for numerals or standard symbols as required in ASME A17.1-1995. Raised and Braille characters and symbols shall comply with 4.30. The call button for the main entry floor shall be designated by a raised star at the left of the floor designation. All raised designations for control buttons shall be placed immediately to the left of the button to which they apply. Floor buttons shall be provided with visual indicators to show when each call is registered. The visual indicators shall be extinguished when each call is answered.
 - c. Height: All floor buttons shall be no higher than 54 inches above the finish floor for side approach and 48 inches for front approach. Emergency controls, including the emergency alarm and emergency stop, shall be grouped at the bottom of the panel and shall have their centerlines no less than 34 inches above the finish floor.
 - d. Location: Controls shall be located on a front wall if cars have center opening doors, and on the front wall next to the door if cars have side opening doors.
 - 5. Car Position Indicator:
 - a. For passenger elevator cars, provide either illuminated-signal type or digital-display type, located near top of car or in car control station. Include direction-of-next-travel signal if not provided in car control station.
 - b. In addition to visual indicator, provide audible signal to indicate to passengers that car is either stopping at or passing each of the floors served.
 - 6. Hall Push-Button Station:
 - a. Provide hall push-button station at each landing for each elevator.

- b. Provide unit with flat faceplate designed for flush-mounting on wall with body of unit recessed in wall.
 - c. Provide 2-button station where passengers can travel either direction; 1-button station where only one direction of travel is available and indicate which direction that is.
7. Hall Lanterns:
- a. Provide units with illuminated “up” and “down” signal arrows, but provide single arrow where only one direction is possible. Provide units projecting from faceplate for ease of angular viewing, except provide flush units where a location in hoistway entrance frame is indicated. Match materials, finishes, and mounting method of hall push-button stations.
 - b. At manufacturer’s option, hall lantern signals may be placed either above or beside hoistway entrance or in both jambs of entrance frame for each elevator. Mount at minimum of 6 feet above finished floor.
 - c. Provide special oversized lantern signals at ground floor.
 - d. In conjunction with each hall lantern device, provide an audible signal to indicate that a car is arriving in response to a hall call and to indicate direction of car travel. Signal shall sound once for up direction of travel and twice for down direction. Audible signal shall be placed on each car.
- B. Hall Position Indicator: Provide illuminated-signal type or digital-display type, located above hoistway entrance at ground floor. Match materials, finishes, and mounting method of hall push-button stations. At manufacturer’s option, ground-floor hall lantern signals may be integrated with hall position indicators.
- C. Telephone: Provide complete hands-free type telephone in each car, contained in flush-mounted cabinet and complete with identification and instructions for use. Provide an ADA compliant telephone in each elevator.
- D. Alarm System: Provide emergency alarm bell properly located within building and audible outside hoistways, equipped to sound automatically in response to emergency stops and in response to “Alarm” button on each car control station.
- F. Provide Fireman’s Recall System.

2.5 PASSENGER ELEVATOR CAR ENCLOSURES

- A. General:
- 1. Provide manufacturer’s pre-engineered car enclosures of the selections indicated. Include ventilation, lighting, ceiling finish, wall finish, access doors, doors, power door operators, sill (threshold), trim, and accessories; floor finish not included in this Section.
 - 2. Provide horizontal sliding doors of manufacturer’s standard flush panel type, with operation and number of panels as indicated.
 - 3. Provide manufacturer’s standard protective edge trim system for door and wall panels, except as otherwise indicated.
- B. Material and Fabrication: Provide selections as indicated for each car enclosure surface; provide manufacturer’s standards except as indicated:
- 1 Aluminum Sills: Cast or extruded aluminum, with grooved surface, 1/4 inch thickness, mill finish.
 - 2 Stainless Steel: American Iron and Steel Institute (AISI) Type 302/304 with satin finish.
 - 3 Fabricate car door frame integrally with front wall of car.
 - 4 Fabricate car with recesses and cutouts for signal equipment.
 - 5 Ceiling: Solid surface ceiling with openings for lighting.
 - 6 Floor finish shall be vinyl or ceramic tile (not part of this Section).

2.6 PERSONAL PROTECTIVE DEVICES

- A Handrails: Provide manufacturer’s standard stainless steel handrails on side walls and back wall unless otherwise indicated either continuous or segmented units.
- B Door Edge Protective Device: Provide electronic multi-beam door detector at 5 inches and 29 inches heights, that when interrupted will cause closing doors to stop and reopen. Provide keyed switch in car operating panel or toggle switch in service cabinet for disconnecting photo-eye protective device. Door reopening devices shall remain effective for at least 20 seconds.

After such an interval, doors may close in accordance with the requirements of ASME A17.1-1990.

2.7 PASSENGER HOISTWAY ENTRANCES

- A General: Provide manufacturer's standard, pre-engineered, sliding, door-and-frame hoistway entrances complete with track systems, hardware, safeties, sills, and accessories. Match car enclosure doors for size, number of door panels, and door panel movement. Provide frame-section size and profile to coordinate with hoistway wall construction as indicated.
- B Raised and Braille Characters on Hoistway Entrances: All elevator hoistway entrances shall have raised and Braille floor designations provided on both jambs. The centerline of the characters shall be 60 inches above finished floor. Such characters shall be 2 inches high. Permanently applied plates are acceptable if they are permanently fixed to the jambs.
- C Materials and Fabrication: Provide selections indicated that comply with manufacturer's standards, but not less than the following:
 - 1 Stainless Steel Frames: Formed stainless steel sheet, AISI Type 302/304 with satin finish.
 - 2 Stainless Steel Door Panels: Flush stainless steel construction, AISI Type 302/304 with satin finish.
 - 3 Aluminum Sills: Extruded aluminum, with grooved surface, 1/4 inch thickness, mill finish.

2.8 PADS

- A Provide one (1) set of "move-in" pads for each cab. Pads shall cover all wall surfaces.

PART 3 – EXECUTION

3.1 EXAMINATION

- A Prior to commencing elevator installation, examine hoistways, hoistway openings, pits, and machine rooms, as constructed; verify all critical dimensions and examine supporting structure and all other conditions under which elevator work is to be installed. Notify Contractor in writing of any dimensional discrepancies or other conditions detrimental to the proper installation or performance of elevator work. Do not proceed with elevator installation until unsatisfactory conditions have been corrected in a manner acceptable to the Installer.

3.2 INSTALLATION OF ELEVATOR SYSTEM

- A General: Comply with manufacturer's instructions and recommendations for work required during installation. Hoist beam installed by General Contractor.
- B Install plunger-cylinder units plumb and accurately centered for elevator car position and travel; anchor securely in place.
- C Welded Construction: Provide welded connections for installation of elevator work where bolted connections are not required for subsequent removal or for normal operation, adjustment, inspection, maintenance, and replacement of worn parts. Comply with American Welding Society (AWS) standards for workmanship and for qualifications of welding operators.
- D Coordination: Coordinate elevator work with work of other trades for proper time and sequence to avoid construction delays. Use benchmarks, lines, and levels designated by Contractor to ensure dimensional coordination of the work.
- E Sound Isolation: Mount rotating and vibrating elevator equipment and components on vibration-absorption mounts, designed to effectively prevent transmission of vibrations to structure and thereby to eliminate sources of structure-borne noise from elevator system.
- F Install piping without routing underground, where possible. Where not possible, cover underground piping with permanent protective wrapping before backfilling.
- G Lubricate operating parts of systems, including ropes, if any, as recommended by manufacturers.
- H Alignment: Coordinate installation of hoistway entrances with installation of elevator guide rails for accurate alignment of entrances with cars. Where possible, delay installation of sills and frames until car is operable in shaft. Reduce clearances to minimum, safe, workable dimension at each landing.
- I Level Tolerance: 1/2 inch, up or down, regardless of load and direction of travel.

- J Set sills flush with finished floor surface at landings. Coordinate with other trades to facilitate and ensure proper grouting of sills.

3.3 FIELD QUALITY CONTROL

- A. Acceptance Testing: Upon nominal completion of each elevator installation, and before permitting use of elevator perform acceptance tests as required and recommended by Code and by governing regulations or agencies.
- B. Operating Tests: Load each elevator to its rated capacity and operate continuously for 30 minutes over its full travel distance, stopping at each level and proceeding immediately to the next. Record temperature rise of pump motor (except submerged pumps) during the 30 minute test period. Record failures of elevator to perform as required.
- C. Advise Contractor, Owner, Company Representative and inspection department of governing agencies in advance of dates and times tests are to be performed on elevators. Submit test results/reports to owner.
- D. Fill all construction voids.

3.4 PROTECTION

- A. Upon start-up or use of elevator work (or portion thereof), provide suitable protective coverings, barriers, devices, signs, or such other methods or procedures to protect elevator work from damage or deterioration.

3.5 DEMONSTRATION

- A. Instruct Owner's personnel in proper use, operations, and daily maintenance of elevators. Review emergency provisions, including emergency access and procedures to be followed at time of failure in operation and other building emergencies. Train Owner's personnel in normal procedures to be followed in checking for sources of operational failures or malfunctions. Confer with Owner on requirements for a complete elevator maintenance program. Provide video tape of training/operating procedures.
- B. Make a final check of each elevator operation with Owner's personnel present and just prior to date of project Substantial Completion. Determine that controls systems and operating devices are functioning properly.

END OF SECTION 14 24 00